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Title: The Relationship of Self -Efficacy Scores of Fifth-Grade Children to Changes in Food Choices and Nutrition Knowledge After a Nutrition Education Program

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The self-efficacy construct has been determined to be an effective method of stimulating desired eating behavior in diabetics and obese adults and exercise behaviors in pulmonary rehabilitation patients. Although the self-efficacy construct has been shown to mediate eating habits, practical classroom application of the construct has been rarely used in this area. A review of literature indicated that no studies have been reported on the effect of self-efficacy on food-related behaviors of children.

The primary purpose of this research was to determine if, and to what extent, self-efficacy predicts changes in food choices of fifth-grade children. The effect of self-perceptions of competence on the nutrition knowledge of children after a nutrition education intervention program was also assessed. Forty-five fifth-grade children in two classrooms participated in this study. Their self-perception profile, food choices, nutrition knowledge, and food acceptance were measured both before and after the nutrition education unit. A 25 item nutrition knowledge questionnaire was also administered to the children before and after the nutrition education program. Change in knowledge in the cognitive domain was measured by differences in scores on the nutrition knowledge pretest and posttest. Students kept five-day food records for the school lunch items consumed. The fruit and vegetable intakes of the students were estimated from these food records. Chi-square analyses were performed on the data to determine the relationship

between self-efficacy as the independent variable and change in food choices, and food acceptance and change in nutrition knowledge as the dependent variables. The 3 x3 contingency tables indicated that there were no significant relationships between self-efficacy and change in food choices, food acceptance and nutrition knowledge. The findings provide limited support for the usefulness of the self-efficacy construct in understanding and predicting eating behavior change. It is recommended that further investigations of the predictive capability of the self-efficacy expectancy be conducted in children of this age group to better understand its relationship with food choices and implications for nutrition education for school children.

The Relationship of Self-Efficacy Scores of Fifth-Grade Children to Changes in Food Choices and Nutrition Knowledge After a Nutrition Education Program

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INTRODUCTION

Statement of the Problem

The importance of nutrition as a key component of health was recognized in Healthy People : The Surgeon General's Report on Health Promotion and Disease Prevention (US Department of Health Education and Welfare, 1979), in Promoting Health, Preventing Disease : Objectives for the Nation (US Department of Health and Human Services, 1980) and in Healthy People 2000 : National Health Promotion and Disease Prevention Objectives (US Department of Health and Human Services, 1991). Poor food choices, overeating, and high intake of fat and sugar continue to be the most prevalent nutrition problems for children. National nutrition surveys conducted in 1968-70 (Garn and Clark, 1975 and Owens et al., 1974) showed intakes below the recommended dietary allowance of important nutrients such as iron, calcium, vitamins A and C, folacin, and riboflavin in children's diets. The diets of children share the same deficits and excesses characteristic of the entire population in the United States : over 40% of calories are from fat; saturated fat accounts for 15 to 18 % of the calories; and average dietary cholesterol is in excess of 300 mg. per day (Coates et al., 1981). Analysis of the nutritional data from the second National Health and Nutrition Examination survey (NHANES II) in a representative sample of children and youth 1-17 years (Kimm et al., 1990) also showed that the average U.S. child's diet is relatively high in total (35-36% of calories) and saturated fat (13% of calories). The ratio of polyunsaturated to saturated fat was 0.4% vs. a recommended ratio of 1.0. A study utilizing two fifth-grade classes from Hoover Elementary School in Corvallis, Oregon found that children consumed significantly higher

percent of calories as fat (35 %) over 24 hours during which high-fat school lunches were served and only 32 % when the low-fat lunches were served (Krupin, 1991).

Consequences of Poor Nutrient Consumption

Poor food habits of children are evident from the plate waste seen in the school lunch programs. The losses occurring should be estimated, not only in monetary terms of the cost of plate waste, but also in terms of the nutrient loss (Boventure and Scioline, 1977). Food consumption and plate waste data reported indicate that raw and cooked vegetables were the least accepted and consumed foods (Lilly et al., 1980). The fact that food waste is a problem in many schools, particularly vegetable waste, is directly related to these findings. Green and Munroe (1987) cited a study by Johnson in 1983 which found an average of 69.3 percent vegetable waste for four different vegetables. Results from a study by Lind et al. (1986) also revealed that only 36.7 percent of the fruit and vegetables were consumed, while 74.5 percent of meat and 74.1 percent of milk were consumed.

The Council on Food and Nutrition of the American Medical Association claimed that poorly nourished children will not reach their fullest academic potential (in Wilder, 1970). Dr. Merrill S. Reed of the National Institute of Child and Human Development reported that hungry children exhibit behavioral characteristics such as apathy, lethargy, inability to pay attention and failure to respond to classroom stimuli (in Wilder, 1970). The habitual diets of school-age children are also risk factors for the development of chronic diseases, such as cardiovascular diseases.

Dietary Guidelines

The Surgeon General's report on Nutrition and Health (US Department of Health and Human Services, 1990) recommended increased consumption of vegetables and fruits. Epidemiological evidence suggests that frequent consumption of vegetables and fruits,

particularly dark green and yellow vegetables and cruciferous vegetables, may lower the risk of cancers of the lung and bladder as well as some cancers of the alimentary tract. Evidence also suggests that it could contribute to the amelioration or prevention of a diversity of other diseases, including hypertension and stroke. Increasing the consumption of vegetables and fruits could have beneficial ramifications on the intakes of energy, fat, and fiber. In recognition of these benefits the Year 2000 goals for the U. S. (US Department of Health and Human Services, 1991) specified increasing the fruit and vegetable consumption from 2 1/2 to 5 or more servings per day which is roughly double what children are currently eating. The Dietary Guidelines (US Department of Health and Human Services, 1990) specifically recommended that all healthy Americans, including children, increase their daily intake of fruits and vegetables. The recommendation is based on substantial evidence that it will reduce the risk of diseases such as cancer, cardiovascular diseases and diverticular diseases, the development of which begins in childhood (National Research Council, 1989).

The Food Guide Pyramid (US Department of Agriculture, 1992) is an outline of what to eat each day based on the Dietary Guidelines. It emphasizes foods from the five major food groups and shows a range of servings for each major food group. It recommended 3 - 5 servings of foods from the vegetable group and 2 - 4 servings from the fruit group. Everyone should have at least the lowest number of servings in the ranges. The Food Guide Pyramid specifically recommended 4 servings of vegetable group foods and 3 servings of fruit group foods for children.

Lifelong dietary habits are established early in life (US Department of Health and Human Services, 1990). The best way to establish improved eating habits and to focus on prevention rather than treatment of chronic diseases is to modify children's diets. Schools have the potential to significantly influence the dietary habits of children and their health through the school Nutrition Education Training Program and the National School Lunch Program. An effective and comprehensive program of health and nutrition education

taught to the children through the American school system will enable them to achieve healthy eating habits. Besides promoting wellness, the school health instruction should also motivate health maintenance and provide the students with the knowledge and skills that are essential to choosing and maintaining health-related behaviors (Lohrmann et al., 1987). One of the goals of the legislation P.L. 95-166, the federally funded Nutrition Education and Training program, was to teach children the value of a nutritionally balanced diet, to improve their nutrient intake and food patterns through nutrition education in schools (Maretzski, 1979).

Bell and Lamb (1977) found that their experimental group of fifth-graders had a significantly greater increase in vegetable consumption than did the control group following a six-week nutrition education program. Shannon et al. (1982) conducted a 9-week nutrition education program for children in kindergarten through sixth grade and found that it had a mixed effect on children's food behavior. Their results indicated that the least accepted snack was raw broccoli and carrot sticks with a mean acceptance percent of control and experimental groups being 61.5%. The vegetable most readily accepted by the first through sixth graders was corn with a mean acceptance of 62.4 in the experimental group and 68.1 in the control group. There was significant interaction between the effects of nutrition education and grade level on the consumption of green beans and corn. Post-consumption of green beans by children in the upper three grades in the experimental group was significantly higher than that of comparable children in the control group. They concluded that the nutrition education program had a favorable, although certainly not a dramatic, influence on the children's food behavior.

Elementary school children are a primary target for nutrition education programs because they are forming food habits and attitudes that affect food choices throughout life. Poor nutrition habits established during childhood may be difficult to change as adults. Weiss and Kien (1987), in a review of instructional methods, materials, and curricula at the elementary school level, found that nutrition education typically received a low

priority in school curricula. Perhaps inadequate teaching emphasis on nutrition and diet patterns is due to the limited effectiveness of the traditional methods of teaching nutrition education for improving children's eating habits. Most nutrition education programs have been designed to emphasize information acquisition and dissemination and are unable to change eating behavior (Cosper et al., 1977). Therefore educators are challenged to learn what stimulates adherence to a decision to make dietary practice changes.

The Self-Efficacy Construct

Self-efficacy is an important concept in the recent health education literature. "Efficacy" is an individual's objective ability to perform a specific behavior. Efficacy can be measured by observing whether or not an individual actually exhibits the behavior. "Perceived self-efficacy" is an individual's judgment of the ability to do the behavior (Lawrance and McLeroy, 1986). Bandura and others frequently use "self-efficacy" to mean "perceived self-efficacy," since an individual's perception is implied in most contexts in which the concept is used.

Bandura (1977b) reported that one's belief in the ability to perform a behavior (self-efficacy) is an important link between knowing what to do and actually doing it. Many instances exist in health education where simply providing health information and increasing an individual's desires to perform a particular behavior did not lead to behavior change (Lawrance and McLeroy, 1986). Individuals need to feel they are capable of performing a task before they are likely to attempt it. Recently, the self-efficacy construct has been identified as an effective method of stimulating desired behavior in diabetics (Kingery and Glasgow, 1989), obese adults (Chambliss and Murray, 1979), and pulmonary rehabilitation patients (Kaplan et al., 1984). However, no studies have been reported in which this technique has been used to study food choices of grade-school age children.

Self-efficacy theory has several important implications for health education. Ratings of perceived self-efficacy can help identify individuals at risk for certain unhealthful behaviors (Lawrance and McLeroy, 1986). Self-efficacy can also be used to measure outcomes of healthful interventions. Since self-efficacy is strongly linked to behavioral performance, it can serve as a predictor of behavior change resulting from health education programs. "A strong sense of efficacy for behaving in a healthy fashion is central to self-regulation of one's life," so the extent to which self-efficacy is generalized from one health problem to another is an important outcome of health education (Lawrance and McLeroy, 1986, p.320). Little work has been conducted in health education to develop measurement strategies for assessing the generalization of self-efficacy.

Although the self-efficacy construct has been shown to mediate eating habits, practical classroom application of the construct has been seldom used in this area. A review of literature indicated no studies in school using this paradigm for studying nutrition behavior change of school children. Bandura (1978) suggested that since these simple measures of task-specific perceptions and performance usually do not require extensive validation due to their simplicity and specificity, they can be both powerful and practical educational tools. Due to the paucity of previous research with children on this topic, the present study was undertaken to explore its value. The results of this research will have the potential to help policy makers and nutrition educators to develop more effective nutrition education programs.

Purpose

The primary purpose of this research was to determine if, and to what extent, self-efficacy perceptions predicted successful changes in food choices among children. The second purpose of the present investigation was to explore the effect of self-efficacy on change in nutrition knowledge of children following a nutrition education program. The

information on self-efficacy scores of the subjects was used to make a prediction regarding their food choices. This was compared to actual change in food choices and food acceptance measures. Forty-five fifth grade children in two classrooms in one of the Portland Public Schools served as the subjects for the study. The self-efficacy profile, the food choices, the nutrition knowledge, and the food acceptance of the children were measured both before and after a nutrition education program. The dependent variables were changes in food choices and nutrition knowledge that occurred following an educational intervention. The independent variable was the self-efficacy of the children. The self-efficacy scores, the food choices scores, and the nutrition knowledge test scores were used to assess the relationship between the dependent and the independent variables. The food choice scores were estimated from a five-day food record of school lunches kept by the students. Statistical comparisons were made between self-perceived competence and the food choices of the children. The results of the chi square test used to determine the relationship are reported.

