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9. ABSTRACT

Research in nutrition education is continually needed, for each new generation must be taught to use existing food supplies intelligently and the science of nutrition is evolving. This project paper reviews and critically analyzes reports concerned with nutrition education research which may or may not have resulted in improved dietary habits. Studies from 1900-1970 are included. A summary of findings resulting from the literature review is presented along with the investigator's conclusions and recommendations related to problems of effective nutrition education.

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Nutrition Education Research¹

FLOY EUGENIA WHITEHEAD

Department of Home Economics, University of Iowa, Iowa City, Iowa

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I. Introduction

The need for research in nutrition education is established by at least two facts: (1) each new generation must be taught to use an existing food supply intelligently, and (2) the body of facts which makes up the science of nutrition is an evolving one. Furthermore, the extent of hunger and malnutrition in both affluent and developing countries of the world indicates that nutrition education methodology to date has had little effect upon dietary habits and nutritional status. This is not to discount that nutritional status has been improved in selected populations where nutritional services have been provided directly through some modifications of dietary intakes via food supplements, improved productions and distribution of the food supply.

According to DAVEY and MCNAUGHTON [1969], results of nutrition education in developing countries have been disappointing. These authors indicated that nutrition education programs, aimed at producing changes in food consumption, develop in 3 necessary stages: (1) an understanding by the population of the change to be induced; (2) an acceptance by the population

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that such change is desirable and beneficial to them, and (3) putting the change into effect. No research data are included in this paper to support or to reject their remarks. Such does not negate the value of their experience and observations in the field of nutrition education. However, until reliable data related to the developmental stages suggested are available, there is little evidence from which to draw conclusions.

Programs of nutrition education have demonstrated in more than 20 countries that food habits have been improved and that the well-being and economic productivity of the population were increased [FAO, 1962, p. 52]. A critical review of these and perhaps other programs is indicated in order to discover indices to methodology and evaluation which may become the conceptual framework upon which the research design can be developed.

MCKENZIE and MUMFORD [1965] published a review of studies concerned with evaluation of nutrition education programs. They reported finding some 40 papers from the relatively extensive literature on nutrition education which dealt with evaluation. No paper was included in their review unless it met the following criteria:

'1) It is specifically concerned with nutrition education. On this basis we have excluded behavior studies in the general field of psychology unless they are specifically related to nutrition. We have also excluded work which was aimed at improving nutritional status merely by the addition of supplements to the diet.

2) It attempts to evaluate the success of a specific education campaign which has been conducted over a period of time.

3) It relates to a field situation and goes beyond a theoretical discussion on the principles and value of education, or a study of a small experimental situation' [MCKENZIE and MUMFORD, 1965].

MCKENZIE and MUMFORD [1965] recognized that:

'Since the value of any nutrition education programme lies in the extent to which it produces the desired changes, it is unfortunate that so little work has been done to test whether a programme has achieved this objective.'

The authors recognized also that the problem of evaluating nutrition education programs is difficult and different from that required for the development of a nutrition education campaign. They suggested that different personnel may be required, considerable time is needed, and that there is no accepted well-tried methodology upon which to base the programs. Their review divided studies according to success assessed by: (1) *subjective results* of worker's impressions, and (2) *objective results* as judged by some specific criterion.

Objective studies indicating changes in food habits caused by nutrition education, were those of: (1) BOVEE and DOWNES [1941]; (2) LEWIN [1943]; (3) DOWNES [1943]; (4) DOWNES and BARANOVSKY [1945]; (5) GRANT [1950]; (6) TISDALL [1951]; (7) WHITEHEAD [1952 a, b]; (8) KONHEIM and NAIMAN [1954]; (9) WHITEHEAD [1960]; (10) SUTTON [1956]; (11) KUNKEL and HALL [1958]; (12) ECOMA [1962], (13) PINDER [1962], and (14) SWOPE [1962].

After discussing the studies in which evaluation of nutrition education was included and indicating that 17 had been assessed objectively, the reviewers reported that assessments were made after a very short time; 8 were tested immediately after the completion of the education program, 2 or more within the following 5 weeks, and 7 in which assessments were made after a reasonable interval. (The reports did not specify what was meant by 'a very short time' or 'a reasonable interval'.)

MCKENZIE and MUMFORD [1965] recognized the need to analyze the circumstances in which nutrition education successfully leads to the modification of behavior. Their first step was to assess the extent to which the effect of programs of nutrition had been evaluated. This, they undertook with the hope of finding: (1) possible shortcomings in the program; (2) help to devise better programs, and (3) help to develop better methods of evaluation (MCKENZIE and MUMFORD, 1965). They concluded from their review that:

1. The success or failure of an educational program depends on the methods used, the personalities involved, and the circumstances prevailing in the area at the time of the program.

2. They were not in a position to isolate these factors partly because few evaluation studies have been made in nutrition education and partly because 'purely technical devices' for use in evaluation have not been fully developed.

3. There is a need for social scientists and nutritionists to work in close cooperation to establish a satisfactory and simple methodology and to encourage the use of evaluation as an integral part of any program they design [MCKENZIE and MUMFORD, 1965].

A. Comments Regarding MCKENZIE and MUMFORD's Article

MCKENZIE and MUMFORD [1965] stated that their review was limited to papers concerned with nutrition education programs (excluding those aimed at improving nutritional status merely by diet supplements) which tried to evaluate their success over a period of time and related to a field situation (beyond a theoretical discussion on principles and value of evaluation, or a

study of a small experimental situation). However, they found 'some forty papers' which met their criteria and reported on only 17 which were published within their 'Objective Assessment' division.

Unfortunately, the MCKENZIE and MUMFORD review [1965] is limited, not only in terms of the number of publications located but also in terms of the incomplete documentations, and the interpretation and evaluation of some of their selected research reports. For example, reference is made to LEWIN [1943] as the classic example of an experiment at attempted food change, and that 'it is not stated how soon after the lecture and discussion evaluation took place'. According to LEWIN's report of his work several methods of changing food habits were compared experimentally.

LEWIN [1943], and others, explored: (1) group discussion; (2) group decision, and (3) lecture methods on change of food habits. In one of their experiments they were interested in trying a method which they had named 'group decision' not 'group discussion'. This method has one aspect in common with group discussion; namely, that a free interchange of ideas takes place and that in many respects the initiative lies with the group. No attempt is made to force a decision or to use high-pressure salesmanship. Unlike a mere group discussion, *group decision* leads to a setting up of definite goals for action. Such *decisions* may be set, within a 45-min period, by the group as a whole for the group as a whole or by each individual in the group setting definite goals for himself.

LEWIN [1943] reported that this experiment, which MCKENZIE and MUMFORD included in their review [1965], was an attempt to evaluate the effectiveness of a *group decision* procedure, in which a nutritionist cooperated with a group discussion leader. The change in food habits instigated by the nutritionist in the *group decision* method was compared with the effect of the same nutritionist in the *lecture* method. This experiment was designed to influence the use of kidneys, brains and hearts. These foods were chosen because of the known resistance to them and that such resistance frequently combined physical aversion, social status and superstition.

'a) The *lecture* method, linking the problem of nutrition with the war effort, emphasized the vitamin and mineral value of the meats as well as their health and economic aspects. Preparation of these meats was discussed by the nutritionist. Mimeographed recipes were distributed and hints for preparing these 'delicious dishes' aroused interest in the group.

b) The *group decision* method, based upon cooperation of the group leader and the nutritionists, avoided attempts to high-pressure the group into any kind of 'promise' to serve these foods. The group's decision leader introduced problems of nutrition with the

war effort, and with general health, and the difficulties the government had met in trying to change food habits. The discussion developed to the point of the group seeing the problem and taking over responsibility to do something about it, as well as reasons why these meats were rejected. Then the nutritionists entered the discussion offering methods for overcoming the difficulties. The same information imparted in the lecture method, but reduced to 7-10 min (about 30 min was used in the lecture method for this purpose) was introduced into the discussion by the nutritionists. The group voted on the question of trying one of the meats the following week.'

The effect of each method was tested after 7 days to determine the extent to which the foods were served and what reaction the family had to these meats. Evidently this statement was disregarded by MCKENZIE and MUMFORD [1965] in reviewing LEWIN's work [1943] as the time period for evaluating results of these methods is clearly indicated more than once in the context of his report. The reason for referring to LEWIN's work as 'the classic example of an experiment at attempted food change' is not clear. This comment is based on the assumption that the word 'classic' is used to describe a work which serves as a standard of excellence.

In addition to experiments in changing food habits, LEWIN [1943] reported on studies determining 'why people eat what they eat'. Two techniques were used: (1) a projective questionnaire was administered to 2,300 school children, and (2) interviews were held with 107 housewives in 3 income groups and 2 'subcultural' groups with approximately 20 individuals in each of these 5 groups.

In summarizing his report to the National Research Council, LEWIN [1943] recognized that:

'Food behavior is determined by the dynamics of the food situation which includes the channels through which food comes to the table, the gatekeeper governing the channels at various points, and the food ideology of the gatekeeper. A system of values is the basis of some of the forces which determine decisions about food and bring about conflicts of varying intensities.

In the experiments on changing of food habits, a group method, group decision, was compared with a lecture method and request. These experiments suggest that it may be possible to bring about in a relatively short time definite changes in food habits, even in food items which would be expected to show great resistance to change' [LEWIN, 1943].

An example of misleading interpretation in the MCKENZIE and MUMFORD [1965] review is noted in their comments related to work reported by BOVEE and DOWNES [1941]. The reviewers failed to mention that this study was one of several conducted during a 3-year period (1935-1938) involving a cooperative community program for the control of tuberculosis and that it was carried on as part of the program of health supervision.

BOVEE and DOWNES [1941] stated that adequate nutrition as a factor in the maintenance of good health was considered important for all members of the tuberculous families under supervision in the Mulberry Area and that general nutrition education had been a part of the health program of the Mulberry Health Center for 20 years or more. That program had included several intensive nutrition education campaigns, as well as sustained nutrition teaching by nurses, and it was believed that the food and health habits of the families had improved. However, BOVEE and DOWNES reported on a special study which was planned to measure the effectiveness of intensive nutrition instruction in the homes of families in the Mulberry Area. From the 539 alphabetically listed, they selected every fourth family as the population to be tested. Before starting the intensive nutrition instruction program, these families were visited by the nutritionist (working under the supervision of LUCY H. GILLET, Director of the Nutrition Bureau of the Community Service Society of New York) who collected data concerning environmental conditions and the food and health habits of each child under 17 years of age. Following this 'preliminary survey' the 135 families were arranged alphabetically and divided into 3 groups of 45 each. Intensive nutrition instruction was given to 1 group by the nutritionist. One group was assigned to the nurses for such instruction and 1 group, which served as the control, received no special nutrition instruction. The nutritionist and the nurses [not a health nurse as mentioned in the MCKENZIE and MUMFORD review, 1965] did not know in advance which families would be assigned to them. Intensive nutrition instruction was carried on in the 90 families by the nutritionist and the nurses for 9 months. After this 9-month period, the nutritionist visited the 135 families again and used the same schedule of questions she had used in the initial visit to these families. The data were collected from the mother (or the person responsible for the management of the house). Data concerning the children's food habits were rated by categories carefully defined according to standards of nutritional adequacy.