Significance

The predictive study was undertaken to increase the understanding of the food choices of children and to provide a theoretical basis for future nutrition education intervention to improve eating habits of school children. The collection of data on children's self-efficacy, along with other pertinent health information, may permit the planning of more effective programs than would otherwise be possible. Interventions could then be targeted to the specific needs identified by the self-efficacy assessments related to the eating behavior of the children. If self-efficacy expectations proved to be successful in predicting changes in food choices, then it would lay a groundwork for subsequent attempts at changing the food choices of children through self-efficacy enhancement in the classroom setting (e.g. through modeling, performance accomplishments, and effort attribution).

Hypotheses

The following hypotheses were tested :

1. Subjects with higher self-efficacy measures will show greater increase in their food choices after a nutrition education program.
2. Subjects with higher self-efficacy measures will show greater gain in nutrition knowledge after the nutrition education program.

REVIEW OF LITERATURE

There is a widespread concern about the dietary habits of children in the United States. Because children are learning to make their own food choices, nutrition education is frequently recommended as a means of improving their nutritional status (White House Conference on Food, Nutrition and Health, 1969). The results from dietary surveys provide justification for the need for nutrition education and the evidence of the ineffectiveness of the current nutrition education efforts. Effective nutrition education has been defined as directed change in both nutritional knowledge and nutritional behavior (MacReynolds, 1970; Carruth and Anderson, 1977).

The nation's health goals for the year 2000 specify increasing the consumption of fruits and vegetables from 2 1/2 to 5 or more servings per day (US Department of Health and Human Services, 1991). The Dietary Guidelines for Americans (US Department of Agriculture, 1990) recommended consumption of five or more servings of vegetables and fruits daily. The Diet and Health report (National Research Council, 1989) also emphasized fruits rich in vitamin C and carotenoids.

In the US NHANES II data, 41% of the population had no fruit on the survey day, only one-fourth had a fruit or vegetable rich in vitamin A or vitamin C and only 10% consumed the recommended five servings of fruits and vegetables (Block, 1991). Kant et al. (1991) reported the dietary diversity of a subset of the NHANES II population, composed of 11,658 black and white individuals 19-74 years old. They found that a high proportion of the US population did not consume diets that included all the major food groups. They found that 78% of blacks scored below 5 on the Food Group Score; they did not consume foods from all the five groups on the day of the survey. More than 40% of the blacks scored 0 to 3 on the Food Group Score. The fruit group was the one most

frequently missed, followed by the dairy and vegetable groups (Kant et al., 1991). Failure to consume any foods from the fruit and vegetable group was reported by 46% and 18%, respectively, of the population on the survey day. The proportion of the population consuming at least the desired number of servings from each of these groups was 29% and 61%, respectively. Patterson et al. (1990) reported the fruit and vegetable consumption of the same group of respondents from the NHANES II survey. Only 27% met the USDA guidelines of 3 or more servings of vegetables and 29% met the fruit guidelines of two or more servings. Only 9% met the guidelines for both fruits and vegetables. Eleven percent ate neither fruit nor vegetable on the recall day, 45% had no servings of fruit, and 22% had no servings of vegetable. Another study from the same survey found that the number of individuals consuming liver, carrots, or other deep yellow or dark green leafy vegetables, the traditional sources of vitamin A and provitamin A, was quite small (Block et al., 1985). The 24-hour dietary data from NHANES II emphasized the need for major public education efforts to increase the consumption of fruits, vegetables, dairy, and grain groups. Special target groups that would benefit from education on strategies for improving nutritional practices included minorities and individuals with limited income and formal education (Kant et al., 1991).

Since childhood is a time when many food preferences and behaviors are established, it is an important period for dietary intervention (Simmons-Morton et al., 1991). Effective interventions should result in an immediate increased consumption of fruits and vegetables and should continue to persist into adulthood. Three factors appeared to be most likely to increase the consumption of fruits and vegetables in children : increasing availability at home, enhancing liking for vegetables, and providing skills in increasing fruit and vegetable consumption (Baronowski et al., 1993). Skills concern whatever abilities and confidence children have in performing the behaviors that are likely to lead to increased fruit and vegetable consumption. Skills enable children to assert control over aspects of their environment.

Obstacles to Effective Behavior Change

Although the need for nutrition education is widely recognized, the factors which contribute to effective nutrition education are not clearly understood. An insufficient understanding of the interrelationships among the factors influencing health behaviors may be responsible for failures of previous nutrition intervention programs (Lewis et al., 1989). Studies conducted in the past (Schwartz, 1975; Picardi and Porter, 1976) verify that nutrition knowledge does not necessarily correlate with wise dietary choices. Nutrition knowledge is necessary but not sufficient in itself to cause a change in eating behavior. Knowledge only acts to influence commitment (Kayman, 1989). Therefore, teaching methods should be developed to influence behaviors rather than simply disseminate information. McGuire (1981) suggested that nutrition and health education should focus on developing skills and self-confidence enhancement needed to make healthy food choices.

Turning knowledge into behavior is a complex process of internalizing nutrition knowledge into appropriate food-related behaviors. An understanding of the potential influences on a child's current nutritional behavior serves as a basis for identifying intervention programs and determining effective strategies. There is a need for continued research to understand ways to work with the power of thought (decision-making, commitment, self-efficacy) on behavior, so that individuals may be taught to modify their thoughts, as a first step to successful behavior change (Kayman, 1989).

Lewis et al. (1989) reported that a poor understanding of the factors influencing food selection and an insufficient understanding of the interrelationships among these factors may be major obstacles to modifying food behaviors. After an extensive meta-analysis and review of nutrition education research, Johnson and Johnson (1985) identified the need for a theoretical model base in future nutrition education efforts. Experts in the field of nutrition education also recommend that the study of behavior change and nutrition education research have a theoretical basis (Sims, 1987). The

theoretical model approach allows a systematic study of the variables that intervene between nutrition education inputs and food behavior outcomes.

The Social Cognitive Theory

Behavior science principles have been applied in the area of nutrition education and they have proven to be very successful for weight change and in the treatment of obesity (Stunkard, 1972). There have been numerous transitions in nutrition/health instruction over the past 15-20 years but the most recent shift has been the incorporation of theoretical models. A behavioral theory that has received attention in theory-based nutrition education research is Bandura's social learning theory (1977a). Recently, Bandura (1985) renamed this as the "social cognitive theory."

Social cognitive theory (Bandura, 1977a) is the guiding force behind several ongoing community-based risk-reduction programs like obesity, coronary heart disease and cancer risk reduction programs. Nutrition and health education based on social cognitive theory focuses on individuals and their beliefs in their own abilities to successfully undertake prescribed behaviors within their environment. The theory offers several educational approaches for behavior change programs, including observational learning, goal-setting, skill-training, and other self-management skills (Parcel and Baronowski, 1981).

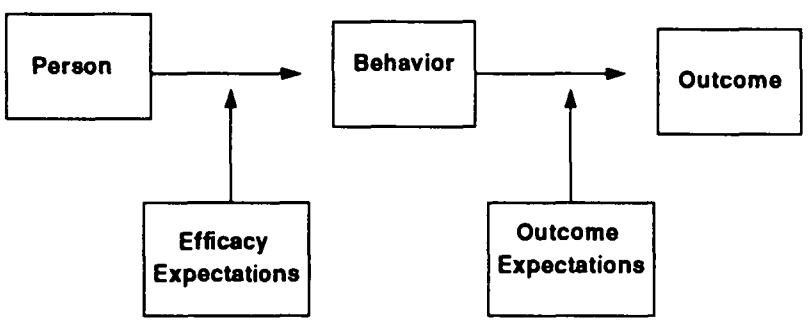
The Self-Efficacy Theory

A major contribution that social cognitive theory has made to the explanations of health-related behaviors is the introduction of the concept of self-efficacy (efficacy expectation). Perceived self-efficacy is the belief or conviction that one can personally and successfully perform the behavior required to produce the outcomes (Bandura, 1977b). It is concerned not with the skills one has but with the judgments of what one can do with

the skills. Thus, it is the perceptions, and not necessarily true capabilities, that influence behavior. Self-efficacy has a major influence on whether or not a person will initiate a behavior, how much effort will be put into it, and how long the behavior will be sustained. Self-efficacy is distinct from outcome expectancy which Bandura defines as "a person's estimate that a given behavior will lead to certain outcomes" (Bandura, 1977b, p.193).

The distinction between outcome and efficacy expectations can be understood from Fig. 1. If individuals think that specific behaviors lead to desired outcomes, and yet think they are incapable of performing those behaviors, the result is low self-efficacy. Bandura contended that although both outcome expectancies and efficacy expectancies are important, self efficacy expectation is a more central determinant of behavior than outcome expectancy, and that outcome expectancies add little to the prediction of behavior.

Fig. 1: Diagrammatic representation of the difference between efficacy expectations and outcome expectations.



Bandura, A. Self-efficacy : Toward a unifying theory of behavior change. Psychological Review 84:193, 1977b.

Efficacy expectations do not refer to the ability to do something but rather to the belief that one can do it. Bandura (1982) claimed that knowledge, skills and comprehension are necessary but insufficient in themselves to accomplish a specific task.

People sometimes do not function up to their full potential in spite of their superior capabilities. Their perception of their capabilities can interfere with their thought processes and thus have adverse effects on their behavior. The term self-efficacy can be equated with self-confidence.

Bandura's self-efficacy theory proposes that the cognitive processes which mediate behavioral change are easily induced and altered by performance attainments or mastery experiences. Self-efficacy theory maintains that all behavioral and psychological change occurs through the alteration of an individual's sense of personal mastery or self-efficacy (Bandura, 1977b, 1982). According to Bandura (1977b), expectations of personal self-efficacy are derived from the four sources briefly described below :

Personal or performance accomplishments: Personal accomplishments provide the most reliable and influential source of efficacy expectations because they are based on personal mastery experience. Successful experience enhances the level of efficacy whereas repeated failures lower it.

Vicarious experiences: Vicarious experience obtained through observation of successful or unsuccessful events or performance of others is the next most important source of efficacy.

Verbal persuasion: Verbal persuasion is frequently used in health education; while it is less powerful than performance accomplishments or vicarious experiences, it can still be a useful adjunct to more powerful influences. These events/people are referred to as "models". Verbal persuasion is capable of producing changes in an individual's belief system that he/she can cope successfully with situations or stimuli which have been overwhelming in the past.

Emotional arousal/physiological states: Stressful situations generally elicit emotional arousal that might have some informative value for the person, related to his/her personal competency. Physiological states, particularly anxiety, may inform

the individual, correctly or not, that he/she is not capable of performing a given action or success in eliminating the negative affect may enhance one's self-efficacy.

The concept of self-efficacy is receiving increasing recognition as a predictor of health behavior and maintenance. Self-efficacy theory may contribute to health education because of its potential to explain health behavior. Behavior change and maintenance are a function of

1) expectations about one's ability to engage in or execute the behavior, and
2) expectations about the outcomes that will result from one's engaging in a behavior (Strecher et al., 1986).

The primary utility of self-efficacy theory is the assessment and enhancement of task-specific perceptions that may influence performance of associated tasks. Another important aspect of self-efficacy is its predictive capability. Empirical research (Bandura, 1977b) supported the concept that self-efficacy is a powerful predictor of behavior rather than an outcome of expectation or past performance. Determining how one perceives the ability to perform a behavior in a certain situation indicates the likelihood of one actually performing the behavior.

The ability to acquire self-efficacy information changes as the child matures. According to Piaget's theory, children between the ages of seven and eleven are in the Concrete Operational stage (Piaget and Inhelder, 1969). Their thinking is characterized by increased flexibility and the ability to perceive more than one dimension, solve conservation problems and consider another child's point of view (Philips, 1975). Concrete Operational children organize, understand, and gather information pertaining to perceived self-efficacy differently from the Pre-operational children (between the ages of 2 and 7). Concrete Operational children will probably rely more on vicarious experiences, either due to their increased social awareness (Elkind, 1967; Selman, 1971) or due to the predominant influence of the peer group (Constanzo and Shaw, 1966).

Harter operationalized the term "self-efficacy" by providing a methodology which captures the child's sense of competency to perform a certain behavior. The scale, developed by Harter in 1979, was called the Perceived Competence Scale for Children. This scale was revised in 1985 and entitled the Self-Perception Profile for Children. The revised scale contains six separate subscales, tapping five specific domains : scholastic competence, athletic competence, social acceptance, physical appearance, and behavioral conduct. In addition the instrument also taps the child's global self-worth. The instrument permits researchers to examine children's assessment of their abilities across different domains. It was based on the rationale that children, like adults, perceive themselves as more competent in some spheres of activity than in others (Harter, 1982). Perceived competence, like perceived self-efficacy, "is concerned not with what one has, but with what one can do with what one has" (Bandura, 1983, p. 467). Perceived competence and self-perception are also dimensions of self-evaluation, in which emphasis is placed on an individual's assessment of abilities (Durr, 1985).

Self-Efficacy and Behavior Studies

Studies have explored the predictive power of self-efficacy on a variety of behaviors. Strecher et al. (1986) reviewed studies of self-efficacy in relation to health practices. Findings from these studies suggested strong relationships between self-efficacy and health behavior change and maintenance. They also suggested that self-efficacy expectancies are an important determinant of health behavior. In general, self-efficacy predicted behavior change, and interventions to increase self-efficacy consistently contributed to change. The self-efficacy construct has been found to predict such health behaviors as weight reduction (DiClemente, 1981), smoking cessation (DiClemente et al., 1985), exercise compliance in patients with chronic obstructive pulmonary disease (Kaplan et al., 1984) and stress reduction (Bandura and Schunk, 1981).

Smoking Cessation

Research on smoking cessation has demonstrated the predictive utility of self-efficacy theory. Condiotte and Lichenstein (1981) reported self-efficacy measures of participants completing either of two different smoking cessation programs. A 46-item questionnaire was used in which subjects were asked to rate their confidence to resist the urge to smoke in various circumstances. The investigators found increased self-efficacy scores as a result of completing the smoking cessation program. In addition, low self-efficacy ratings following treatment were highly predictive of relapse, while those who relapsed or never quit smoking experienced significant decreases in self-efficacy over the same period to levels below the pretreatment.

DiClemente (1981) measured the self-efficacy of 63 male and female subjects to resist smoking cigarettes in various social and stressful situations. His subjects had recently ceased smoking through various smoking cessation techniques. Efficacy expectations were highly related to the ability to maintain smoking cessation. At a five-month follow-up, persons who relapsed had lower initial levels of self-efficacy than those who abstained. He also demonstrated that self-efficacy scores were predictive of what situations would lead to recidivism. The evidence indicated consistently that self-efficacy can predict smoking abstinence and relapse, regardless of treatment methods, methods of measuring self-efficacy, and populations under study. It is a better predictor of behavior than physiological dependence, motivation to quit, confidence in treatment, and expectancies concerning the rewards of smoking.

Exercise

Several studies have examined the applications of efficacy expectations in exercise maintenance and athletic performance. Ewart and colleagues (1984) studied men with clinically uncomplicated myocardial infarction. They found that changes in self-efficacy scores as a result of treadmill exercise testing predicted both the duration and intensity of subsequent self-reported home exercise. Self-efficacy expectations were correlated with subsequent performance on the treadmill test, which in turn, predicted subsequent changes in self-efficacy.

In a study with chronic obstructive pulmonary disease, Kaplan et al. (1984), randomly assigned patients to one of five experimental groups, including three exercise treatment groups and two control groups. Patients in each of the three treatment groups increased their walking activity in comparison to those in the control groups. This increase was related to increases in perceived efficacy for walking. They also found that efficacy expectations specifically related to the target behavior were most predictive of subsequent performance of that behavior.

Eating Behavior

Kingery (1990) studied the self-efficacy and self-monitoring of selected exercise and eating behaviors of 85 college students. Subjects were given a diet monitor for each of five days, prompting specific records such as the time of the meal, any meats or high-fiber foods eaten and the approximate amount at breakfast, lunch, snack and dinner. The exercise monitor asked for the date of the session, time spent on warming up, and length and type of exercise. Self-efficacy proved to be a good predictor of self-monitored performance of dietary and exercise behaviors when measured following a self-monitored performance attempt. Students seemed to learn from actually monitoring their behaviors. McCaul et al. (1987) used a social cognitive theory framework to study adherence to self-care regimens by adults and adolescents with diabetes and found that the single best

predictor of regimen adherence in both age groups was a measure of expectancies that included self-efficacy.

Weight Loss

Weight control is generally considered a desirable though difficult to achieve goal. One barrier to its achievement may be a lack of self-efficacy with regard to engaging in the required behaviors. Some research has applied self-efficacy theory to eating disorders, mainly in obesity and weight control. Chambliss and Murray (1979) manipulated self-efficacy to increase weight loss by clients in a behavioral treatment program. This result was achieved by telling half of the patients that their medication was ineffective and that their own control had produced the weight loss. Self-efficacy increased the ability to reduce weight in subjects with an internal locus of control.

Jeffery and colleagues (1984) assessed efficacy expectations of 89 males at pretreatment, posttreatment and one year follow-up. In their study, self-efficacy was divided into "emotional state" , which described confidence ratings in ability to refrain from eating during various emotional states, and situational efficacy, which reflected confidence in ability to abstain from eating in various situations such as visiting friends or watching television. High pretreatment levels of emotional state and situational efficacy were associated with initial and with long-term weight-loss.

Shannon et al. (1990) examined the plausibility of models to explain eating behavior. Data were obtained from 170 women who participated in a ten week weight control course. Data collected prior to the course (Time 1), immediately after it (Time 2) and two months later (Time 3) were used to test the models for each time period. Analysis of results showed self-efficacy contributed significantly to explanation of eating behavior change at Times 1 and 3. They suggested that self-efficacy may be an important factor to address in nutrition education programs designed to change eating behavior.

These results suggested that eating self-efficacy may be an important influence on dieting and weight loss success. Obese individuals view themselves as having so little control over their eating (low eating self-efficacy) that successful treatment may first involve persuading clients that they can control their weight.

Self-efficacy Studies in Children

Efficacy expectations are learned from four major sources: a) performance accomplishments, b) vicarious experience, c) verbal persuasion and d) emotional arousal. Several studies have investigated the effects of these self-efficacy enhancing techniques on the self-efficacy scores and their relationship to task-performance.

Keyser and Barling (1981) investigated the relative importance of modeling and performance as sources of self-efficacy beliefs in sixth graders. Modeling, as assessed by scores on a scale measuring teacher's self-efficacy beliefs, was positively correlated with children's self-efficacy beliefs. Contrary to the predictions, regression analyses indicated that performance, as measured by scores on the Wide Range Achievement Test, did not predict self-efficacy beliefs. They suggested that the age of the subject may influence the relative salience of the sources of efficacy information. The work of the cognitive developmentalist Jean Piaget (Flavell, 1977; Piaget and Inhelder, 1969) indicated a progressive change of nature and quality of the child's cognitive capabilities. Thus, the information that they receive may be processed differentially with age.

Zimmerman and Ringle (1981) investigated the relationship between an adult model's expressed confidence or pessimism and task persistence on self-efficacy beliefs of 100 first and second grade black and Hispanic children. The tasks to be solved involved two wire puzzles and a word puzzle. The child's pretest and posttest self-efficacy judgments about solving the puzzles were measured by showing them three pictures: the first picture was of a person who is very happy because he is absolutely sure that he can solve the puzzle; the second person is not sure he can solve the puzzle; and the last person

who is unhappy because he is sure he cannot solve the puzzle. The child is asked to point to the face which tells how he/she feels about solving the puzzle. The experimenter model first attempted to solve the puzzles and the child was subsequently presented with an insolvable embedded word puzzle. In addition to their actual persistence on the two tasks, the children's self-efficacy measures were assessed at two different times. The model's duration of performance and his statements of confidence increased the children's task-persistence on the two puzzles, and the modeling treatment was found to significantly affect the children's self-efficacy.

An important means of developing and enhancing percepts of self-efficacy is through goal-setting (Schunk, 1983). Bandura and Schunk (1981) demonstrated that self-efficacy could be cultivated in slow learning students by having them set and achieve small subgoals. Students who were in the treatment group which used small subgoals progressed significantly ($p < .05$) faster in self-directed math learning and achieved greater mastery of math skills than subjects assigned to a group that had set only long-term goals. Performance accomplishments were also demonstrated (Barling and Snipelisky, 1983) to be stronger determinants of children's academic self-efficacy belief than teacher modeling.

Schunk (1981) also studied modeling and attributional effects on children's achievement. Fifty-six children ranging between 9 to 11 years and showing low arithmetic achievement received either modeling of division operations or didactic instruction, followed by a practice period. During practice, half of the children in each instructional treatment received effort attribution for success or difficulty. Though both treatments enhanced division persistence, accuracy, and perceived efficacy, the cognitive modeling produced greater gains in accuracy. Perceived efficacy was found to be an accurate predictor of arithmetic performance across levels of task difficulty and modes of treatment. The treatment combining modeling with effort attribution produced the highest congruence between efficacy judgment and performance. Self-efficacy predicted behavior

change in general and interventions to increase self-efficacy consistently contributed to change.

Schunk (1983) studied the role of social comparative information and goal-setting in developing children's self-efficacy and skills. He chose 40 children from grades 4 and 5. He identified children who could not correctly solve more than 30% of the division problems and focused on processes to develop the skills which were initially lacking in the children. The children were first pretested on their self-efficacy for solving the problems. In the comparative information group the supervisor explained that she had worked with other children and that half finished at least 25 problems. The 50% completion rate was chosen to foster self-motivation by presenting the task as challenging but attainable. In the goals only group at the start of the first session, the proctor suggested that the children might want to decide to work on at least 25 of the problems. At the start of the second session, the proctor suggested a goal of 16 problems. The goal instruction was offered suggestively so that the actual goal decision was left to the children, which was expected to increase self-involvement and goal commitment. In the goals + comparative information, the children were given both sets of treatment. The fourth group received only training packets and no treatment instructions. Results of the study indicated that providing children with specific, proximal goals, along with social comparative information indicating that the goals represent average attainment by other similar children, constituted an effective means of fostering skill development and perceived efficacy for solving problems.

Durr (1985) studied 50 third grade and 42 fifth grade children to assess the relationship between self-efficacy, locus of control, and self-perceived risk-taking and task-persistence. She administered the Perceived Competence Scale for Children to measure their self-efficacy. A significant relationship was found between perceived competence and self-perceived risk-taking/task persistence at grade five. With respect to gender, boys perceived themselves more likely to take risks and to persist at tasks.