The intensive nutrition instruction of the mothers focused on the main problems revealed by the initial survey. Tentative plans for correcting these problems were outlined. Such plans were used by the nutritionist and the nurses in their instructional program for each family. No 2 families presented the same problems. Therefore, the method used in this study may be described as individual instruction based on specific problems revealed by an initial survey.

Data presented by BOVEE and DOWNES [1941] showed that the improvement in eating habits of families given special instruction was statistically

significant. However, they recognized the necessity of accepting the information given by the mothers to the nutritionist as being reliable and that no objective observations of children's actual food habits were possible. The authors stated that some of the reported improvement in food habits was likely to represent an increase in the mother's ability to give the right answers on the second survey and suggested that where knowledge of proper dietary practices has been acquired, it will have some influence on action. Unfortunately, very little evidence was reported to support their suggestion. (In fact, there is some evidence in the literature which suggests that the acquisition of knowledge about nutrition *per se* does not assure improvement in food choices.)

MCKENZIE and MUMFORD [1965] included a study in their review of nutrition education programs which was reported by DOWNES in 1943. They stated that dietary records of 166 Negro families were studied before and immediately after at least 6 months of teaching, and that the (dietary) pattern was compared to the NRC recommended allowances for calories and nutrients.

The period of time reported by DOWNES [1943] in which these families were supervised by public health nurses during home visits was 10–12 months. The amount of 'dietary instruction' given the families by the nurses varied according to 4 categories: (1) frequent – instruction given on at least half of the visits made; (2) some – instruction given less than half of the visits made; (3) instruction given to or for the patient only, and (4) no instruction as to food habits or proper diet.

Data indicate that frequent instruction resulted in a 33.3-percent increase in dietary patterns rated excellent or good. Some instruction yielded a 6.8-percent increase in dietary patterns rated excellent or good. Instruction to or for the patient only increased this rating in dietary pattern by 5.6%. No instruction during this period of supervision resulted in a 13.6-percent increase in the 'excellent or good' dietary pattern. DOWNES [1943] concluded from these data that improvement in food habits of the family can be brought about by instruction from the public health nurse, especially if the instruction is frequent and directed toward proper diet for the family.

Exactly how DOWNES [and MCKENZIE and MUMFORD, 1965] concluded from data presented that the percentage of families with dietary patterns failing to meet NRC standards was reduced from 71 to 51 after at least 8 months of supervision is not clear. Data presented in table 4 [DOWNES, 1943, p.172] do not support that conclusion. [MCKENZIE and MUMFORD, 1965, reported the teaching period as 6 months.]

Comments on the MCKENZIE and MUMFORD review are not intended as presumptuous criticisms. They are made as a plea to researchers in nutrition education to use *primary* rather than *secondary* sources in whatever literature search they make before conducting original research designed to investigate the effectiveness of nutrition education.

Nutrition education researchers must become aware of the fact that titles of reports and reviews are not always consistent with their content. For example: MCKENZIE and MUMFORD [1965] included in their listing of studies under section B, *Objective assessments*, a review by SWOPE [1962] entitled *A Review of Nutrition Education Research*. SWOPE included 44 studies in her bibliography and indicated that she used 43 in her review. Approximately one-half of her references may be classified as nutrition education research. Otherwise her review refers to reports of dietary assessments, books and articles concerned with effects of dietary supplements upon nutritional status, factors other than nutrition education which influence food habits of children and monographs developed specifically for teachers' use in evaluating learning opportunities in nutrition education, as well as a listing of characteristics considered to be key features in positive programs of nutrition education in elementary schools.

In light of the above comments, the need for a critical review of nutrition education research is evident. The review presented in section II of this report is the most extensive one made to date. However, no claim is made that it is an exhaustive review of the research conducted during the past 70 years. It is limited to original reports of nutrition education research which include evidence showing whether or not such investigations resulted in improved dietary habits of the individuals and/or groups included in the research design.

II. Review of Literature

A. Introduction

This review is concerned with nutrition education research which may or may not have resulted in improved dietary habits. Studies which have been published between 1900 and 1970 are included in this report because the author assumes: (1) that certain pertinent reports have not been extensively reviewed, and (2) that a comprehensive literature search is an essential first step toward the development of a method for use in evaluating the effectiveness of nutrition education.

The hypothesis to be tested in this review of the literature in the field of nutrition education is stated as follows:

Nutrition education research has been directed toward the purpose of disseminating nutrition information rather than toward the purpose of improving dietary habits.

In order to explore nutrition education efforts made to apply nutrition knowledge to dietary habits prior to 1950, reference is made to the unpublished doctoral dissertation by WHITEHEAD [1951, pp.14–55], especially chapter II which reports a selected review of literature published between 1900 and 1950. Studies relative to nutrition curriculum and methods of teaching nutrition effectively are included in that chapter. A summary of nutrition education programs conducted under the auspices of public schools and directed toward the school-age child was published by WHITEHEAD [1957].

B. Review of Nutrition Education Research (1900–1940)

The origin and development of 'the nutrition class' method is credited to Dr. W. R. P. EMERSON of Boston in 1908 [EMERSON, 1910]. Dr. EMERSON worked with 'under-par' children who repeatedly went without help from one department to another in the Boston Dispensary. He decided that what these children needed most was to be taught what to eat, that they needed constant supervision and encouragement in developing new habits of eating, rest, exercise and sleep. He had 15 poorly nourished children, aged 11 years, report to him for 1 h on Saturday mornings for instruction and assistance until they improved their dietary habits and gained normal weight. Then they were 'graduated' from the class. Therefore, evidence that nutrition education had a favorable impact upon dietary habits was reported in the United States of America as early as 1910.

ROBERTS describes the fundamental tenets of EMERSON's nutrition class method as follows:

'Children 7 percent or more underweight for height (at first the 10 percent limit was used) were enrolled in his classes with the definite purpose of bringing each child up to his "normal" weight. Weight charts were prepared showing the child's actual weight and his "expected" weight for his height; the children were weighed weekly thereafter and their progress charted. Careful medical examinations were made and physical defects corrected, and no child was admitted to the class until this was accomplished and he was "free to gain". The class period was devoted to a discussion of the charts; the chief attention was given to those who had failed to gain in an endeavor to discover the cause. Mid-morning

and mid-afternoon lunches and at least one rest period during the day were prescribed. The spirit of the class competition was aroused in the children and various devices were used to stimulate them to carry out directions as to diet, rest periods, and other factors. The mothers also attended the class and were given advice as to future procedure. Follow-up work in the home was done by a social worker. When a child reached his coveted goal of average weight or above, he was "graduated" from the class and given a certificate testifying to this fact. The usual result was that both children and parents became tremendously interested in the children's progress, and surprising success in bringing them up to normal weight was attained' [ROBERTS, 1927, p. 320].

The important feature of EMERSON's nutrition class, in respect to methodology, is that the nutrition class was actually an early application of group therapy based upon needs and interest of the group.

Attempts to transplant the nutrition class from clinics into public schools were first made by the Bureau of Educational Experiments in 1918 when Dr. EMERSON was brought to New York from Boston to conduct a nutrition class in a public school [EMERSON, 1919]. He visited the class weekly for 1 year and then left the work, which continued for 3 years under school direction. Again the class was for underweight children. During this trial period, much was learned about modifying EMERSON's method to better fit school situations. Special departments with trained teachers and new concepts of educational procedures soon led to the conclusions that: (1) subject matter and methods could be developed by such teachers as those in home economics, biology, general science and school lunch management; (2) methods of parent cooperation other than weekly attendance at the class were needed, and (3) nutrition should be fitted into the whole health program of the school and made available to every child. It appears that many other schools, after a trial period with nutrition classes for underweight children, soon came to the same conclusions.

The spectacular weight gains of children in nutrition classes were widely publicized and Dr. EMERSON was called upon to start similar work in Rochester, New York, and a number of other cities. His personal ability and conviction of the efficacy of the method gave it a long-lasting stimulus. After about 4 years, the permanency of EMERSON's efforts was studied by KAISER *et al.* [1926]. They found that the nutrition class caused accelerated gains in weight for 80% of the children enrolled and similar gains were made by 35% of equally under-par children not in the class. It was concluded that the nutrition class held benefits not only for class members but also for their families and for other children in school. Again the value of an all-school program was apparent.

It was MAUDE A. BROWN working in Fargo, North Dakota, who made

studies indicating that instruction designed to improve food habits is most effective when given during the child's early years [BROWN, 1929]. Stress was placed upon the need for working with children at the elementary school level so that health habits may become automatic before the child reaches adolescence.

EICHELBERGER [1927] conducted studies in 9 schools in Moberly, Missouri, with a total enrollment of 1,773 elementary school children. Data confirmed findings of other workers that malnutrition is not entirely the result of poverty. Also, it was shown that nutrition instruction resulted in a marked reduction of the number of underweight children who were exposed to nutrition instruction for 1 year. A proportionately better reduction in the number of underweights resulted from a 3-year program of instruction. A nutritionist spent 1 h each week teaching the children about nutrition and its relation to health. The lessons were planned in relation to other studies. The teacher could then correlate nutrition and health with other work, thus keeping the idea before the children 5 days a week instead of merely on the day of the nutritionist's visit. Underweight children were not placed in classes by themselves. Home visits were made to enlist parent cooperation. This study supplied evidence endorsing correlated nutrition instruction over a time period of at least 3 years and postulated advances for a continuous program throughout the elementary grades.

MACLEOD [1939] reported that food habits of 5,000 Tennessee high-school students in 95 counties had been studied to determine effects of nutrition training over a number of years. It was concluded that such training appeared to improve food habits, particularly in regard to use of milk, fruit, vegetables and whole grain cereals.

HATCHER [1941] showed quite conclusively that definite improvement in food habits could be obtained when methods of instruction were designed with that as an objective. She showed that teachers who guided pupils to analyze their diets, to decide what they needed to do to improve them, and to check on their progress, were able to obtain rather striking improvements; whereas, when the teaching was of the traditional type in which the teacher decided what should be studied and how it should be done, and made the evaluation, there was no significant improvement in the diets of the pupils at the end of a period of food instruction.

The basic questions related to HATCHER's research, which was conducted during 1939-1940 and published in 1941, were in essence the same as those concerned with LEWIN's work conducted in 1942 and 1943 to determine effects of the *lecture method* with the *group discussion* and the *group decision*

method. Both researchers were seeking to determine the relative effectiveness of 2 methods of instruction. HATCHER's 'control method' was wholly directed by the teacher and in principle it was comparable to LEWIN's 'lecture method'.

HATCHER's 'experimental method' (which involved the teacher and pupils in determining the goals they wished to reach, how best to work toward those goals, and together check their accomplishments) represents to some degree LEWIN's 'group decision method'. Data presented by both HATCHER [1941] and LEWIN [1943] suggest that nutrition education is a factor in improving dietary habits, when the methodology employed is designed with that as a purpose and when the learner is involved in decision making. HATCHER's research sample was selected from senior high-schools and the methods of instruction were tested during a 12-week unit in foods and a 4-week unit in consumer buying. All classes were taught daily. The investigator visited each class twice, interviewed 36 pupils and their mothers, representing a controlled sampling from the 900 pupils participating in the study. Food habits of pupils in the 'experimental group' showed consistent superiority over those of the 'control group'.

In this investigator's evaluation of HATCHER's work [1941], the term 'classic' seems applicable. Regardless of the evaluations placed upon HATCHER's or LEWIN's [1943] work, there remains a serious question directly related to the study of food habits, namely: Why is the application of their methods concerned with nutrition education as a means of modifying food habits rarely found in the research literature?