Assessment of Nutrition Knowledge

Learning in the cognitive domain is routinely evaluated with achievement tests. Test items are categorized into the following five types : true-false, matching, multiple choice, short answer and essay (Gronlund, 1968). These items are classified as either objective or subjective based on the ease and precision of scoring. Except for the essay question, all other types are considered objective items. Sax (1974) reported that essay questions and short answer items lack the scoring precision and accuracy required in research studies.

The multiple choice test item has several advantages over matching and true and false items. The guessing effects are reduced to a minimum because of a choice of 4 or 5 answers. Since alternative answers serve as a standard of comparison, these items are relatively free from ambiguity (Payne, 1992). It has greater versatility because the items can be used to test a greater variety of instructional objectives (Nitko, 1983). It can be used to measure simple to complex levels in the cognitive domain and to assess knowledge as well as such higher mental processes as application and analysis. Lastly, item analysis is easily performed.

The quality of an entire test is described by the terms, validity and reliability. Reliability refers to the extent to which individual differences are measured consistently. It is a measure of how stable, dependable, trustworthy, and consistent a test is in measuring the same thing each time (Worthen et al., 1993). Reliability can be determined by test-retest method, the internal consistency method, the equivalent forms method, and the test - retest with equivalent forms. The simplest way to estimate a test's reliability is to give the same test twice to the same individuals and then determine the correlation between the two sets of scores. Reliability, or the consistency of the measurement, can be classified as either a measure of stability (test-retest reliability) or measure of equivalence (Sims, 1981). The reliability coefficient is a measure of consistency of measurement for all methods. The reliability coefficients generally range from 0 to +1.0. The closer the reliability is to 1.0,

the more reliable the scores. The reliability coefficient typically ranges between 0.60 and 0.80 for classroom tests. The reliability coefficient for well-developed standardized tests should be .90 or higher. Coefficients as low as .50 are acceptable if the tests are used to make decisions about groups (Worthen et al., 1993). The test-retest method typically produces high coefficients, perhaps highest of any method relative to the actual reliability of the test if the interval between the test administrations is short. As the time interval between the test increases, the coefficients typically decrease to moderate levels (Worthen et al., 1993). The standard error measurement, which is the standard deviation of obtained scores around a theoretical true score, is another way to measure reliability (Sax, 1974). For tests containing 24 to 47 items, a standard error of 3 points is suggested (Diederich, as cited in Gronlund, 1968). Gronlund suggested two ways to improve reliability of a test. First, improve the difficulty of the test and the discriminating power of the individual test items. The ideal for both factors is at the 50 percent level. The second way of increasing the reliability of a test is to increase the length of the test; a greater number of test items will result in a bigger spread of scores.

Validity of a test is the extent to which an instrument actually and accurately measures what it is designed to measure. Test scores are valid to the degree to which they accomplish the purpose for which they are being used or more precisely, the scores obtained from the test are valid to the degree that differences represent actual differences in the characteristic being measured (Worthen et al., 1993). Content validity of a test is determined by its relevance to the instructor's objectives rather than by its coverage of the materials of instruction (Test Development Handbook, no year). Content validity is the degree to which the score or scale being used represents the concept about which generalizations are to be made. It is assessed by carefully examining the tests, item by item, to determine if the items individually and collectively are measuring what they are supposed to. A clearly defined set of instructional goals or a well-developed table of specifications can be ideally used as a guide when analyzing the test (TenBrink, 1974).

Item analysis is routinely performed on individual test items after the test has been administered and scored. It provides a systematic method to examine items and determine whether students are answering them in suspicious ways. There are several methods for analyzing objective test results which make it possible to determine the following points:

1. Difficulty of an item: The difficulty of each item, measured by the index of difficulty, is the percent of students in the class answering the question correctly.

2. Discriminating power of the correct answer: The capacity of an item to distinguish between good and poor students, described by the index of discrimination, is the percent of the highest scoring students answering the question correctly as compared to the percent of the lowest scoring students answering the question correctly. It is the extent to which the item separates the highest scoring student from the lowest scoring student (McLaughlin, 1964). The discrimination index of each item tells how well that item distinguishes between students who did well on the total test and those who did poorly.

An indication of the item's quality is its difficulty level. In a test designed to measure knowledge prior to instruction, the items will all be quite difficult (TenBrink, 1974). The difficulty level is computed by simply determining what proportion of all the students taking the test got an item correct. The easier the item, the higher the difficulty index. Items in norm-referenced tests should have levels of difficulty in the 20 to 80 percent range so that scores will be spread out along a continuum of content mastery (Worthen et al., 1993). The 50 percent level of difficulty is considered ideal for the test items since at this level maximum discrimination is possible (Gronlund, 1968). Ideal difficulty, however, does not necessarily imply an ideal item. The item difficulty index, or the p-value, is the proportion of correct answers to an item. The p-value of an item ranges in value from zero to one; the easier an item, the higher its p-value. In a four choice item there is a probability of .25 of being correct by chance alone. The p-value midway between .25 and 1.00 is .62; therefore a test composed of four-choice items should have items

ranging in difficulty from .25 to 1.00 with a majority of the items having p-values about .60 (Test Development Handbook, no year).

The discrimination index is computed by subtracting the number of students who got the item right in the low-scoring group from the number of students who got the item right in the high-scoring group, and dividing the answer by the size of each group. The index of discrimination can range from -1.0 to +1.0. Hopkins et al. (1990) suggested the following guidelines for interpreting the discrimination index.

Table 1. Discrimination index

Discrimination index	Item Evaluation
.40 and up	very good item
.30 to .39	good item
.20 to .29	reasonably good item
.10 to .19	marginal item, usually subject to improvement
Below .10	poor item, to be rejected or revised

Hopkins et al. Educational and Psychological Measurement and Evaluation. 7th ed. Englewood Cliffs, N.J. , Prentice Hall, 1990. p. 274.

Dietary Evaluation Methodology

There are several methods used to measure the dietary intake and food consumption pattern, and each method has its advantages and limitations (Marr, 1971). The most common technique in current dietary assessment of children is the 24-hour recall (Eck et al., 1989). This involves collection of information from individual subjects about their personal food habits. Data may be collected using written questionnaires or by interviewing the subjects. Subjects are asked to recall in as much detail as possible the quantity of everything eaten in the previous 24 hour period. Food records, food recalls, and food intake frequencies are some of the methods used to collect data from individual

subjects. Food records rely on data gathered over a specific, limited time period, usually 1 to 7 days, which may not be representative of the usual food habits of the individual. Food records are accounts of actual food intake by the individual. The individual is provided with forms and instructions prior to keeping the records. Amounts of food eaten may be recorded in actual weights or in common household measures.

Few attempts have been made to validate the dietary recalls and the food recording method in groups of children. The validity testing of dietary recalls among children have given varying conclusions. A review of literature by Carter et al. (1981) and Stunkard and Waxman (1981) provided evidence that self-reports of food intake by children are relatively accurate. In a study of 13-year old children (Persson and Carlgreen, 1984), there was generally a good agreement between the computed results of food records and the outcome of chemically analyzed duplicate portions of all eaten foods. However, Baronowski et al. (1986) reviewed the literature on methods for children to self-record their dietary intake and found that there were no reports of validity or reliability. Their article reported the validity of different methods of self-recording of the frequency of food consumption of foods by third to sixth graders. They found an overall agreement of 82.9% between observers and self-report by children which documented the ability of the third to sixth grade children to accurately report on the frequency of foods consumed on a daily basis using the self-report of diet measure.

Frank et al. (1989) conducted a study comparing the observed versus self-report of food items chosen by fifth-grade children at lunch. They obtained an 83 to 94% agreement between the two reports when students recorded their selections shortly after the meal. Frank et al. (1978) have also evaluated the reproducibility of 24-hour recalls by 30 fifth-graders by having two nutritionists independently interview each child for the same 24-hour period. They found that there were no systematic differences between the duplicate interviews.

To improve the quality of dietary information gathered from children requires modified and specific techniques. Van Horn et al.(1990) recommended the following for improving the accuracy of dietary self-reports by children: use of food models and pictures, attractive appearance of the instrument used to record the data, adequate training of the child, and maintaining overall simplicity. It was also recommended that the diets of children younger than age 12 be assessed by individually administered interviews rather than self-recording. The number of days of dietary data needed to best estimate the usual nutrient intake has not been clearly established. One day's diet, whether recalled or recorded, is generally considered to yield a reliable and valid characterization of the average nutrient intake of a large group (Karkeck, 1987; Emmons and Hayes, 1973). Since an individual's diet differs greatly from day to day, one day's intake may not adequately represent the usual food patterns of an individual or a small group (Block, 1982). Therefore, it is considered essential to gather data on food intake over a longer period of time (Eck et al., 1989). Studies (La Porte et al., 1989; Jackson et al., 1986) have demonstrated that food records maintained for a period of 3-4 days are enough to adequately describe the normal food practices of the individual. A study conducted by Gersovitz et al. (1978) suggested that the accuracy of the food recording deteriorates over time so that an individual's records may become unreliable after the first few days. In their study on the validity of 24-hour dietary recall and seven-day record for group comparisons, accuracy was found to decline by fifth, sixth and seventh day. The use of a 3-day food record has not been validated in an elementary school-aged population. La Porte et al.(1989) had sixth-graders complete 3-day diet records to evaluate the effectiveness of a nutrition education program. They reported that students had difficulty determining portion sizes and completing the forms correctly. Several researchers (Stunkard and Waxman, 1981; Carter et al, 1981) have reported the existence of the "flat slope syndrome" in dietary studies with pediatric population. This refers to the tendency to over-report small intakes and under-report large intakes, resulting in a smaller apparent

difference between groups than might be observed if the measurement were more accurate.

Statistical Analyses

Non-parametric statistical tests typically make no assumptions about normally distributed variables or equal variance and are suitable for use with ordinal measurement or, in some cases, nominal measurement (Siegel, 1956). The Chi-square is an example of a non-parametric statistic. If there is reason to believe that the sample size is limited, the researcher would do well to consider the use of non-parametric statistics. With fewer subjects, it is possible that one or more of the assumptions of the parametric statistical techniques will not be met (Minium, 1970). Siegel believed that small sample sizes should always be analyzed with non-parametric techniques.

RESEARCH PROCEDURES

Purpose and Design

The purpose of the study was to test the predictive power and the relationship of self-efficacy to food choices and learning in children. The independent variable in the study was self-efficacy. The dependent variables were the change in food choices and the nutrition knowledge of the children who participated in the nutrition education program. In order to identify the possible relationship among self-efficacy, change in food choices, and nutrition knowledge of children, the research hypotheses were tested regarding relationship between the predictor variable, self-efficacy, and the dependent variables, fruit and vegetable consumption and gain in nutrition knowledge.

Approvals

Prior approval of all procedures of the study was obtained from the Committee for the Protection of Human Subjects at Oregon State University, Corvallis, Oregon (Appendix 1a). The study was conducted within the guidelines for the protection of the rights of human subjects. Approval was also obtained from the Director, Jefferson cluster of schools (Appendix 1b), and the principal of the Woodlawn elementary school (Appendix 1c). Consent was also obtained from the two classroom teachers, and the parent of each of the fifth grade children who participated in the study (Appendix 1d). The participation of the students in the study was voluntary. Written informed consent from the students was also obtained prior to conducting the study (Appendix 1e). Subjects were asked whether they understood the instructions and then were asked to print or sign their name on the Student's Consent Form if they wanted to be in the study. The responsibilities and expectations of the students were explained before the first lesson. An information sheet was sent to the parents explaining the objectives and purpose of the study, the time

of the study, and the instruments that would be used in the study. Prior to the study, the researcher visited both classrooms on several occasions while the regular teachers were teaching different subjects. This was intended to build rapport with the subjects and to reduce any problems during the actual study. The students were told before the study that they were going to take some tests and participate in a nutrition education program.

Nutrition Education Program

Knowledge, skills and comprehension are essential to accomplish any task and can either restrict or enhance performance of the behavior. The nutrition education intervention program was to ensure that lack of knowledge did not deter the change in nutrition behavior. The nutrition education program was developed by the researcher by reviewing programs for grade school children, by referring to textbooks on foods and nutrition, and children's books on nutrition. Some parts of the program were adapted from nutrition programs developed by the Oregon Dairy Council, the American Cancer Society and the F. U. N. program of the Portland Public Schools Nutrition Services. Program aspects were discussed with Connie Evers (L.D.), Nutritionist, Portland Public Schools Nutrition Services and Pat Aune, an extension home economist with the Multnomah County Extension Service. A unit of five lessons was planned to complement the fifth-grade nutrition education unit in the health curriculum. The initial program was submitted to Connie Evers for comments and critique. This information was then used to improve the finished product.

Five 45-minute nutrition education units (Appendix 2) emphasizing fruits and vegetables and the importance of choosing foods for a balanced diet were taught by the researcher during May, 1993. The units were entitled : 1) Nutrition: A Foundation for Good Health; 2) The Basic Five; 3) Vegetables Are Very Good Indeed; 4) Three Cheers for Fruits and Vegetables; and 5) Nutrients in Fruits and Vegetables. These were not pilot-tested.

The Food Guide Pyramid (US Department of Agriculture, 1992) was used as the basis of the nutrition education program. The visually striking Food Guide Pyramid is an exciting new tool for nutrition educators. It is an outline of what to eat each day based on the dietary guidelines. It's not a rigid prescription but a general guide to choosing a healthful diet. The Pyramid calls for eating a variety of foods to get the necessary nutrients and at the same time the right amount of calories to maintain healthy weight.

The five-day nutrition education program was designed to increase the consumption of fruits and vegetables and to teach the children the importance of including a variety of foods in the diet, with particular emphasis given to the nutritional value of vegetables and fruits. The US Department of Health and Human Services (1980) suggested that for good health Americans should include five or more servings of fruit and vegetable in the daily diet which is roughly double what children are currently eating. The five lessons used informative instruction, participatory classroom activities, handouts, and goal-setting. Lesson plans were designed to provide a fun learning experience as well as awareness and improvement of the current food patterns. Posters with nutrition themes were exhibited in the classroom during the teaching period. At the end of each class there were nutrition related activities, songs, and games. The games included crossword puzzles relating foods to nutrients or functions of nutrients. The children were also given home-work sheets every day which they were supposed to turn in the next day. On the average, three activity sheets and two homework sheets were distributed each day during the instruction period. Two techniques of self-efficacy enhancement were used in the program, namely, modeling and performance accomplishment which was attained by short-term goal-setting. The techniques were used because they have been demonstrated to be useful and effective educational tools in the design of school nutrition education programs. Emphasis was placed on setting short-term goals and evaluating them frequently. At the end of the second class, the subjects were encouraged to choose one of the nutritious foods from the fruit and vegetable group more often in their diet over the next week. They

wrote down the fruit or vegetable that they would eat more often on a piece of paper and also shared their decision with a classmate. The goals were reviewed every day for success or failure. During the third class, the subjects viewed a videotape/film which showed other children similar to the subjects successfully changing their eating habits to include more fruits and vegetables in their daily diet.

The lessons were scheduled during regular school hours and were taught while the classroom teachers were present. Care was taken to avoid any inconvenience to the classroom teachers. The nutrition education program was taught as five one-hour lessons for five days. This was part of the school unit on nutrition under the Health curriculum. The nutrition education program which was developed by the researcher was integrated with other subjects and the established health and nutrition curriculum. In developing the nutrition education program, the researcher referred to the nutrition section of the health textbook and incorporated some of the nutrition topics in the program. The five lessons were based on the following objectives:

1. The student will understand that good nutrition depends on eating the right kind of foods.
2. The student will learn the importance and role of each food group in relation to nutrition and health.
3. The student will learn that vegetables and fruits are actually different parts of the plants and the variety of fruits and vegetables available. They will also be able to discuss nutritional information on fruits and vegetables.
4. The student will be able to identify the main nutrients provided by fruits and vegetables and also be able to know at least one function of each nutrient.
5. The children will be able to discuss a fruit and vegetable report and make goals of including more servings of fruits and vegetables in the diet.

6. The student will be able to identify one's own food choices and will be encouraged to choose one of the nutritious foods from fruit/vegetable group over the non-nutritious snacks.

Evaluation Instruments

The Self-Perception Profile for Children

The Self-Perception Profile for Children (Harter, 1985) was administered to all children to assess their level of self-perceived competence or self-efficacy. This scale (Appendix 3) was a revision of the Perceived Competence Scale for Children (Harter, 1979). The original measure tapped three competence domains : cognitive competence, social competence, and athletic competence as well as one's global self-esteem. In the revised version, two subscales were added to the original four. These were physical appearance and behavioral conduct. The original subscales were also renamed to provide a more accurate label for the domain content. The revised version of this instrument contains six separate subscales tapping five specific domains, as well as global self-worth. The specific domains in Harter's scale are : 1. Scholastic Competence, 2. Social Acceptance, 3. Athletic Competence, 4. Physical Appearance, 5. Behavioral Conduct. For the present research study, the items pertaining to athletic competence and global self-worth were not included in the scale. Global self-worth items do not translate into attributes which an objective observer can rate. Domains may be deleted without affecting the validity of the results (Harter, phone communication, Feb., 1993).

Six items which tapped the children's nutritional behavior competence were developed and included in the scale. The six additional items were developed by referring to similar questionnaires used by Kingery (1990) and Shannon et al. (1990) to tap the self-efficacy levels of diabetics, college students and an adult population. These items were reviewed by Harter who originally developed the Perceived Competence Scale and the

revised Self-Perception Profile for Children. Based on her feedback, the instrument was revised. Several items were reworded slightly for clarity. One item was dropped and one item added to better represent the category of nutritional competence. The final subscale consisted of six items. While these additional items were not validated, they were pilot-tested with fifth-grade students from Martin Luther King Jr. School in Portland, Oregon. The mean score on the test was 80.4 with a range of 64 to 104. The instrument was not pretested for reliability but the pretest and posttest scores obtained from the actual study were used to measure the test-retest and internal consistency reliabilities.

Content of Each Domain

1. Scholastic Competence : All of the items in this scale are school-related. These items tap the child's perception of his/her competence or ability within the realm of scholastic performance.
2. Social Acceptance : This subscale taps the degree to which the child is accepted by peers or feels popular. These items tap the degree to which one has friends, feels popular, and feels that most kids like them.
3. Physical Appearance : Physical appearance taps the degree to which the child is happy with the way he/she looks; likes one's height, weight, body, face, hair; and feels that he/she is good-looking.
4. Behavioral Conduct : These items tap the degree to which children like the way they behave, do the right thing, act the way they are supposed to, avoid getting into trouble, and do the things they are supposed to do.
5. Nutritional Competence : This was the new subscale added to the original self-efficacy instrument. Nutritional Competence was defined as the belief in one's ability to choose healthy foods, to try new and unfamiliar foods, and to be able to change food habits. A total of 6 items were written to measure nutritional competence.

The original scale developed by Harter and entitled "What I Am Like" consists of 36 forced-choice items presented in a structured alternative format. As administered for the present study, there were 30 items. There are no false answers. The type of statement legitimizes either choice. Children are asked to decide which kind of kid he or she is most like: the kids described on the right side or on the left side. Once they make that decision, the child then decides whether that statement is really true or sort of true for him or her. Items are mixed across the different subscales so that no two consecutive items represent the same domain. Scores were totaled and averaged for each of the subscales, providing separate mean scores. The instructions for marking the items were read aloud to the students in the classroom. The students then read the items themselves and marked the suitable box.

Scoring

A scoring key is included in Appendix 4. Items are scored either 4, 3, 2, or 1, where 4 represents the most adequate self-judgment and 1 represents the least adequate self-judgment. Items within each subscale are counter-balanced such that three of the items are worded with the most adequate statement on the left and the other three items are worded with the most adequate statement on the right. Thus, the item scores for those with the most adequate description on the left are scored 4, 3 ,2, 1 (from left to right) whereas the item scores for those with the most adequate description on the right are scored 1, 2, 3, 4 (from left to right).

Nutrition Knowledge Test

The change in nutrition knowledge of the children was assessed by comparing performance on a written test administered before the program and immediately after completion of the program. A copy of the instrument is included in Appendix 5. A 30-minute paper and pencil test containing 25 multiple choice items based on the objectives

of the program was developed by the researcher. The objective, multiple-choice format was selected because it best discriminates between degrees of knowledge yet provides accurate, unbiased scoring. A classification matrix was developed to insure that the questionnaire contained a balance of items about various nutrients and nutrition topics. This classification grid insured the validity of the knowledge test in relation to the subject matter. Using the classification matrix as a guide, the researcher developed most of the multiple choice questions. Some of the questions were selected from a nutrition knowledge questionnaire developed by Skinner (1978) and two items were selected from the Curriculum Guide for Upper Elementary Grades by the California State Department of Education. Content validity and accuracy were established through the use of faculty members in the Department of Nutrition and Food Management at Oregon State University who determined whether the items reflected the stated objectives. The 25 item nutrition knowledge test was also pilot tested on a group of fifth grade children from Martin Luther King Jr. School. The subjects used in the pilot study were similar to the subjects in the actual study with respect to age, race and economic background. The mean score on the pilot test was 8.95 with a range of 5 to 14. On the basis of the responses from the children, questions were rewritten when necessary, and 25 items were selected for the final instrument. This test was administered both before and after the nutrition education program to assess students' knowledge regarding the nutrition unit. A knowledge score was obtained by summing up the number of correct responses; 25 was the highest possible score. Student learning in the cognitive domain was measured by differences in scores on the nutrition knowledge pretest and posttest.

Five-Day Food Record

The method of dietary evaluation chosen was the food record for school lunches. The students recorded all the foods and beverages they consumed at school lunch for five week days before and five week days after the nutrition education program. The students

were given all instructions before they started keeping the record. Each student was given a special folder to keep the five-day food record sheets. Appendix 6a and 6b shows the lunch menus for the five pretest days and the five posttest days, respectively.

A copy of the food record form "What I ate at School Lunch" can be found in Appendix 7. The menu items for each day were already printed on the forms. The students were asked to check the appropriate column to indicate how much of each item they ate. A baseline food record was kept for five days at the beginning of the study. At the end of the nutrition education program, they repeated the five-day food record keeping for school lunch. Students were asked to mark what they ate, and whether they ate all, half, quarter or none of each item on the menu. A score of 4 was given to the student who ate all of a particular item on the menu, 3 if they ate half of it, 2 if they ate only a quarter, and 1 if they didn't eat it at all. The scores for only fruits and vegetables on the menu for the five days were totaled to obtain a food choices score and this was used for statistical analyses. A comparison of the pretest to posttest difference in food choice scores was done.