The fact that HATCHER's work [1941] was not included in the MCKENZIE and MUMFORD review [1965], or in the SWOPE review [1962] to which they referred, is an unfortunate omission because it undoubtedly is one of the most carefully controlled studies conducted in nutrition education and its contributions should be recognized.

C. Review of Nutrition Education Research (1940-1950)

Research reported as unpublished theses, in professional journals, and in reports of special committees concerned with nutrition education between 1940 and 1950 reflects a changing emphasis from disseminating information alone to that of influencing human behavior. AMUNDSON [1941] made a study of nutrition knowledge and needs of adult student homemakers in Madison, Wisconsin, and concluded that knowledge of nutrition had little effect on the selection of food for the family group. The National Research Council's

Committee on Food Habits published 2 reports relative to the science of changing food habits [LEWIN, 1943; National Academy of Sciences, 1945]. The committee's approach to the problem was based on a recognition that food habits can never be studied in isolation for they are but a part of the culture of a people.

MEAD [1943] postulated that educational approaches to the problem of changing food habits must consider at least 4 forms of change: (1) morally dictated changes; (2) socially desirable changes; (3) scientifically sanctioned changes, and (4) forced changes. She classified the latter as: (a) changes dictated by physical circumstances; (b) changes dictated by a lowering of the economic status of the individual, the group or the nation, and (c) changes dictated by alteration in the bodily state of the individual.

Several research reports which emphasized the influence of nutrition education upon human behavior are those of MCLEOD [1943], BELL [1943], O'CONNELL [1943], and THOMAS [1943]. MCLEOD worked with children in grades 1 through 3 in the Florida State College for Women Demonstration School. Indications from this study were: (1) children accepted food readily when experience with it was pleasant; (2) improvements in food habits were more marked when parents cooperated by serving disliked foods properly prepared at frequent intervals during the instruction period, and (3) improvement in eating habits continued a long time after the study was completed. BELL found considerable gain in both nutrition information and improved dietary practices among home economics students in Tennessee after instruction based on nutritional needs of the students. O'CONNELL reported improvements in food selection habits of 10th and 11th grade students in North Carolina following an intensive course in nutrition employing a test, teach and retest procedure. Foods most frequently selected were those discussed, then prepared and eaten by students in a laboratory period. THOMAS reported dietary improvement in senior high-school home economics students in Ohio when self-teaching and self-evaluation devices were used in laboratory periods.

BENSON's work with rural schools in Dakota County, Minnesota, indicated that children improve their food practices when they: (1) *discover* what changes *they* need to make; (2) are *strongly motivated to learn* about foods and to apply what they learn to their own diets, and (3) *have access* to the right kinds and amounts of food [BENSON, 1944]. SPERRY [1944] developed an 'experimental nutrition program' for 3rd grades in city and consolidated schools in Washington State which demonstrated what several others have; namely, nutrition can be integrated with other subjects and does not necessarily need to be taught as a separate subject. SPERRY observed that real life

situations and group activities which give children some responsibility in planning their work afforded effective teaching of nutrition. Other observations reported by SPERRY were: few grade school teachers have training in nutrition and therefore see few possibilities for teaching it, and that there was need for nutrition materials for the 3rd grade level as well as supervision to help build an appropriate program of nutrition which would prevent repetition. Another report of the use of real-life situations and actually preparing food in primary grades was made by ELLIOT [1944] who worked with 3rd and 4th grades in North Carolina, where parents reported improvements in children's food habits.

By this time nutrition education activities were being so generally included in elementary school programs that such leaders in the field as ROBERTS, who had strongly advocated that nutrition education be centered in the public schools, concluded that schools were becoming increasingly aware of their responsibility in using nutrition education as an effective means of improving the nutritional status of Americans [ROBERTS, 1944].

Two reports of nutrition education concerning adults contributed important results. ELLIS [1944] found that nutrition instruction given in wartime Red Cross nutrition classes resulted in measurable improvement of the food habits of adult woman wage-earners in New York City, and concluded that it is necessary to create first a desire in the individual to change his food habits and then give him the correct information to guide his practices. The group of women attending ELLIS' classes represents a section of the general population which, according to KILANDER [1944], rated poor to fair on information about nutrition. He reported results of nutrition information tests given to 5,000 individuals, representing 35 groups, indicating that those best informed about nutrition were nutritionists, dietitians and home economists; doctors and some homemakers were next best; educators and college students were fair to good; and clerks, stenographers, unskilled laborers and high-school students were poor to fair. ELLIS' investigation to find relations of knowledge to food habits points to the fact that while knowledge alone will not bring about changed food habits, it is necessary for individuals to be informed about certain nutrition facts before they can be expected to change their food habits. This implies that food habit improvements are not due to chance and that education may be a determinant in effecting such a change. ELLIS' study further supports what others have shown in respect to income and diet; that is, when income is sufficient, education in nutrition determines adequacy of diet, and when income is insufficient, it is possible to improve diets through education even in lower income groups.

Nutritionists and others concerned with the study of food habits reported that food habits are not static, even in an individual's life-span his food habits change with income, seasons, state of health, location, emotional states, religious beliefs and food availability, and that the quality of his education may be a determining factor in the adjustments he makes to these variants. Studies made by MALTBY [1945] and LOCKWOOD [1948] suggest the importance of administrative recognition of the contributions of nutrition to general education for both boys and girls in public schools. Moreover, a majority of 'experts' polled by MALTBY believed that nutrition should be made a separate subject in the school curriculum and that it should be required for both girls and boys. These studies indicate the need for school administrators to accept the responsibility allocated to them by their sponsors – the people they serve. Unless and until administrators at local, state and federal levels develop policies which will assure appropriate places for nutrition education within school programs, there is little reason to expect teachers to prepare themselves to teach the subject. This does not imply that there is need for special nutrition teachers in the elementary and secondary schools, but rather that they as well as medical, dental and nursing students need opportunities to study nutrition during their pre-service training experiences.

CHANEY [1945] emphasized the need for instruction in nutrition and gave reasons based upon the importance of good nutrition for well adjusted individuals. She maintained that good health, ability to work, to play, to recover from fatigue and illness, and to resist infection are factors which make for adjustment and satisfaction in life, and that all these factors are related to nutritional status. Indeed, concepts supporting the need for nutritional guidance have grown far beyond that single criterion of weight anomaly, used by EMERSON [1919] and others during the first and second decades of the century, as an index to nutritional status.

In the mid-1940s, the emphasis in nutrition education curricula seemed to follow 2 schools of thought. There were those who advocated an integrated program of nutrition education and those who adhered to the graded plan of nutrition education. Each has its advantages and disadvantages and perhaps only more careful study under controlled situations over a period of years, will indicate specific strengths and weaknesses of each. BOSLEY's work in North Carolina advocated the discovery of needs as a basis for nutrition teaching, supported the graded plan of nutrition education and emphasized the importance of teaching only one nutrition idea at a time and giving children actual experience in eating foods at school [BOSLEY, 1947].

HOCKING [1945] worked with 31 children in a 3rd grade at Tuscaloosa, Alabama, in developing a program of nutritional guidance based upon certain nutritional needs; namely, physical measurements, diet survey, observations in the lunch room and dental conditions. Implications from this study supported observations made by others: (1) the need for teachers to be trained in nutrition so as to recognize needs of children; (2) children learn readily when guided through real-life experiences related to their needs; (3) the school lunch provides an important teaching situation, and (4) improvement in food habits may be expected when parents, children and teachers cooperate to that end.

There is considerable agreement in the literature that nutrition education in the elementary school is important and that it should be related to existing curricula as well as to school health programs. However, there is considerable disagreement as to what subject matter should be included at various grade levels. The work of NEEL [1946] was designed to discover if elementary school children, aged 7-11, could assimilate certain technical nutrition subject matter. From this work it was concluded that elementary grade children could acquire rather advanced information about nutrition and that they evidenced some ability to apply facts learned to their own eating habits if the facts were presented in terms of simple experiments and if they were adequately illustrated.

Teaching nutrition on the basis of discovered needs has become an increasingly popular concept. EPPRIGHT [1947] discussed several factors related to the complex reaction of food acceptance, emphasizing change as a slow process, and postulated that educational procedures will gain in effectiveness as they become geared to specific needs of individuals and communities, and as they conform to democratic techniques.

Other accounts in the literature indicate that it is important to discover needs and most workers have attempted to build nutrition education programs upon needs determined by a survey of food habits. There are many ways to assay nutrition needs but the most practical one and, therefore, the most popular, is that of appraising dietary intakes. Various methods of determining dietary intakes have been used by many workers who have selected or developed methods deemed most suitable for purposes of their respective studies.

Four studies reported in 1947 contributed specifically to nutrition education. They were conducted by BARRICK, MOORE, CLINE, and TINSLEY. BARRICK [1947] studied 3 types of audio-visual material for teaching nutrition to college women in Iowa and concluded that: (1) motion pictures, as com-

pared with slides and animal-feeding experiments, were most effective in motivating large groups to improve food habits; (2) experimental animals were most effective when class size was disregarded, and (3) the effectiveness of an 'aid' depends upon the objective, length of time it is used and class size. MOORE [1947] reported that a 6-week series of food preparation activities with primary grade children had a favorable influence upon attitudes about food outside as well as inside school. The same outcome was realized with 5th grade children who had prepared food at schools for 8 weeks and had fed and kept growth records on a litter of baby hamsters. Similar activities guided by CLINE [1947] in developing nutrition units for elementary children showed an increase in children's food interest as well as those of their parents. TINSLEY [1947] worked with elementary grades also and developed evaluation instruments for measuring certain nutrition information gains and dietary improvement. She found that the relationship between information gain and dietary gain showed no significant positive correlation. However, it was not interpreted to mean that the less information a pupil has the better his eating habits will be. TINSLEY questioned whether she collected adequate data for the accurate determination of relationship between information and application.

Inference has been made frequently that improvement in dietary habits requires more than nutrition knowledge. Several studies have supported the thesis that attitudes, interests, recognized needs and teaching methods must be especially considered if educational procedures are used to improve eating habits.

A research project in nutrition education was initiated in Ascension Parish, Louisiana, in October 1944. The project was tentatively planned for a 2-year period. However, an additional 2 years was made possible as reported by WHITEHEAD [1947] who conducted the research. Actually, this 4-year program was a pilot study based upon work reported prior to 1944. A summary of such work is included in this review because it has not been published to date and because it may be of some assistance to those currently concerned with nutrition education methodology and evaluation.

D. Summary of Nutrition Education Research (1900-1944)

Nutritionists and educators have included nutrition education activities in school programs with increasing emphasis since the early 1900s; usually they were related to other subjects and offered to both boys and girls in the

elementary school first, and later in the high-schools where many girls and only a few boys took courses including nutrition. Nutrition education programs in elementary and secondary schools, in adult classes and public health clinics, as well as in certain universities and professional schools, have developed in scope and intensity as knowledge of nutrition has increased. Some of the following statements are expressions of beliefs about nutrition education, some are statements of fact. However, both may serve as directives for developing programs of nutrition education in schools and communities.

1. Nutrition education should be preventive as well as corrective.
2. Nutrition education should develop attitudes which favor desirable practices.
3. School administrators need to accept the responsibility of assuring an appropriate place for nutrition education within curricula.
4. Nutrition can be correlated with other subjects in the elementary school without the addition of another course to the usual curriculum.
5. Nutrition should be taught to all boys and girls in accord with their needs and interests throughout their school life, at whatever time intervals and grade levels are appropriate.
6. Nutrition should be a primary emphasis in the entire school health program.
7. Nutrition information and guidance should be made available to all children rather than just to those who may be segregated on the basis of weight anomaly.
8. Nutrition may be taught as a separate course, having lessons and units of instruction which emphasize one or more food groups at a time, or it may be taught entirely through correlation with other subjects, especially in the elementary grades.
9. It is generally agreed that nutrition education should be included in elementary school programs but there is disagreement as to what subject matter should be included in each grade level.
10. Nutritional guidance and methods of teaching nutrition should be developed with teachers in home economics, health and physical education, biology, general science, other interested qualified teachers and qualified school dietitians.
11. The classroom teacher – not the nurse, the physician, the physical educator or any person who visits the school occasionally – should be responsible for teaching nutrition in the classroom.
12. When nutritionists and classroom teachers plan and teach together,

a correlated program of nutrition education over a period of several years will likely yield favorable results.

13. Nutrition education in both pre-service and in-service training of teachers is necessary to an effective school health program.

14. Nutrition principles may be most profitably developed with children after they reach the 4th or 5th grade.

15. Nutrition information does not of itself assure the practice of good food habits.

16. Access to food as well as knowledge about food does not improve food habits unless motivation to do so is provided.

17. Food habits may be improved by group decision and by teacher-pupil planning, participation and evaluation of their learning experiences.

18. Education which creates a desire to change food habits and then provides information needed to direct that change may be expected to yield improved food habits.

19. Nutrition instruction which aims to develop good food habits is most effective when given during a child's early years.

20. Elementary grade children gain increased interest and favorable attitudes about food when they prepare and eat food in class. Upper elementary grade children have similar associations with food preparation and gain understanding of the relationship of food to health when they participate in animal-feeding experiments.

21. Children improve their food practices when they discover what changes are needed, are motivated to learn how to apply information about food to their own diets and have access to the food needed.

22. Group decision method of teaching nutrition is more effective for changing food habits than is the lecture method.

23. Surveys of food habits reveal certain strengths and weaknesses of dietary intakes which may be used as bases for nutrition education programs.

24. When income is sufficient, education may determine adequacy of diet and when income is insufficient, it is possible to improve diet through education.

25. The purposes of the school lunch program must be geared to the nutrition education program for best results; otherwise, the school lunch program may not strengthen nutrition education.

26. The effectiveness of teaching aids used in nutrition education depends upon purpose, time period involved, size of group taught and the age level of the group.

27. The problem of changing food habits is complex, and it is believed

necessary to set up programs to control social processes in such ways that desired changes will occur instead of a program aimed at reform of identified individuals.

28. Educational efforts to improve food habits must not be confined to the classroom.

29. The nutrition education program which has the following characteristics may be expected to yield significant improvements in food habits for a period of several years.

(a) It is planned, developed and evaluated by nutritionists, teachers, pupils, parents and other community leaders.

(b) It does not begin after a survey of food habits is made but rather with the planning for that survey.

(c) It is based on children's needs as determined by an appraisal of food habits.

(d) It is guided by leadership from school personnel and a qualified nutritionist.

(e) It is not limited to individual children or to a few courses of study.

(f) It is a part of the regular school program centered upon needs, interests and age level of groups of children.

(g) It is a program in which classroom teachers are responsible for instruction and guidance of their own pupils, both in classrooms and in lunchrooms.

(h) It is a program in which classroom teachers and nutritionists together determine nutrition education problems and guide groups in the solution of those problems.

(i) It is a program which contributes to the in service training of teachers in the science of nutrition.

30. Concepts of nutrition teaching have changed considerably over the past 50 years and, although studies have been made to develop methods, materials and other program characteristics, there is yet a need for continued investigation under more carefully controlled situations so that effective nutrition education may be developed.

E. Summary of Nutrition Education Research (1944–1950)

The pilot study conducted for 4 years (1944–1948) in Ascension Parish, Louisiana, was the first longitudinal work undertaken in the United States which involved schools, parents and community leaders as well as professional

workers in areas related to nutrition and health [WHITEHEAD, 1947]. The purpose of the research was to determine effective ways of teaching nutrition. It was based on the premise that the effectiveness of teaching nutrition would be manifested not only in measurable changes in nutritional status but also in measurable changes of behavior concerning dietary habits.

In attempting to create situations in which methods of teaching nutrition could be explored and evaluated, certain information was deemed necessary. With relatively little technical assistance, teachers could collect and evaluate information concerning food habits and dental conditions. Food habits data were collected to establish points of emphasis for nutrition teaching in the classroom, the school lunch program, the home and the community. Information about dental conditions was collected to help arouse interest in child health and to create an awareness of the important relationship of nutrition to dental conditions. These data were collected with those directly concerned with the pilot study and not by the investigator alone.

Seven-day food habit records were made by the teachers and by their pupils. Such records were then evaluated by the teachers and their pupils with supervision from the investigator. Following the evaluation of the food habits records, teachers concerned developed 4 statements or generalizations about their nutrition education needs.

1. Teaching units on green leafy vegetables, whole-grain cereals and butter or margarine should take precedence over other units.
2. Teaching units on citrus fruits and other sources of ascorbic acid should be second in importance.
3. Teaching units on milk, eggs, potatoes, noncitrus fruits, meat and other vegetables (other than green leafy vegetables) should be emphasized in the order listed.
4. All nutrition teaching should emphasize the interrelationship of basic food groups to the extent that each of them should be included in the daily diet in amounts recommended. (These food groups and amounts recommended were based upon NRC allowances for nutrients.)

Food habits were rated 'good', 'fair' or 'poor' on a 14-point scale giving each serving of a basic food group a value of 1. The initial food habits survey showed only 1.6% of the records rated 'good'. After 4 years of nutrition education, this percentage increased to 25.4. This improvement was so obvious that no test of statistical significance was deemed necessary. The nutrition education program, based on assessed needs, involving teachers, pupils and parents was believed to have produced this change in food habits. Details describing the 'representative committee way of teaching nutrition' and the

in-service teacher-education activities, developed during this 4-year pilot study, are described in WHITEHEAD's doctoral dissertation [WHITEHEAD, 1951].

Considerable work has been directed toward determining what classroom methods of guiding nutritional behavior are most successful. RADKE and CASO [1948] directed an investigation in methodology based upon findings of LEWIN and others. They worked with junior high-school students to compare group discussion-decision method to lecture without decision, and found the discussion-decision method superior to the lecture method in changing students' lunch-eating habits.

A report by SHAVER *et al.* [1948] described an extensive cooperative health project in East York Township, Canada, using a variety of procedures and devices for motivating specific dietary changes. The need for such changes was determined by an initial appraisal of health. These workers found that their educational efforts led to an improvement at the end of 1 year, but that by the end of the second year improvement was not sustained and some deterioration was observed. They offered opinions about their results, mentioning difficulties of evaluating educational programs, and concluded that their study points the way to at least 2 further investigations: (1) ways to assess the efficacy of classroom teaching, and (2) more effective methods in health education with respect to nutrition.

F. Review of Nutrition Education Research (1950-1960)

Reports of ARCHIBALD [1950] and CAMERON [1950] imply that educational efforts to improve diets must not be confined to classrooms for best results. ARCHIBALD advocated *group decision* and maintained that for best results, nutrition programs must be thought of as a community, home and school program and that it must be cooperatively planned, conducted and evaluated by individuals concerned. CAMERON reported that in Richmond, Virginia, where all agencies sponsored an education program during war years, only 4% of the housewives gained adequate information for the job of feeding their families, and that 50% of them indicated little or no information in spite of the fact that intensive use of the press, radio and group teaching was made to disseminate information on nutrition. Again, the mere dissemination of nutrition information had little effect upon dietary practice. One wonders what the results would have been had the program in Richmond been geared to specific needs and approached through group decision methods.

Reports by LEWIN [1943], RADKE and CASO [1948], and others, support

the *group decision* method of improving diets advocated by ARCHIBALD [1950]. And, reports of HATCHER [1941], BENSON [1944], EPPRIGHT [1951] and others agree with ARCHIBALD that educational efforts to improve diets must not be confined to the classroom. However, as far as this investigator knows, no one had demonstrated the effects of these 2 concepts within a community, home, and school program long enough to effect desired outcomes. ARCHIBALD postulated that for best results nutrition education programs must be co-operatively planned, conducted and evaluated by individuals concerned. At the time of her report, the pilot study in Ascension Parish, Louisiana, was well into a period when those characteristics were producing lasting or carry-over results.

The major developments within the 4-year pilot study, (1944–1948) and results of an evaluation study made in 1950–1951 were reported by WHITEHEAD [1952a]. The nutrition education program developed in Ascension Parish, Louisiana, was based upon the premise that the mere acquisition of certain nutritional information would not be considered as an ultimate criterion of its effectiveness. The hypothesis tested by this study indicated that if the nutrition program were effective, it would do more than impart knowledge of nutrition. It would motivate children and others to develop food habits which would contribute to improved nutritional environments. This pilot study was based on the following assumptions:

1. Food habits of school children could be improved through a program of nutrition education.
2. An effective nutrition education program would be based on the needs of the children as evidenced by an appraisal of their food habits.
3. An effective nutrition education program would continue to function after the nutritionist (investigator) left the program.
4. If the program were to be effective after the nutritionist (investigator) left the program, it would require leadership from school personnel.
5. If the program were to be effective, it would require planning, participation and evaluation by teachers, pupils, parents and other community leaders, including the nutritionist.

Included in the report are criteria for evaluation and evidence in support of those criteria. Food habits data are presented comparing changes in Ascension Parish with those in St. Martin Parish which served as a control for this study. Characteristics of the nutrition education program in Ascension are described as being hypotheses which need to be tested under more carefully controlled situations rather than as conclusive statements of fact.

MEAD [1943] reported that usually changes in food habits are due to several factors described as physical and socio-economic which embrace moral dictates, social standards, income levels, dietary opportunity as influenced by crop failure or food distribution channels and scientifically sanctioned processes.

WHITEHEAD [1952a] stated that the dominant factor influencing the change in food habits in Ascension Parish, Louisiana, from 1944 to 1951 was the nutrition education program. That factor may be described as an interdisciplinary process through which desirable changes occur. Another interpretation of the dominant factor causing change in food habits in Ascension Parish is that it was an intentionally developed program of nutrition education based upon the appraised needs of the individuals participating in the program. Three practical results of this pilot study were: (1) the development of an evaluation device for teachers to use in discovering what they should emphasize in their nutrition teaching; (2) the organization of teacher committees for purposes of planning, conducting and evaluating nutrition education activities in terms of school-community problems of nutrition and health, and (3) the development of a point system for evaluating food habits.

Both of WHITEHEAD's reports discussed above presented results of nutrition education in terms of the overall dietary practices (food habits) of the total school population in grades 2 through 11. There were 1,529 children's food habit records in 1944, 1,851 in 1948, and 2,158 in 1950 participating in the 6-year Ascension Parish, Louisiana, study.