Food Acceptability Questionnaire

A food acceptability questionnaire was also administered to the children at the beginning and following the nutrition education program. This questionnaire was developed by Caprio (1977). It consisted of a list of foods and was aimed at determining the student's stated acceptance of each of the food items. For the purpose of this study, some of the items from the original list were deleted and more fruits and vegetables were added to the list. The children rated each food on the list as LIKE, DISLIKE, or NEVER TRIED (Appendix 8). As developed by Caprio (phone communication, March 1993), a score of 2 was assigned to each food that was placed under the like category, a score of -2 was given to the foods in the dislike category and a score of -1 to the foods that were marked as never tried. The total scored data were analyzed to determine the relationship between self-efficacy and food acceptability scores.

Sample Selection

The subjects in this study consisted of 46 students from two fifth-grade classrooms at Woodlawn Elementary School in Portland, Oregon. The school was selected based on the interest shown by the principal and classroom teachers in the research study and the nutrition education program. Of the 46 children enrolled in the two classrooms, 45 agreed to participate (98%) in the study. Data for 12 students were eliminated from some of the statistical analyses because of absenteeism and incomplete food records. Fifth-grade elementary school children were selected for the study because they were old enough to read and write, but still young enough to be forming and developing food habits. Fifth grade students were also selected because they were old enough to assert some influence over their dietary habits and could provide reasonably accurate dietary self-report information.

Description of Subjects

The population served by the school selected for this study was primarily black. Therefore, the majority of the students were black, except for 3 Spanish children, two Caucasians, and 1 Asian child. According to the school principal and the classroom teachers, the children were predominantly from a low-income family bracket. Of the 45 students who agreed to participate in the study, 28 were girls (62%) and 17 were boys (38%). Eleven children were 10 years old, twenty-nine were 11 years old, and five were 12 years old.

With the exception of one child, all the students reported that they ate the school lunch all 5 days of the week. Since 1 child brought lunch from home, she was excluded from that portion of the analyses.

Sequence of Study

The study was conducted during May - June 1993. A one group pretest-posttest design was used to test the hypotheses. The sequence of the study is presented in Table 2.

Table 2: Sequence of study of self-efficacy effects for fifth-grade children in two classrooms

Duration	Activity	Description
May 10 - May 14	Pretest	Self-Perception Profile for Children, Nutrition Knowledge Test, Food Acceptability Questionnaire.
May 17 - May 21st	Pretest	Keeping the food records for five days.
May 24 - May 28	Intervention	Nutrition education program
June 1 - June 5	Posttest	Self-perception profile for Children, Nutrition Knowledge Test, Food Acceptability Questionnaire.
June 7 - June 12	Posttest	Keeping the five day food records.

Statistical Analyses

Statistical analyses of the relationship between self-efficacy and the other dependent variables were performed using the Statistical Packages for the Social Sciences

software, SPSS/PC+ , version 4.0.1. The normal distribution of pre- and posttest nutrition knowledge scores, the pre- and posttest self-efficacy scores, and pre- and posttest food acceptability scores were tested using the normality criteria. Chi-square statistics were used to test differences between the two classrooms with regard to self-efficacy, nutrition knowledge scores, food choices and food acceptability scores. Results were reported as significant at the $p < 0.05$ level.

The self-perception profile scores, the nutrition knowledge scores, the food choices scores and the food acceptance data were categorized into low, medium and high categories. A cumulative frequency distribution table was used to categorize the data. Categorization of the data was done as the data were not equal interval data. The chi-square test of significance was used to interpret the relationship between the variables of interest as the categorized data did not lend themselves to ANOVA. The full scale scores for the self-perception profile and its subscales were used to correlate self-efficacy to the other variables in the study.

A series of 3 x 3 contingency tables were set up to analyze the relationship between change in nutrition knowledge, change in food choices, and food acceptability as the dependent variables and self-efficacy as the independent variable.

RESULTS

In this chapter the results of the predictive study are presented. First, the reliability of the Self-Perception Profile for Children is discussed, next the correlation for the subscales of the Self-Perception Profile for Children, and finally the results of the statistical analyses used to test the hypotheses.

Reliability of the Self Perception Profile Scale

The Self-Perception Profile for Children was administered to the sample population before the nutrition education program and then readministered to the same groups following a two week interval. The mean score for the pretest and posttest self-efficacy scale was 90, which is well above the mid-point for the scale. The study did not intend to enhance the self-efficacy levels of the children and therefore an increase in self-efficacy from pretestto posttest was not anticipated. Test-retest reliability coefficients of this instrument are presented in Table 3.

As can be seen from Table 3, the statistical reliability of this instrument was satisfactory for the full-scale scores as well as for the subscale scores for classroom A. The overall test-retest reliability of the self-efficacy scale for classroom A was $r = .86$, $n = 24$, $p < .05$. For classroom B, the full-scale scores were satisfactory but some of the subscale scores were unsatisfactory. Test-retest reliability was also computed for each of the subscales making up the self-efficacy instrument and for classroom A ranged from $r = .52$ for the Nutritional Competence subscale to $r = .92$ for the Physical Appearance subscale.

Table 3. Test-retest reliability (correlation) for the Self-Perception Profile for Children

Subscale	Classroom A	Classroom B
Nutritional Competence	0.52*	0.44*
Scholastic Competence	0.77*	0.32*
Social Acceptance	0.77*	0.15
Physical Appearance	0.92*	0.51*
Behavioral Conduct	0.54*	0.57*
Total	0.86*	0.55*

* Correlations significant at $p < 0.05$

The Social Acceptance scale for classroom B showed a very low reliability. The inconsistent findings for some of the subscales for classroom B suggested that the findings with respect to classroom B be interpreted with caution. To improve the reliability of the scale, it is suggested that the Nutritional Competence scale be revised by replacing the items which attenuated the reliability by new items.

Internal Consistency Reliability

The internal consistency reliabilities for the five subscales are presented in Table 4. These reliabilities were based on Cronbach's Alpha. The internal consistency reliability of the self-efficacy subscales ranged from .31 for the Scholastic Competence subscale to a high of .80 for Physical Appearance. It can be seen from Table 4 that the reliabilities are not acceptable for the Scholastic Competence and Nutritional Competence subscales. The remaining three subscales showed excellent reliability. The reliability coefficient typically ranges between 0.60 and 0.80 for classroom tests. The reliability for well-developed standardized tests often is above 0.90.

Table 4. Internal consistency reliabilities of the five subscales of the Self-Perception Profile for Children. (n = 45)

Subscale	N	Reliability (Alpha)
Scholastic Competence	45	0.31
Social Acceptance	45	0.73
Physical Appearance	45	0.80
Behavioral Conduct	45	0.73
Nutritional Competence	45	0.45

An item analysis of the Scholastic Competence subscale revealed that two items (#1 and #4) seemed to attenuate the reliability of the scale. Item #1 asked whether they felt they were very good at schoolwork and item #4 tried to find out if they often forgot what they learned. Three items from the Nutritional Competence subscale (#1, #2, and #5) lowered the reliability of the scale and didn't fit well with the rest of the scale since the reliability improved if these items were excluded from the scale. Item #1 was intended to find out their self-efficacy in being able to change their present food habits, item #2 described their ability to eat foods which may be considered unpopular by their friends, and item #5 described their confidence in choosing fresh fruits instead of cookies. The remaining three subscales showed excellent reliability. The internal consistency using coefficient alpha was 0.73 for Social Acceptance, 0.80 for Physical Appearance, and 0.73 for Behavioral Conduct. A comparison of the reliability of the subscales of the self-efficacy instrument used in the study with Harter's sample showed similar reliabilities for Social Acceptance (0.75), Physical Appearance (0.76), and Behavioral Conduct (0.73) among the fifth and sixth graders. The coefficient alpha (.31) for the Scholastic Competence subscale was much lower than the coefficient alpha (.82) reported for Harter's sample.

Correlational Analysis of Self-Efficacy Subscales

The correlational analyses were done by two stages. First, the inter-relations among the subscales which tap each domain were investigated. This was followed by the correlation of the full-scale variables. The correlation among the five subscales for the two classrooms are presented in Table 5.

Correlations were generally positive but low. Several patterns are of interest. A strong positive correlation was found between Nutritional Competence and Behavioral Conduct for classroom A ($r = .62$, $p < .01$). Nutritional Competence showed positive correlation with Physical Appearance for classroom B ($r = .44$, $p < .05$), indicating that children who felt that they have good eating habits reported that they were physically well-built and felt good about their height, weight, and looks. Social Acceptance seemed to correlate well with Physical Appearance ($r=.58$, $p < .01$) for classroom A, indicating that children felt that physical attractiveness may lead to greater acceptance and popularity amongst one's peers. Harter (1985) found a similar correlation between Social Acceptance and Physical Appearance ($r = .51$) at the third and fourth grade level when she assessed the psychometric properties of the Self-Perception Profile for Children..

Table 5. Correlation among subscales of the Self-Perception Profile for Children for the two fifth-grade classrooms (n = 45)

Subscale	Scholastic competence	Social acceptance	Physical appearance	Behavioral conduct
Nutritional competence	A$^{\lambda}$ 0.11 B$^{\nu}$. 0.09	A. 0.11 B. 0.09	A. 0.18 B. 0.44*	A 0.62** B. 0.30
Scholastic competence		A. 0.60** B. 0.11	A. 0.33 B. 0.25	A. 0.27 B. 0.18
Social acceptance			A. 0.58** B. 0.01	A. -0.11 B. 0.26
Physical appearance				A. 0.13 B. 0.35*

λ - classroom A, ν - classroom B.

* $p < .05$ ** $p < .01$

Scholastic Competence had a strong positive correlation to Social Acceptance ($r=0.60$, $p < .01$) for classroom A. This signified that students who were doing well in the school also felt they were well-accepted among their social circle. Doing well in school seemed to be related to one's popularity. A correlation value of $r = 0.63$ was obtained by Harter between Social Acceptance and Scholastic Competence at the third and fourth grade level. Physical Appearance had a positive correlation with Behavioral Conduct for classroom B ($r = .35$, $p < .05$).

Means For Pre- and Posttest Nutrition Knowledge, Food Choices, and Food Acceptability

The means for the different variables used in the study are presented in Table 6.

Table 6. Means for nutrition knowledge, food choices, and food acceptability scores for the two fifth-grade classrooms.

Variables	Mean	S.D.	Minimum	Maximum	N
Nutrition knowledge test $^{\alpha}$ (pretest)	10	2.7	4	16	45
Nutrition knowledge test (posttest)	12	4.2	2	22	45
Nutrition knowledge change(pre to posttest)	2	4.3	-11	11	45
Food choice scores$^{\beta}$(pre)	39	10.2	23	63	39
Food choice scores (post)	36	8.4	18	57	41
Food choice scores (change)	-3	8.1	-26	14	38
Food acceptance $^{\gamma}$(pre)	31	11.2	6	46	45
Food acceptance (post)	35	9.6	6	46	45
Food acceptance (change)	4	5.2	-12	15	45

$^{\alpha}$. The test consisted of 25 multiple-choice items. A score of 1 was given to each correct response. The total score for each student was obtained by totaling the number of correct responses.

$^{\beta}$. A score of 4 was given if the child ate all of the fruits/vegetables, 3 if child ate only 3/4, 2 if the child ate only 1/2, and 1 if the child ate none of the fruit/vegetable served at school lunch. The scores for fruit and vegetable were totaled over the five pretest days and for the five posttest days to get the pretest and posttest food choice scores respectively.

$^{\gamma}$. The food acceptability form consisted of a list of foods. Children were asked to mark whether they liked, disliked or never tried the item. A score of 2 was assigned if child liked the item, -2 if the child disliked it, and -1 if the child had never tried it before.