Food habits data collected in Ascension Parish, Louisiana, were considered critically with respect to definite grade levels in a report by WHITEHEAD in 1952. The percentage of poor food habits in grades 2 through 11 varied considerably. There were more children with poor food habits in the high-school grades than in the elementary grades. The data showed a positive relationship between advancement in the elementary grades and the reduction of poor food habits. Children in the high-school grades had food habits which were little if any better than those of children in the primary grades. After 1 year of nutrition education there was a significant reduction in poor food habits throughout all grades. The probability that children learned which foods were highly protective and that the data reflected increased knowledge rather than improved practice was recognized. Data were cross-checked with school lunch records and found to be consistent, therefore indicating that the improvement was due to real changes in food habits. That indication was further supported by physicians' examinations and by certain laboratory tests of blood plasma taken from a representative group of high-

school girls. Food habits were recorded annually during the 4 years of nutrition education and showed continued reduction of poor food habits with the high-school students having poorer practices than children in elementary grades. However, this difference between poor food habits of high-school students and those of elementary grade students diminished as the nutrition education program developed.

Between 1947 and 1950 no parish-wide appraisals of food habits were conducted but annual parish-wide evaluation meetings with teachers were held under the guidance of local leaders continuing the nutrition education program. Data collected in 1950 showed continuing improvements in food habits after a 6-year program of intentionally developed nutrition education. The reduction of poor food habits continued for all grades. However, the children in elementary grades still had better food habits than those of high-school students. The need for further research was obvious. Specifically, what programs of nutrition education are needed for children in intermediate and high-school grades?

An opportunity to explore answers to that question was made possible when the Kansas City, Missouri Public School, administrators invited the investigator to conduct a research project in nutrition education in cooperation with their school health education director. Thus, a modification of the Ascension Parish, Louisiana, program was explored with a more carefully controlled situation between 1952 and 1955.

The purpose of the research project in the Kansas City, schools was to discover whether nutrition education could help young adolescents make wise food choices. This 3-year study was based on the following assumptions: (1) food choices of boys and girls in Kansas City, would not differ significantly from those of children of other comparable communities in the United States; (2) food choices of boys and girls in Kansas City would be found to be not as good as they could be, and (3) if nutrition education is based on problems revealed by dietary surveys it may be expected to cause improvements in food choices.

Results of the Kansas City, Missouri, research project were reported by WHITEHEAD [1960, p. 348]. A total of 264 children (132 in the research group and 132 in the control group) in grades 6 and 7 participated throughout the study. Dietary data based on 1,306 7-day records were collected. These data were used to reflect nutrition education needs or problems and were not intended to serve as an index of nutritional status. The results of the initial food habits survey showed that the research and the control groups had the same basic dietary pattern [WHITEHEAD, 1960, p. 349]. An intensive nutrition

education program, based upon the needs of the children revealed by the survey, was developed with the research group for 1 year. At the end of that year the research group had dietary scores considerably higher than those of the control group. After 2 years of nutrition education the research group reported intakes of all food groups well above those of the control group. Data presented indicated that the nutrition education program which was specifically designed to improve food choices of adolescents produced positive results [WHITEHEAD, 1960, p.355].

Both the 1 year of nutrition education research and control groups and the 2 years of nutrition education research and control groups were surveyed for food choices 1 year after their nutrition education program was completed to determine what if any 'carry-over' effect existed. The 1 year post nutrition education dietary scores indicated that all totals were in favor of the research groups. Because of the variation in the final dietary scores it was concluded that factors other than the length of time, to which the research groups were exposed to nutrition education, were influential in causing improvement in food choices. Therefore, recommendations were stated as follows:

'All available reports of the nutrition education programs developed during this project should be analyzed to discover the characteristics which contributed to their relative effectiveness. Attention should be given to learning experiences, methods, approaches, and materials used by the teachers – especially those teachers responsible for programs effecting the greatest increases in dietary scores.

Once the dominant characteristics of the most effective nutrition education programs have been formulated, they should be explored and tested with other interested teachers and nutritionists who work with young adolescents.

Further study is recommended to determine: (a) what and how much preparation teachers need in the area of nutrition and nutrition education to feel secure enough to guide children in making wise food choices; and (b) the extent to which such preparation will cause teachers to improve their own dietary intakes, as well as those of their families' [WHITEHEAD, 1960, pp.355-356].

Although only precursory analyses have been made of these data to determine 'dominant characteristics' of the most effective nutrition programs developed by the teachers of the research groups in the Kansas City project, there is reason to believe that the teacher's interest in nutrition, specifically where the food habits of her pupils are concerned, is positively related to the effectiveness of nutrition education methodology and that such methodology is determined by or positively related to the teacher's purpose of nutrition education.

Reports of both the Ascension Parish, Louisiana, project and the Kansas City, Missouri, project, representing a total of 11 years of nutrition education

research, presented evidence supporting nutrition education as the causal factor in improving food habits.

The effectiveness of a 6-month program of nutrition education based on 3-day diet records and evaluation of nutritional status of 5th, 6th, and 7th grade pupils in Hanover County, Virginia, were reported by FLETCHER and SCHUCK [1950]. Prior to the instructional period, meetings were held with the school supervisor, public health nurse and teachers in the experimental schools to discuss nutrition subject matter and its integration with other subjects. Community nutrition education included talks and discussion of findings of the initial dietary survey with the Parent-Teacher Association in the experimental schools but no efforts were made to influence dietary habits of children in the control schools. Data showed a 6-percent increase in 'good' diets of experimental groups and only a 2-percent increase in the control groups. The authors indicated that the very short period of time given to nutrition instruction probably explains the fact that little tangible evidence of its effectiveness was obtained. There is evidence available from other researchers (LEWIN, RADKE, CASO, WHITEHEAD, HATCHER) that the approach and methods of instruction may be factors related to the lack of effectiveness of nutrition education in the Hanover County, Virginia, schools rather than the 'very short period of time' devoted to the program. There is no indication that persons concerned directly with the food habits of the children were involved in the planning of this program, nor was there any suggestion that problem-solving was used as a method of nutrition education.

Many descriptive articles on nutrition education programs were published between 1950 and 1960 in such professional journals as: (1) Journal of the American Dietetic Association; (2) Journal of Home Economics, and (3) The American Journal of Public Health. However, they are not included in this review because concrete evidence of the effectiveness of nutrition education upon food habits was not presented. However, the description of a health program designed to change food habits of mothers and infants on a 'native reserve' in the Union of South Africa supports the *case study* method as an effective means whereby the 'unfelt' needs could be made apparent and members of the community could be stimulated to make changes to meet those needs. This work was reported by CASSEL [1957] at the annual meeting of the American Public Health Association in 1956. He was the medical officer-in-charge of the Pholela Health Center, Natal, Union of South Africa, which was charged with the responsibility of providing comprehensive medical care and health services to the population. A team, consisting of family physician, a family nurse and a community health educator, was responsible for the

preventive and curative aspects of health problems of individuals attending the center.

Dietary surveys determined existing food patterns which were analyzed for major factors responsible for the inadequacy of the diet. These included extreme poverty, extensive soil erosion, traditions as to which foods were customary, inefficient use of available resources and cooking methods which destroyed food nutrients. These and other factors were presented to the community at regular small group meetings and discussion was invited. Confirmation was sought from older members of the tribe that the modern diet was not traditional. Subsequently, resistance to change was reduced.

In attempting to improve infant nutrition, in the light of existing resources, those foods on which greatest emphasis should be laid are: (1) green vegetables; (2) eggs, and (3) milk.

1. A demonstration vegetable garden was developed at the center. Ways of preparing vegetables without destroying nutrients were demonstrated using traditional cooking equipment. Between 1941 and 1951 home gardens increased from 3 to 80% while the variety of vegetables grown increased from 5 to 25% or more.

2. Demonstrations to increase egg consumption encountered somewhat more resistance than did those for vegetables. Surveys showed that 95% of the families had poultry and that eggs were plentiful at certain seasons but they were eaten infrequently because doing so was uneconomical, a sign of greed, and thought by some to make girls licentious. None of these beliefs had deep emotional associations, and demonstrations for improving egg yield, discussions of the nutritive value of eggs, and various methods of using eggs without marked modification of recipes were factors which, in the course of 12 years, resulted in increased consumption, particularly in infant diets. Furthermore, families eventually put excess eggs on the market and found purchasers among their neighbors.

3. Increasing milk consumption was more difficult and complex than was the case for eggs and vegetables. The milk supply was extremely limited, women took no milk whatsoever because of deep-seated beliefs and customs. Only members of the kin group or the head of a household could use milk produced by that man's cattle. In fact, no family could supplement its milk supply from another family outside the kin group. The 2 conditions under which a married woman might have milk were: (a) her father gave her a cow, at the time of her marriage, from which she could get milk, and (b) her husband performed a special ceremony involving the slaying of a goat, allowing her to be free to use any milk in his home. Neither of these conditions was

common because of the general poverty of the community. Attempts to change these practices were futile. Thus, the most practical way to increase milk consumption was to provide powdered milk to which no stigma was attached. Although powdered milk was 'unfamiliar stuff with a strange taste', demonstrations for its use created a demand over the years which outgrew the supply from the center. In time, the more educated families gave permission for women to consume milk from the family cows.

In the course of 12 years, nutritional status and improvement in food habits were attributed to the fact that the center provided not only medical care but also a community health education program. Three guiding principles were concluded from this program: (1) health workers should have detailed knowledge of the people's beliefs, attitudes, knowledge and behavior before attempting any innovations into an area; (2) psychological and social functions of these practices, beliefs and attitudes need to be evaluated, and (3) sub-cultural groups must be carefully defined, as programs true for one group will not necessarily be successful in a neighboring group and that social scientists can provide invaluable assistance to nutrition education programs designed to improve food habits.

CASSEL [1957] postulated that concentration of a nutritionist's time in a carefully defined subcultural group with the development of programs specifically designed for that group would eventually be efficient in effecting permanent changes in food habits. The programs of nutrition education being developed in Ascension Parish, Louisiana, during approximately the same years as those reported by CASSEL, were based on not only the 'guiding principles' concluded from his work but also on the 'leadership pattern within a community' which was determined and developed to carry on the nutrition education program after the nutritionist left the community.

Perhaps it is appropriate to mention the fact that the efforts to improve food habits of the mothers and infants in the Union of South Africa and the efforts to improve food habits in Ascension Parish, Louisiana, were concurrent: they were developed independently and in many respects based upon common philosophies and principles of effective nutrition education. This is not surprising because the nutrition-health education orientation of both investigators was practically the same, i.e. they were aware of the same primary sources of research in the field and they were graduates of schools of public health.

The population groups and the research design are the essential differences between these 2 studies. CASSEL and his team worked with mothers and the community primarily, and did not include concrete data indicating

a carefully controlled research design. WHITEHEAD worked with grade school children, their teachers, their parents and community leaders. She also included food habits data from both 'experimental' and 'control' groups at the beginning and at the end of the 4-year research program, as well as 3 years after the research program was continued by local community leaders. CASSEL and his team conducted surveys and then presented results to the 'population' with which they worked. WHITEHEAD worked with the 'population' in conducting the surveys and they participated in the analysis and presentation of the results of all concerned with the 'unfelt' needs for specific emphasis in nutrition education activities.

A study designed to analyze the knowledge and food practices of both boys and girls after a 1-semester (5 months) food course was reported by KUNKEL and HALL (1958). Three-day food records made at the beginning and end of the course were used to determine the extent to which behavior changed. Food records of a control group of boys and girls who were not studying foods were used for comparison with the groups enrolled in the course. The food course group made a significantly greater improvement in their knowledge and in their food practices than did the control group. Greater progress was made by students who analyzed their own records than by those whose records were analyzed by the teacher. However, this difference was not significant. The authors stated a larger group would be needed to learn if this factor was significant in influencing food habits. [MCKENZIE and MUMFORD's review, 1965, of this work was concerned with knowledge only. They did not mention that changes in food habits were also used to determine the effectiveness of the 1-semester food course.]

Eleven articles related to nutrition education were found in the *Journal of Home Economics* between 1950 and 1960. These, and other reports of this nature, were summarized by research assistants and reviewed by the investigator. They are not included in this report because they did not present research evidence indicating food habit changes. These and other similar articles and reports are listed in the Appendix: 'Description of bibliographic search'.

G. Review of Nutrition Education Research (1960-1970)

The National Research Council has provided guidelines based upon research for both nutritionists and nutrition educators, as well as for other professionals, for many years. Especially, the Food and Nutrition Board, a privately financed unit of the National Research Council, has published

reports which reflect scientific authority for many organizations, agencies and individuals seeking to improve the nutritional status of humans. Reference has been made earlier to 2 publications of this board: (1) 'The problem of changing food habits', [LEWIN, 1943] and (2) 'Manual for the study of food habits' [National Academy of Sciences, 1945]. One of the more recent publications of this board [MEAD, 1964] is directly concerned with the following section of this report. The extent to which any relationship between that publication and the research reviewed during the 1960-1970 period may exist remains to be seen.

A total of 22 unpublished theses, including 3 doctoral dissertations, with titles suggesting research in nutrition education were read by the investigator and evaluated in terms of evidence presented which influenced changes in food habits between 1960 and 1970.

BECKMAN [1963] hypothesized that if interest in food habits of his or her students could be stimulated, the teacher would become aware of the need for nutrition education. Two locations were selected to explore the use of a food habits survey in stimulating interest. School I was located in Iowa City, Iowa; the teacher of the 6th grade had no formal education in nutrition and the study was instigated by the investigator. School II was located in Sacramento, California; the teacher of the 6th grade had no formal education in nutrition and the study was undertaken in response to an invitation from the director of research in that school district. School I had no nutrition program in the curriculum. School II had 10 min daily for nutrition education. School I had no nutrition consultant on the faculty whereas school II had a nutritionist available for the school lunch program.

No attempt was made to compare food habits in the 2 schools because the purpose of the study was to determine the use of a food habits survey in stimulating teacher interest. The investigator conducted the study in the 2 schools independently and her work was based on the following assumptions:

1. When students are actively involved in learning about their food habits, interest is stimulated.
2. When the teacher accumulates and interprets information about food habits of students, she becomes interested in motivating them to learn about the foods they eat.
3. When the teacher becomes aware of the need for nutrition education in her class, she will include it in the curriculum.
4. When parents become involved in the study of food habits, they become interested in what their children eat and can understand the aims of any resulting program in nutrition education.

For purposes of her study, BECKMAN used JOHN DEWEY's definition of interest: 'Interest is the evidence of the way in which the self is engaged, occupied, taken up with, concerned in, absorbed by, carried away by the objective subject matter' [DEWEY, 1913, p.90]. She developed a means for determining evidence of interest at selected intervals in the study and recorded her observations which were later evaluated by 5 qualified judges.

Data show that teacher interest in school I increased from 'no interest' at the first interview preceding the food habits survey to 'active interest' during (1) the beginning of the survey; (2) the course of the survey; (3) tabulation of results, and (4) on conclusion of the survey. The interest level increased to the highest level, i. e. 'consuming interest', during (5) the post-survey classroom activities phase of the study. In comparing changes in interest levels of the teacher at school I with those of the teacher at school II, data indicate that both reached the 'consuming interest level' during the last phase of the study. However, the model diagrams for both teachers differed at other levels and phases of the study. For example, the teacher at school II had a 'mild interest' level (1) preceding, and at (2) the beginning phase of the food habits survey, he moved up to the 'active interest' level (3) during the survey while (4) tabulating results, then he moved to the mid-point between 'active interest' and 'consuming interest' during (5) the conclusion of the survey phase.

BECKMAN [1963] concluded from data collected, using logs of observations which were evaluated by 5 independent judges, that: (1) a food habits survey could be used as an effective means of stimulating teacher interest in nutrition education; (2) when teachers become aware of the nutrition education needs of their students they introduce programs based on those needs into their curricula; (3) when parents express interest in the food habits survey, the teacher interest level increased; (4) both teachers felt a need for guidance from a qualified nutritionist during the survey and the planning period for teaching nutrition based on results of the survey, and (5) as teacher interest increased, their involvement in nutrition education activities increased and then they seemed convinced that such education should be a part of an extended school program.

BECKMAN [1963] recommended that similar studies, using the interest scale she developed, be made at various class levels in elementary schools and in special areas in secondary schools such as physical education, science, home economics and health education. She recommended further that a similar study be made with a plan for rechecking teacher interest levels to determine if any high-interest level reached during a food habits survey with one class would be lasting, and if the teacher would continue to include these

nutrition education activities in other classes. Actually, BECKMAN's work supported what had been advocated by others in nutrition education and by educational psychologists concerning the need for involving those concerned directly (with the problem) in making surveys to determine nutrition education problems. However, within limits of this literature search, she was the first investigator to develop an interest scale with which to measure degrees of interest and to apply this scale to the problem of stimulating interest in teachers who had no formal education in nutrition and no observable interest in the food habits of their students.

A proposal for using the 'discussion-decision' method for changing dietary patterns with Indian villagers was prepared by SYDNEY [1965] with the purpose of exploring a method that would provide not only knowledge about foods and nutrition but also motivate people to change their eating habits. The author stated that if her proposal for using this method were used effectively, it could provide the incentive to change, once the facts of nutrition were known. Unfortunately, no follow-up on the use of this proposal has been found to date. [The author was graduated from Lady Irwin College, New Delhi, in 1961. She married Mr. Sydney Daniel of Madras in 1962 and was a Rockefeller Foundation scholarship recipient at Cornell University in 1963. She received her Master's degree from Cornell in 1965 in Home Economics Education.] SYDNEY's review of literature using the discussion-decision method in the United States prompted her to conclude that this method might be useful in teaching Indian villagers when the goal was to change dietary patterns by changing attitudes. She indicated that the method effects change without threat or outside pressure. Although there seems to be some discrepancy between SYDNEY's stated purpose of her proposal and the conclusions drawn from her review of literature concerning the 'discussion-decision' method, efforts should be made to discover whether or not her proposal has been put into action in India since 1965.

Food preferences, food likes and dislikes, as well as attitudes about foods, have been studied by several nutritionists. PILGRAM [1961] reported that individual attitudes and beliefs, as well as group and cultural attitudes, may determine whether a person will accept a food. Other factors influencing food acceptance are variations in age, methods of preparation, characteristics of the population, i.e. the locale in which an individual lived until age 16, levels of education, size of town, menu combinations, physical form in which food is served, frequency of serving, satiety of food and, apparently, certain psychologic and physiologic influences.

The stability of food preferences of men in the United States Armed

Forces was determined several times between 1950 and 1960, using the general method known as the hedonic scale method. (Subjects are asked to rate foods on a 9-point scale ranging from 'like extremely', valued at 9, to 'dislike extremely', valued at 1.) PILGRAM [1961] concluded that the level of food preference has changed little over the years in spite of the availability of many new foods, advertising, and changed marketing techniques; and that army food preferences correspond generally with those of the entire American population. Furthermore, the author postulated that if we are to change food preferences and food habits, it will require a very active and vigorous approach over time and not the short 'nutritional campaign' type of approach; and that part of the problem of changing food habits is introducing individuals to new products and their learning to like them. This and other reports of research undertaken at the Quartermaster Food and Container Institute for the Armed Forces present data which support the need for nutrition education programs other than those which are of the 'campaign' or 'advertising' type. It also provides techniques for securing data which could be valuable in planning nutrition education programs based upon specific needs of selected populations.

Nutrition education programs for low-income families have been reported by NEFF [1964], OLIVER [1967] and HARRIS [1970]. The research reported by NEFF was conducted in Clark County, Kentucky, where 540 families were receiving donated foods. 54 of these families were interviewed to determine: family composition, place of residence, educational level of the homemaker, food preparation equipment, food preparation practices, food commonly used, meal patterns and what donated foods the homemaker found difficult to use. Results obtained by the interviews are summarized as follows:

1. 27% of the homemakers completed 4 grades or less; 13% used an 'X' to sign their names. The average grade completed was 6.5 and only 2 homemakers were high-school graduates.

2. 40% of the homemakers had wood or coal stoves. In rural homes, 65% used wood or coal. 61% had no thermostatic oven controls. 15% had no refrigerator; 76% had sifters; 70% had egg-beaters; and 30% had cheese-graters. All had biscuit pans. Approximately half of the homemakers had no measuring cups; 72% had no measuring spoons, and 65% used no recipes. Obviously, problems of using donated foods are not solved by giving recipes to these women.

3. Many homemakers, 76%, indicated difficulty in using dried eggs; 41% had difficulty using dried milk; 33% had difficulty using cornmeal; and 24% had difficulty using rice.

4. The 24-hour recall of food eaten indicated that fruits and vegetables high in ascorbic acid and carotene were used little, if at all. Lean meat, fish and poultry were not used often. Inadequate amounts of milk were used – over half did not use the donated milk. NEFF [1964] concluded from this study, and her review of reports from public health nutritionists working with families receiving donated foods in 48 Kentucky counties, that program planning based upon ‘needs’, such as those indicated by ROBERTSON’s research, but also upon the review of reports indicating that 18 agencies were involved in nutritional programs in 48 counties was necessary. And, that such ‘planning’ should be organized, directed, channeled and delineated as well as evaluated periodically in terms of selected objectives for teaching nutrition effectively.

OLIVER’s ‘pilot study’ with low-income families in rural areas in 5 Alabama counties was designed to: (1) test methods of reaching and teaching young homemakers; (2) test and evaluate educational literature designed especially for that group in the fields of family financial management, nutrition, housing and child development, and (3) test the feasibility of using part-time semi professionals, working under the supervision of a professional home economist in an educational program [OLIVER, 1967].

County Extension home economists began working in 4 counties with ‘program aides’ (non professional home economists) in 1964 to provide on-the-job training and supervision. Their training included discussion conferences, demonstrations, and workshop techniques as well as home visits and the development of teaching methods and materials appropriate for helping low-income families. The program was extended to a fifth county in 1966 and the total number of program aides reached 14. The aides kept records of progress of families in ‘log’ form; some records represented as many as 51 home visits over a 15-month period.

This ‘pilot study’ provided substantial help to 508 young homemakers. Program aides reported changes in food and nutrition activities as follows: 40% were using better food-buying practices; 44% improved food preparation skills; 42% improved eating habits of their families. These young homemakers served better balanced meals, made better use of donated foods, increased the amount of milk served, and some of them improved practices of freezing, canning and storage of food; and 21% ‘now have gardens’. OLIVER concluded that program aides working with supervision of extension home economists can reach and teach young homemakers in low-income families and that the most effective teaching method was to tell, to show and to do with them and to repeat the process until it was understood.