A comparison of the means for food choices showed that there was no increase in the vegetable consumption for school lunch from pretest to posttest. However, fruit consumption showed a slight increase, which was not statistically significant.

Item Analysis of the Nutrition Knowledge Test Items

An item analysis was carried out on the pretest and posttest nutrition knowledge test to gather information which will assist in improving the test items for future use. The difficulty of the test items was revealed by determining the index of difficulty for each item. The discriminating power of each item was also determined by the index of discrimination. The analysis of the 25 test questions with regard to their difficulty index are given in Table 7 and the results of the discrimination index in Table 8.

The difficulty index is applicable to the posttest items; a lower difficulty index is to be expected on a pretest. On the posttest, 22 of the items fell under the 20 to 80% range showing that these items were not too difficult or too easy. Items 3 and 25 were easy whereas item 4 was too difficult as seen from their difficulty indices. Item 4 should be rewritten.

Table 7. Difficulty indices for the items of the nutrition knowledge test for the two fifth-grade classrooms

Statement #Φ	% students with correct response (pretest) n=45	% students with correct response (posttest) n=43
1	.42	.44
2	.60	.65
3	.71	.81
4	.18	.19
5	.53	.74
6	.53	.63
7	.58	.60
8	.07	.30
9	.20	.42
10	.44	.58
11	.29	.37
12	.33	.67
13	.33	.42
14	.22	.21
15	.60	.63
16	.44	.44
17	.18	.35
18	.24	.35
19	.40	.72
20	.49	.40
21	.31	.47
22	.36	.49
23	.58	.63
24	.33	.26
25	.58	.81

Φ: Statement numbers refer to the questions in the nutrition knowledge test shown in Appendix 7.

Table 8. Discrimination index[ɜ] for the nutrition knowledge test for the two fifth-grade classrooms

Statement #[Φ]	High[a] n=15	Low[a] n=15	H - L (%) (Pretest)	High n=14	Low n=14	H - L(%) (Posttest)
1	6	4	.13	8	4	.28
2	12	5	.53	12	8	.28
3	13	9	.26	14	10	.28
4	3	2	.06	2	2	0
5	12	5	.53	13	11	.14
6	10	3	.46	11	9	.14
7	15	4	.73	12	5	.50
8	0	1	-.06	7	3	.28
9	5	1	.26	7	5	.14
10	8	5	.20	10	7	.21
11	5	2	.20	6	3	.21
12	8	3	.33	10	9	.07
13	7	3	.26	5	6	-.07
14	2	2	0	6	1	.35
15	11	9	.13	12	5	.50
16	7	7	0	10	1	.64
17	4	3	.06	8	2	.42
18	7	3	.26	8	2	.42
19	9	4	.33	12	8	.28
20	11	3	.53	9	4	.35
21	4	3	.06	11	4	.50
22	4	2	.13	8	6	.14
23	8	7	.06	13	6	.50
24	9	4	.33	4	2	.14
25	10	7	.20	13	9	.28

ɜ : The discrimination index is computed by subtracting the number of students who got the item right in the low-scoring group from the number of students who got the item right in the high-scoring group, and dividing the answer by the size of each group.

Φ : Statement numbers refer to the questions in the nutrition knowledge test shown in Appendix 7.

a : Data used for those in top third and lowest third of total test score.

Hopkins, Stanley, and Hopkins (1990) guidelines for interpreting the discrimination index were used to interpret the results shown in Table 8. The most discriminating items in the pretest were item 2, 5, 6, 7 and 20 with discrimination indices above .40. Items 4, 8, 14, 16, 17 and 21 have discrimination indices below .10. On the posttest, the most discriminating items were 7, 15, 16, 21, and 23 and the least discriminating items were 4, 12, and 13 since their discrimination indices were below .10. Questions with an index below .10 did not discriminate well between the two groups and should be rewritten or new questions substituted.

Test of the Independence of Variables With Respect to Classroom

A series of 3 x 2 contingency tables were set up to determine whether the two classrooms differed with respect to the independent and dependent variables used in the study. The hypothesis for this is :

Ho : Classroom A - Classroom B = a

Ha : Classroom A - Classroom B $\neq$ a ,

where "a" is the hypothesized difference between the classroom proportion.

Independence of the Full-Scale Self-Efficacy Scores with Regard to the Classrooms

It is hypothesized that there is no difference between the classrooms with respect to self-efficacy.

Table 9. Test of independence of self-efficacy with respect to the two fifth-grade classrooms included in the nutrition education program.

	% Low	% Medium	% High
Classroom A	29.2	29.2	41.7
Classroom B	38.1	42.9	19.0

$\chi^2 = 2.7$, df = 2, p =.25

Table 9 presents the relevant 3 x 2 contingency table for the independence of self-efficacy with respect to the two classrooms. It yields a chi-square value equal to 2.7, with df = 2. The critical value of chi-square at $\alpha = 0.05$ significance level for df = 2 is 5.99 and it exceeds the calculated value. The null hypothesis that there is no significant difference between the classrooms with respect to self-efficacy is therefore accepted.

Independence of the Nutritional Competence Subscale Scores with Respect to the Two Classrooms.

The chi-square test was used to determine the difference between the two independent classrooms with respect to the Nutritional Competence subscale of the Self-Perception Profile for Children.

Table 10. Test of independence of the Nutritional Competence subscale with respect to the two fifth-grade classrooms included in the nutrition education program.

	Nutritional Competence		
	% Low	% Medium	% High
Classroom A	41.7	20.8	37.5
Classroom B	23.8	42.9	33.3

$\chi^2 = 2.8$, df = 2, p = .23

Table 10 presents the relevant 3 x 2 contingency table used to test the independence of Nutritional Competence subscale with respect to classroom. The test yields a $\chi^2 = 2.8$ with df = 2. The critical value of chi-square at $\alpha = 0.05$ significance level for df = 2 is 5.99 and it exceeds the calculated value. The null hypothesis of no significant difference between the two classrooms with respect to nutritional competence subscales is therefore accepted.

Independence of Nutrition Knowledge Test Scores with Respect to the Classrooms

Table 11 represents the relevant 2 x 3 contingency table for assessing the independence of nutrition knowledge scores with respect to the two classrooms. It yields a $\chi^2 = 0.47$, with df = 2. Since the critical value of χ^2 at $\alpha = 0.05$ for df = 2 is equal to 5.99, the null hypothesis of no significant difference between the two classrooms with respect to the nutrition knowledge scores is accepted.

Table 11. Test of independence of nutrition knowledge test scores with respect to the two fifth-grade classrooms included in the nutrition education program.

	Nutrition Knowledge Test Scores		
	% Low	% Medium	% High
Classroom A	33.3	25.0	41.7
Classroom B	33.3	33.3	33.3

$\chi^2 = 0.47$, df = 2, p = .78

The total food acceptance scores, the scores for vegetable acceptance and scores for fruit acceptance were all compared to see if there was a difference between the classrooms with respect to these scores. The results of the chi-square test revealed that there were no significant differences between the classrooms for any of the variables. Because there were no significant differences between the two classrooms, data were pooled for all measures.

Analysis of the Effect of Self-Efficacy Levels on the Food Choices of Children

Hypothesis # 1 stated : Subjects with higher levels of self-efficacy will show greater increase in their food choice scores as a result of a nutrition education program.

To test this hypothesis the full-scale scores of self-efficacy and the total food choices scores of children in both classrooms were subjected to a chi-square test of

significance. The total food choices scores were obtained by adding up the individual scores for fruit and vegetable consumption. A pretest and a posttest total food choices score was obtained. The change or difference in food choices score was calculated as the posttest total food choices score minus the pretest total food choices score. The self-efficacy and the food choices scores were categorized into low, medium and high categories and a 3 x 3 contingency table was set up. The analysis of this test is presented in Table 12.

Table 12. Chi-square analysis for full scale scores of self-efficacy and changes in food choice scores of the children (n = 38)

	Changes in food choices		
Self-efficacy	%Low$^{\vartheta}$	%Medium$^{\vartheta}$	%High$^{\vartheta}$
Low	42	33	25
Medium	27	36	36
High	33	25	42

$\chi^2 = 1.08$, df = 4

ϑ - Cumulative frequency distribution was done to categorize the data into low, medium, and high levels

Table 12 shows that of the total children who had low self-efficacy levels, the greatest percentage of them also showed the least positive change in their food choices scores. Thirty-six percent of the children with medium levels of self-efficacy showed moderate change in their food choice scores, whereas of the children with high levels of self-efficacy, the greatest percentage (42%) showed the most positive change in their food choices scores after the nutrition education program. However, the relationship between self-efficacy and change in food choices of fruits and vegetables in the school lunch of the children was not statistically significant. Fig. 2 is a graphic representation of the results shown in Table 12.

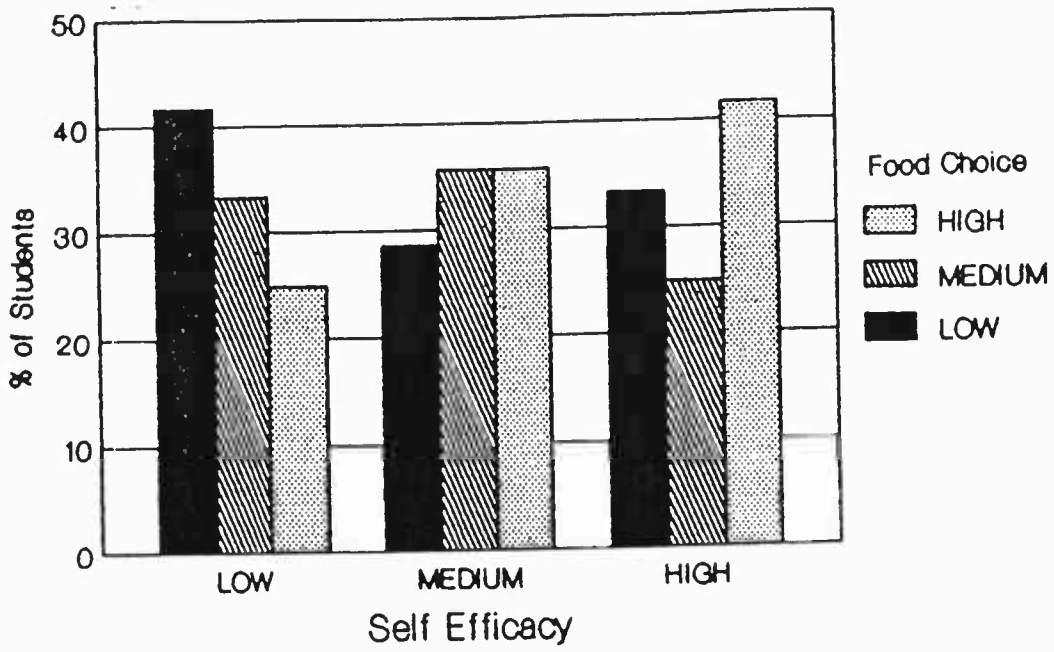


Fig. 2 : Self-efficacy by change in food choice scores of the two fifth-grade classes following a nutrition education program.

Though the chi-square analysis did not show a statistically significant relationship between total self-efficacy scores and change in food choice scores of the children, the results showed a trend which is of interest. Of the children low in self-efficacy, the greatest proportion of them tended to be low on food choice scores; and of the children with high self-efficacy, the greatest proportion tended to have high food choice scores after the intervention. The group that was high in self-efficacy showed increase in food choice scores and the group that was low on self-efficacy showed decrease in food choice scores after the nutrition education program. This would partly support the predictive capability of the self-efficacy theory. Thus, a study with larger numbers of children is recommended.