Results of this pilot study should not be evaluated in terms of criteria used for research requiring precise data and controls. However, the value of this work should not be underestimated as a demonstration which contributed much-needed guidelines for 'reaching and teaching' this long-neglected segment of the population which has suffered not only from malnutrition but also from a sense of loneliness and lack of self-respect.

HARRIS [1970] reported on a study which was conducted in 4 counties in Mississippi. Low-income families in 3 counties received donated foods. In the fourth county they were given food stamps. The purpose of her study was to test the effect of the different methods of teaching 4 food and nutrition lessons in each of 3 areas in each county. The areas were determined according to the day of the month families were scheduled to receive donated foods or food stamps. Area I homemakers were taught through the demonstration method. Area II homemakers were taught through home visits. Area III homemakers received no teaching, thereby serving as the control group.

The lessons dealt with the 4 basic food groups needed for good health. Each lesson concentrated on one of these groups for 1 month. Thus, the study lasted 4 months. A home economist in the Mississippi Department of Public Welfare trained 1 home economist and 12-15 welfare clients in each county. These trained clients, called 'Program aides', in turn taught homemakers in area I, using the demonstration method, when they came to the food distribution centers. The program aides gave lessons in 10-20 home visits to homemakers in area II where they lived as neighbors. The teaching of the program aides became an effective method in itself. The lessons were taught during March, April, May and June.

Families were interviewed during July, August and September to collect data which would indicate the relative effectiveness of the teaching methods used. HARRIS [1970] reported that there was no difference in the effectiveness of teaching by demonstration compared with teaching by home visits. However, both groups showed improvement when compared with the 'control' group. She stated that the teaching of the program aides method was more effective than the other 2 methods and offered explanations which might account for this effectiveness: (1) the program aides were taught by a professional home economist; (2) they learned by repetition, and (3) their prestige was increased when they were selected to be 'teachers'. HARRIS recommended that these factors be considered when planning educational programs for low-income families and that such experience and leadership responsibilities be extended to as many low-income homemakers as practicable.

These 3 studies, reported by NEFF [1964], OLIVER [1967] and HARRIS

[1970] are quite similar in some ways and they provide support for the theory that teachers tend to teach what they are taught and the way they are taught. The objectives of these studies were clearly stated, the procedures were slightly different, the results were well expressed. However, no indication of 'carry-over' or long-lasting effects could be reported because the nutrition education programs were short-term and recommendations for periodic evaluation were not expressed.

Apparently these 3 studies were more 'information-centered' than they were 'behavior-centered'. In spite of the impression that 'improvements' in food habits, in the homemaker's food management practices, the development of appropriate educational literature and learning by repetition were observed, there are some questions which nutrition educators should raise. The questions remain unanswered concerning the basic differences between the acquisition of facts, *per se*, and the documentary evidence that problemsolving is an effective teaching method. In other words, 'teaching', as used in these 3 reports, seems to indicate variations or adaptations of 'telling' rather than the involvement of learners which requires *planning with* more than *planning for* as advocated by nutrition educators who are 'behavior' oriented toward teaching.

Most important, none of these 3 studies reviewed above, suggested ways to motivate learners to think critically and/or analytically about their own food and nutrition problems. The learners were 'told' primarily what to do and how to do it. They were even shown how to do it. But, no evidence was presented which would lead the reader to ascertain what, if any, effort was made by the teachers to stimulate the learners to ask 'why' they should make certain changes. Until nutrition educators learn to do more than 'show and tell', there is little reason to expect learners to use existing food supplies intelligently throughout life.

After reviewing nutrition education research reported between 1960 and 1970, this investigator concludes that the NRC publication on food habits research [MEAD, 1964] is not directly concerned with nutrition educational problems of the 1960s. However, careful study of that publication is recommended for researchers in the field of nutrition education.

III. Summary and discussion

The purpose of this chapter is to summarize the results of nutrition education reports published between 1900 and 1970. These reports were selected and reviewed by the investigator who wishes to emphasize the state-

ment made earlier that this review does not represent an exhaustive informational search. Furthermore, not all of the reports reviewed included basic elements of the research process, *per se*. For example, practically all of the reports published before 1940, as well as some since then, should be classified as demonstrations or examples of how some of the early workers in nutrition education and in health education attempted to apply principles of the developing science of nutrition to child health problems.

A. Results of Literature Review

A summary of findings resulting from this review of literature is presented in the following 32 statements; each statement can be documented even though some repetition will be noted. These statements, which are presented in chronological order, are reflected in both the discussion section of this chapter and the investigator's conclusion and recommendations related to problems of effective nutrition education.

1. Nutrition education is a factor in improving dietary habits when the methodology employed is designed with that as a purpose and when the learner is involved in decision-making.

2. Young children accept food readily when experience with it is pleasant. Their food habits improve when parents serve 'disliked food' properly prepared at frequent intervals; this improvement is 'long-lasting'.

3. The homemaker's knowledge of nutrition has little effect upon the provision of food for her family.

4. Considerable gain was found in both nutrition information and improved dietary practices of home economics students when instruction was based on nutritional needs of the students.

5. An intensive course in nutrition, using a test, teach and retest procedure, resulted in better food selection habits of 10th and 11th grade students; foods most frequently selected were those discussed, then prepared and eaten by students in the laboratory period.

6. Senior high-school home economics students showed dietary improvement when self-teaching and self-evaluation devices were used in food laboratory periods.

7. Children improve their food practices when they discover what changes they need to make, are strongly motivated to learn about food and to apply what they learn to their own diet, and have access to the right kinds and amounts of food.

8. Nutrition can be integrated with other subjects and does not necessarily need to be taught as a separate subject in the 3rd grade. Real-life situations and group activities, which give children some responsibility in planning their work, afford effective teaching of nutrition when adequate supervision is available.

9. Nutrition educators must first create a desire in the adult individual to change his food habits, and then give him the correct information to guide his practices. Knowledge alone will not bring about changed food habits.

10. When income is sufficient, education in nutrition determines adequacy of the diet, and when income is insufficient, it is possible to improve diets through education even in lower-income groups.

11. Surveys indicate that school administrators need to recognize contributions of nutrition to general education for both boys and girls; and that nutrition should be a subject in the school curriculum for grades 1 through 12.

12. Effective nutrition education includes: (1) the discovery of dietary needs as a basis for nutrition teaching; (2) a graded plan emphasizing the importance of teaching only one nutrition idea at a time, and (3) giving children actual experience in eating recommended foods at school.

13. Teachers must be trained in nutrition so as to recognize needs of children; children learn readily when guided through real-life experiences related to their needs; school lunch provides an important teaching situation. And, food habits may be expected to improve when parents, children and teachers cooperate to that end.

14. When nutrition facts are presented in terms of simple experiments and adequately illustrated, elementary grade children can acquire rather advanced information about nutrition, and they show some ability to apply facts learned to their own eating habits.

15. The effectiveness of nutrition education through the use of an audio-visual aid in motivating freshmen college women depends upon the objective, length of time it is used and class size. Motion pictures are most effective in motivating large groups to improve food habits; animal experiments are most effective when class size is disregarded.

16. Food preparation activities, feeding hamsters and recording their growth, created children's interest in food, improved their attitude about food and stimulated parents' interest in food.

17. No significant positive correlation between nutrition information gain and dietary gain was found after developing evaluation instruments for measuring such gains by children in elementary grades having nutrition education programs.

18. A 4-year pilot study of nutrition education programs, developed on the appraised needs of school-age children and their teachers and parents, showed improvement in food habits. Reports of that study presented 30 descriptive statements of the programs developed (see pp. 108–110). These were held as statements of fact and belief to serve as directives in developing effective nutrition education programs; included were 9 program characteristics which may be expected to yield improvement in food habits (see p. 110).

19. The discussion-decision method is superior to the lecture method of nutrition education in changing junior high-school students' lunch-eating habits.

20. Community health education programs based on health appraisals led to some improvement at the end of 1 year but such improvement was not sustained and some deterioration was observed at the end of the second year. Authors concluded that there is need to investigate: (1) ways to assess the efficacy of classroom teaching, and (2) more effective methods in health education with respect to nutrition.

21. Group-decision and the cooperatively planned, conducted and evaluated nutrition education programs which involve individuals concerned may be expected to improve food habits.

22. Intensive use of the press, radio and group teaching made to disseminate nutrition information had little effect upon dietary practices of housewives in a city where all agencies sponsored the program.

23. Effective nutrition education depends upon trained leadership; it is based on initial and sustained involvement of community leaders, parents, school-age children and teachers who cooperatively plan, conduct and evaluate their own programs which are intentionally developed to solve their own problems. Over a 6-year period, food habits improved significantly. Children in elementary schools showed more improvement in food habits than did those in high-schools.

24. Nutrition education based upon problems revealed by an initial survey of food habits of 6th and 7th grade boys and girls produced positive results. A 1-year post-nutrition education food habits survey showed dietary scores in favor of research groups. Two years of nutrition education resulted in better food habits than did 1 year of nutrition education. However, dietary scores achieved by each of 6 research groups varied widely. Thus, the author concluded that factors other than length of time to which research groups were involved in nutrition education influenced their food choices.

25. Six months of nutrition education, based on 3-day diet records of 5th, 6th and 7th grade pupils, resulted in little tangible evidence of improved

food habits; the methods involved meetings with school supervisors, public health nurses and teachers to integrate nutrition subject matter with other subjects, and talks were given at meetings with the Parent-Teacher Association.

26. The case-study method is an effective way to acquaint the community with 'unfelt needs' and to stimulate changes related to such nutrition needs. This case-study method involved a team of a physician, a nurse and a community health educator working with individuals attending a health center. Demonstrations of ways to raise and prepare vegetables and other foods were conducted at the center. Team members should have detailed knowledge of the people's beliefs, attitudes, knowledge and behavior before attempting changes in food habits.

27. Greater progress is made in improvement, both in knowledge and food practices, by students who analyze their own records than by those whose records are analyzed by their teachers.

28. A food habits survey can be used by a nutritionist to stimulate teacher interest in nutrition education; teacher interest increases as students and parents become involved in nutrition education based on results of their survey; teacher interest increases when their own involvement in nutrition education increases.

29. Levels of food preference have changed little since 1950 in spite of availability of new foods, advertising, changed marketing techniques, cultural attitudes and beliefs, variations in age, methods of preparation, locale in which individual lived prior to age 16, levels of education, size of town, menu combinations, physical form in which food is served (to adults), frequency of serving, satiety of food and, apparently, certain psychologic and physiologic influences. If change in food preferences and food habits is to be realized, recommendations include: an active and vigorous approach over 2 or 3 years, not the short 'nutritional campaign' types; and recognition that introducing individuals to new food products, and their learning to like them, is part of the problem.

30. Nutrition education program planning, based on 'needs' revealed by interviews with homemakers and reports of county public health nutritionists, should be organized, directed, channeled, delineated and evaluated periodically in terms of selected objectives, if nutrition is to be taught effectively by all agencies concerned.

31. 'Program aides', trained by County Extension home economists and working with their supervision, helped low-income families to use 'better' food-buying and food preparation skills as well as to improve

eating habits of their families. The most effective teaching method used was to tell, to show and to 'do with them', and to repeat the process until it was understood.

32. There is no difference in the effectiveness of teaching low-income homemakers by demonstration compared with teaching by home visits. The teaching of 'program aides' as a 'method' for nutrition education is more effective than is teaching by demonstration or by home visits.

B. Discussion

Because the primary purpose of this Nutrition Education Research project was to review and to prepare a critical analysis of reports rather than to compile an annotated bibliography, the discussion of findings will be brief. Reports of research in nutrition education indicate that workers in this field are not always in agreement concerning concepts of: (1) research methodology; (2) teaching, and (3) interpretation of results presented by other researchers.

There is need for research models applicable to each objective and/or factor influencing the solution to food habits problems. There also is need for training nutrition educators in light of what is known about both the teaching-learning complex and new methods and techniques used in research and evaluation.

Returning to the hypothesis stated in the introduction to section II, p. 99, the investigator concludes from the statements presented in the summary of findings that the hypothesis was supported for the most part. Indeed, nutrition education research has been directed more toward the purpose of disseminating nutrition information than toward the purpose of improving dietary habits. However, there is evidence that nutrition education which purports to improve dietary habits can be expected to do so within carefully defined limitations.

There are certain statements in the literature which are misleading and should be examined in light of research findings. For example, one frequently finds statements which imply that to change food habits is complex and requires long periods of time. Factors other than the length of time to which learners are exposed to nutrition education have been reported. The method used in nutrition education is more important than the length of time *per se* to which learners are exposed. This was reported as early as 1941 by HATCHER, and supported by LEWIN in 1943 and WHITEHEAD in 1960.

The age of the learner and the interest level of both the learner and the teacher are factors other than time *per se* which influence food habit changes. The point to keep in mind is that changing food habits may be complex within given situations and within certain limitations but unraveling this complex does not necessarily require long periods of time (whatever that term means).

Another point which should be emphasized is that food habits change throughout the life-span, for better or for worse, depending upon both the available food supply and the extent to which man uses his total environmental influences to adjust to that supply. The question which is central to nutrition education, as an environmental influence, may be stated as follows: What does research in nutrition education have to offer in helping man to use his available food supply intelligently?

Research in nutrition education indicates that:

1. Problem-solving is an effective way to influence what people do about their dietary intakes and their food supply. Numerous surveys have indicated that poor food habits and nutrition problems exist in many countries. However, nutritionists and nutrition educators are not yet convinced that they cannot solve these problems for other people – they must learn to solve their own problems. The challenge, therefore, is to create learning situations in which people will recognize their own nutrition problems. Then, nutrition educators must lead people step by step through the active process of problem-solving.

Learning to solve nutritional problems means: (a) discovering the problem; (b) where and from whom to get scientific information relevant to the problem; (c) using facts in making decisions; (d) relating facts to real-life situations; (e) sharing information and expressing and clarifying ideas; (f) developing trial solutions; (g) testing and evaluating those solutions; (h) thinking critically, and (i) replanning and testing other solutions until the problem is solved.

Because nutrition educators are concerned with what the 'learner' does, they must be concerned also with what he thinks and how he thinks. Concepts of nutrition are not developed automatically by exposure. They come to be a part of one's thinking when the 'teacher' guides the learner to see relationships between nutrition facts and his own experience. Any known, identified, recognized nutrition problem is well worth solving. The investigator does not intend to discount the need for nutrition knowledge (facts, information) in using problem-solving as a method of nutrition education. Without sound, current nutrition knowledge, problem-solving would be a

farce. Without problem-solving, nutrition knowledge *per se* may be meaningless, uninteresting and of little value to learners. The learner needs to become involved in the problem-solving process before he is told 'what and how much to eat', or even shown how to prepare nutritionally adequate food. Studies indicate that mere acquisition of nutrition knowledge has little effect upon dietary habits.

2. Discussion-decision is more effective than is admonition by lecture as a method of influencing what people do about dietary habits and nutrition problems. The 'group discussion' method is not the same as the 'discussion-decision' method. It requires a teacher who is competent in both the discussion leading to decision for action technique and the field of nutrition. The 'group discussion' method may or may not lead to decision. The discussion-decision method has been used to stimulate people to try new foods, to select better ways of preparing food and to make better food choices in school lunch programs. The discussion-decision method may be a 'first step' in certain situations to get people to recognize their own nutritional problems and to provide the stimulation needed to seek solutions to such problems.

3. Effective nutrition education, based on recognized needs, is cooperatively planned, conducted, and evaluated by individuals concerned in homes, communities and schools; such education is supervised by adequately prepared nutrition educators, i.e. those who possess expertise in both the science of nutrition and the teaching-learning complex. The research which supports this statement has no specific method terminology but it contains comparable elements reported by WHITEHEAD in 1947, ARCHIBALD in 1950, and WHITEHEAD in 1952 and 1960. Some of the same elements were reported by HATCHER in 1941, BENSON in 1944, LEWIN in 1943, and RADKE and CASO in 1948. Perhaps this method which was developed over a period of many years and by several researchers is, in fact, not a single method, but a series of sequential, and at times overlapping, methods which should become known as: *the coordinated community approach* to nutrition education problems.

4. The case-study method is an effective means of reaching community members, stimulating changes needed as a result of a dietary survey and an analysis of factors responsible for inadequacies. This method, reported by CASSEL in 1957, employs some of the same elements reported in the *coordinated community approach* to nutrition education problems. However, the report of the case-study method by CASSEL did not include any control groups; and there was no indication that the learners were involved in the planning,

development and evaluation of this method. In some ways, the case-study method is apparently limited to working for more than working with people. It is directed more toward providing solutions to nutritional inadequacies than toward creating situations in which nutrition education could have been utilized to 'teach' those attending the center and others in the community to learn how to solve their own problems.

There are several questions which this investigator would propose concerning the CASSEL report of the case-study method: (1) Why did it require 12 years to improve nutritional status and food habits on a 'native reserve' in the Union of South Africa whereas comparable results were achieved after 4 years of an intentionally developed program of nutrition education in Ascension Parish, Louisiana? (2) Why was the case-study method more 'telling' or 'information' oriented than it was 'teaching' or 'behavior' oriented in light of available results reported in the literature before and early in the 12-year period when Pholela Health Center was providing 'comprehensive medical care and health services to the population' in Natal, Union of South Africa? (3) Why did CASSEL postulate that 'concentration of a nutritionist's time in a carefully defined subcultural group with the development of programs specifically designed for that group would eventually be efficient in effecting permanent changes in food habits'? It is unrealistic, in this investigator's opinion, to anticipate that effective nutrition education would aim to establish permanent food habits. Actually, effective nutrition education teaches the learner to make intelligent food choices in light of an existing food supply which is constantly undergoing changes.

One of the dogmas of education is the fact that all learning is not taught. However, nothing has been taught until something has been learned, and learning will be manifested in changed behavior which can be measured and evaluated. Finally, the investigator recognizes that change can result from 'telling' if such is repeated often enough for the learner to believe what he is told. Once he believes it he will accept it as fact, and if strongly motivated, he will act accordingly. This is the method used in 'brain-washing'. It is the driving force of the dictator who controls the minds of men – enslaves them and destroys that quality of life which is becoming increasingly dear to all people in the developing countries, i.e. *freedom* – freedom of thought, freedom of choice. Nutrition educators must learn to recognize that not only the products, but also the processes of education are important. The means as well as the ends deserve our careful attention. Thus, there is need to focus research on methods and techniques of teaching nutrition if we would improve food choices and nutritional status of people throughout the world. This need is

crucial in the developing countries where the economic productivity is positively correlated with nutrition status and total health of the population.

Appendix – Description of Bibliographic Search

The purpose of the bibliographic search was to compile a selected bibliography of references pertinent to nutrition education studies which resulted in improved dietary habits and nutrition. The bibliographic, or informational, search was conducted by 3 part-time research assistants, working on an hourly pay basis, with supervision provided by the principal investigator. Frequent conferences were held with the research assistants as well as with the chief reference librarian on the University of Iowa library staff.

The bibliographic search was undertaken beginning with references published in 1970 and going back as far as 1950 because the principal investigator had previously reviewed the research literature available to that date; and, because the assumption was made that references listed in more recent research reports would provide leads to earlier research which would perhaps save considerable time. Resources relevant to this search were explored, and a systematic card file was developed, including both reference cards by source and a cross-index card file by authors. The documentation guide selected for this search and for this report is entitled: *A manual for writers of term papers, theses and dissertations*, 3rd ed. rev., by KATE L. TURABIAN (University of Chicago Press, Chicago 1967).

Research assistants consulted the following resources, made comments on the reference cards, prepared written abstracts of reports when specified by the principal investigator, arranged for securing theses through the inter-library loan service, and made photocopies of original articles when necessary.

1. Indexes. (a) *Bulletin (Public Affairs Information Service)* 36 (1950) and 56 (22) (March, 1970). (b) *Index, 1945–1966, Nutrition (FAO Documentation Center)*. (c) *Research in education, annual index (January to December, 1969)*. (d) *Social science and humanities index* 12 (1949–1952) and 57 (4) (March, 1970).

2. Abstracts. (a) *Psychological abstracts* 24–44 (1950 to January, 1970). (b) *Sociological abstracts* 1–3 (1953–1955) and 18 (1 and 2) (February to April, 1970). (c) *World agricultural economics and rural sociology abstracts* 1–11 (1959–1969).

3. Journals. (a) *Journal of the American Dietetic Association* 28–56 (4) (1952 to April, 1970). (b) *Journal of Home Economics* (March issues, 1961–

1969). (c) *Journal of Nutrition* (1950–1970). (d) *American Journal of Public Health* (1955–1970). (e) *American Journal of Clinical Nutrition* (1950–1970). (f) *Journal of School Health* (1960–1970). (g) *Journal of Health – Physical Education and Recreation* (1950–1970). (h) *Research Quarterly* (1950–1970). (i) *Journal of Nutrition and Dietetics 1–6* (1964–1969). (j) *Journal of Nutrition Education* (1970). (NB. Photocopies of pertinent articles most relevant to this review are on file in the office of the principal investigator.)

4. **Theses.** Attention was focused on the *Journal of Home Economics* listing of theses titles because the principal investigator considered that such would provide more rapid access to these studies than would be the use of sources such as dissertation abstracts. Therefore, 40 theses were located by the research assistants and abstracted by the principal investigator. Three theses were available from the principal investigator's files; 37 were made available through the inter-library loan service, and all were read and evaluated by the principal investigator, who prepared abstracts of those judged to be relevant and representative of all elements in the research process.

5. **Books.** 13 books were selected for study and reference information by the principal investigator. Some were made available by the Office of Nutrition, Agency for International Development, Department of State, Washington, D. C., and others were located in the University of Iowa library or in the personal library of the principal investigator.

6. **Other sources.** Although only 33 items have been listed in this category, equally as many have been secured and read by the principal investigator. They were judged to be concerned with aspects of applied nutrition programs which did not include nutrition education as a specific component of their work.

The investigator recognizes that the general bibliography, included in this appendix, is not an exhaustive one and some very important reports may not be included. Their omission is not intentional. However, because of the limitations of time and funds, as well as qualified research assistants, it was not possible to search further. Actually, the extent of this review is such because approximately half of the work was completed by the investigator prior to the initiation of this exploration of resources.

In summary, this general bibliography contains a total of 268 items which is believed to be the most complete compilation in the field of nutrition education to date. By categories, the items listed total: (1) 13 books; (2) 183 periodicals; (3) 40 unpublished theses, and (4) 33 other sources. The investigator recognizes that the entire literature search suffers considerably because of the fact that literature written in the English language only has been included.

Reports in other languages are available to the investigator and they will be reviewed at some time in the future.

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