Table 13 shows the relationship between self-efficacy scores and pretest food choice scores.

Table 13. Chi-square analysis for full scale self-efficacy scores and pretest food choice scores for the two fifth grade classrooms (n = 33)

	Pretest food choice scores		
Self-efficacy	% Low	% Medium	% High
Low	25	33	42
Medium	27	53	20
High	42	16	42

$\chi^2 = 4.5$, df = 4

This analysis was done to establish effects on current food choices of the children. There were no significant differences in the pretest food choice scores of children with low, medium, and high levels of self-efficacy at 0.05 significance level. Of the total students with high levels of self-efficacy, an equal proportion (42 %) showed low and high food choices scores at pretest. The greatest proportion (42 %) of children with low self-efficacy levels scored high on food choices.

Chi-square Analysis of the Effect of Nutritional Competence Scores on the Change in Food Choice Scores of the Fifth-Grade Children

A chi-square test was also performed to test the effect of the Nutritional Competence subscale scores on the food choices of the children (Table 14). This analysis was performed to assess whether the six items which tapped the nutritional competence of the children had a relationship with their changes in food choices.

Table 14: Results of the chi-square test between Nutritional Competence scores and change in food choice scores of the fifth grade children (n = 38)

	Change in Food Choice Scores		
Nutritional Competence	% Increase	% No Change	% Decrease
Low	36	27	36
Medium	25	33	42
High	40	33	27

$\chi^2 = 1.00$, df = 4

The calculated value of chi-square (1.00 for df = 4) does not exceed the table value (9.48 for df = 4) which indicated that there was no significant relationship between change in pretest to posttest food choice scores and the nutritional competence subscale at $p < 0.05$. In general, no consistent pattern of relationship between self-efficacy scores on the nutritional competence subscale and food choices of the children was observed.

The Relationship Between Self-Efficacy and Food Acceptability

A chi-square test was also performed between total self-efficacy and posttest scores for total food acceptability, as determined by the children's ratings of foods liked, disliked, or never tried from the food acceptability questionnaire. The results of this analysis is presented in Table 15. There were no significant relationship found between self-efficacy and food acceptability level of the children. The analysis reveals that there was no relationship of the stated acceptability for fruits and vegetables by the children with respect to their self-efficacy levels.

Table 15: Results of the chi-square test between self efficacy and food acceptability scores for fifth-grade children (n = 45)

	Posttest Food Acceptability Scores		
Self -efficacy	% Decrease	% No change	% Increase
Low	33	33	33
Medium	31	31	38
High	36	36	29

$\chi^2 = 0.26$, df = 4

Analysis of the Effect of Self-Efficacy on the Nutrition Knowledge Scores of the Children

Hypothesis # 2 stated : Subjects with higher levels of self-efficacy will show greater gain in nutrition knowledge after the nutrition education program.

Results of the chi-square analysis (Table 16) to test the relationship between self-efficacy and pretest scores of nutrition knowledge of the children revealed no significant relationship at $p < .05$. It indicated that there was no ceiling effect. This means that students with high self-efficacy levels did not tend to have high pretest nutrition knowledge scores, so their pretest to posttest changes were not low because they started out close to some maximum score that was obtainable.

Table 16. Chi-square analysis for self-efficacy and pretest nutrition knowledge scores of the fifth-grade children (n = 45)

	Pretest Nutrition Knowledge		
Self-efficacy	% Low	% Medium	% High
Low	33	27	40
Medium	31	25	44
High	36	36	29

$\chi^2 = 0.86$, df = 4

Analysis of the Relationship of Self-Efficacy Levels to the Change in Nutrition Knowledge of the Children.

Table 17: Results of the chi-square test between self-efficacy and change in nutrition knowledge scores of fifth grade children (n = 45)

	Change in Nutrition Knowledge Scores		
Self Efficacy	% Decrease	% No change	% Increase
Low	13	47	40
Medium	38	25	38
High	21	57	21

$\chi^2 = 4.73$, df = 4

Table 17 shows the results of the chi-square test between self-efficacy and change in nutrition knowledge scores. There was no consistent pattern observed. The majority of the children with low levels of self-efficacy showed no change in their nutrition knowledge scores from pretest to posttest. Of the children with medium levels of self-efficacy, 38 % showed a decrease and 38 % showed an increase in nutrition knowledge scores. 57 % of the children with high levels of self-efficacy showed no change in nutrition knowledge scores.

Table 18: Results of the chi-square test between Scholastic Competence subscale scores and change in nutrition knowledge scores of the fifth grade children (n = 45)

	Change in Nutrition Knowledge Scores		
Scholastic Competence	% Decrease	% No change	% Increase
Low	15	54	31
Medium	33	33	33
High	24	41	35

$\chi^2 = 1.16$, df = 4

This analysis was done to determine the relationship between the Scholastic Competence subscale scores and the nutrition knowledge scores. No significant relationship was identified between self-efficacy levels of the children and change in nutrition knowledge scores within the scholastic competence domain (Table 18). Thus no support was provided for hypothesis # 2.

DISCUSSION

The value of self-efficacy expectations in health promotion and maintenance has been demonstrated in numerous studies. However, the present research findings did not provide support for the principles of self-efficacy theory proposed by Bandura (1977, 1982, 1986) as applied to nutrition-related changes of fifth-grade children. Higher levels of self-efficacy did not lead to greater change in the nutrition-related behaviors measured, which was the fruit and vegetable consumption of the fifth-grade children or in learning nutrition facts. Additional research is needed to determine the exact relationship between self-efficacy and food choices of the children. Even though Harter (1982) demonstrated the utility of a domain specific approach, the present research efforts failed to adequately show its effectiveness in establishing the prediction or enhancement of food choices in fifth-grade children.

It is possible that there is in fact no correlation between self-efficacy and food choices of the children. Kingery and Glasgow (1989) found that self-efficacy expectations were not potent predictors of dietary or glucose-testing self-care. In their study with non-insulin dependent diabetics, dietary self-efficacy failed consistently to predict dietary self-care over one-week and six month intervals. Durr's (1985) study also provided only partial support for the self-efficacy theory. More recently, in a study on self-efficacy in weight management, Clark et al. (1991), using subjects from independent clinical samples, developed and validated a questionnaire measure of self-efficacy judgments about eating behavior (Weight Efficacy Life-Style Questionnaire -WEL). Using this instrument they explored the best fitting model of self-efficacy and examined the change with treatment. Results from two separate treatment studies revealed that subjects did not demonstrate significant improvement on all five subscales of the WEL. Maddux et al. (1986) examined the relative contributions of self-efficacy expectancy, outcome expectancy, and outcome value in influencing and predicting behavioral intentions. The self-efficacy manipulation

consisted of three questionnaire items concerned with ability to learn and perform the broken- record technique. They failed to find a significant main effect for self-efficacy expectancy despite successful manipulation of the variable.

There were a number of limitations which should be considered when interpreting the results of the present study. First, the sample population was not selected randomly and therefore not representative of fifth-graders in Portland. Findings cannot be extrapolated to a larger population of fifth-grade students. The sample was not representative of other fifth-grade children in terms of race and economic background. The subjects in the present study were predominantly black children from low-income families. The sample size was limited. The lack of power resulting from small sample size may explain the failure to detect any significant relationship between self-efficacy and change in food choices and nutrition knowledge gain. Fewer observations may also have led to more unstable means and standard deviations. Increasing the sample size might improve the magnitude of the variance of variables used in the study. With larger samples, it is possible to obtain varied enough examples to speak confidently about averages and variability in a given population.

Reliability of the self-efficacy measures used in the study varied from low to satisfactory. With the exception of the Nutritional Competence subscale, Harter had assessed the scale's validity and reliability by collecting data from numerous samples. Early versions of the scale were individually given to approximately 300 third through sixth graders in Colorado (Harter, 1979). The test was then group administered to 133 nine through twelve year old children in California. Additional testing was conducted on six separate samples totaling 2,271 subjects in the third through ninth-grade range in four states (Harter, 1982). These samples were drawn from middle and upper-middle class populations. For every sample, boys and girls were represented in approximately equal proportions. These initial test construction evaluations and replications provided evidence that the factor structure of the test is stable, particularly across grades three through six.

Initial estimates of reliability were based on an index of internal consistency within each of the four subscales. Test-retest reliability data were gathered from one sample of 208 Colorado students after a three month interval. This information was also collected from a New York sample of 810 pupils after a nine-month period lapse. There was not a great deal of variability, either across subscales or across ages. No clear gender differences emerged.

Additional analyses on construct validity, convergent validity, and discriminant validity supported the rationale behind the construction of the scale, as well as the usefulness of the scale as a research tool for third through sixth graders. The revised version of the Perceived Competence Scale for Children was administered to four different samples. The samples represented both boys and girls at each grade level. All four samples were drawn from Colorado and were from neighborhoods ranging primarily from lower middle class to upper middle class. Approximately 90% of the subjects were Caucasian. Findings from the four separate samples are presented in the appendix (Appendix 9 and Appendix 10). Harter obtained a subscale reliability ranging from .80 to .85 for the Scholastic Competence subscale. The Scholastic Competence reliability in the present study was much lower (0.31). The lower reliability for the Scholastic Competence subscale in this study may be attributed to the difference in the samples in the two studies.

The Nutritional Competence subscale items of the self-efficacy scale were new and developed by the researcher for this study. The reliability and validity of this instrument were being established. The items therein may not have measured the construct within the specific domain; i.e. the items did not correctly measure what they were supposed to measure. The items for this domain were developed by the author and reviewed by Harter but had not been validated prior to use. Since the item analysis for some of the items in the nutritional competence subscale showed substantially lower reliabilities than the other items, they may have represented something other than what the construct subscale was designed to measure. The reliability improved when these items were excluded from the

scale. It is also possible that the subscales contained too few items which would have lowered the reliability of the instrument. An item analysis of the subscales revealed that certain items from the Nutritional Competence and Scholastic Competence subscales attenuated the reliability. The reliabilities for Scholastic Competence subscale obtained by Harter was satisfactory. The lower reliability for Scholastic Competence in the present study as compared to Harter's may have been due to the differences in the sample population. Replacement or revision of these items by items which specifically focus on nutrition and scholastic behavior may improve the reliability. It is suggested that the self-efficacy scale should consist of items tapping competency on a wide range of dietary behaviors and should represent a range of varying difficulty to each individual. Since self-efficacy is domain-specific, it is suggested that there be further development of the self-efficacy scale for children which will tap their perceived competence in nutrition practices and behavior. The development and validation of a measure of eating self-efficacy specifically for children would facilitate research on the relation between self-efficacy theory and eating behavior among children. A valid and reliable measure of eating self-efficacy would also enable us to test the hypothesized causal role of self-efficacy within the sphere of eating disorders.

The nutrition knowledge test, not being a standardized test, is likely to contain considerable measurement error. The errors may have been due to the personal circumstances of the students while taking the test or errors related to the test items themselves. Difference scores, the number which results from the posttest minus the pretest scores, are assumed to contain the error associated with both testings (Fruin and Davison, 1978). Since the knowledge difference scores and difference in food choices scores contain error from the pretest score plus the error from the posttest score, the two tests need to be extremely reliable if their difference scores are to contain anything but error. It is possible that the variability between testing situations may have caused unreliability, or error, in the resulting measurement. Change may have been present, but it

may have been confounded with errors of measurement. Thus, the interpretation of the results should be considered tentative until others have reported their observations and inferences with the measures based on similar sample populations.

Another limitation of the study was the exclusive reliance on self-reports of food consumption. The assumption was made that subjects are accurate and truthful in estimating their food intake. It might have been possible to confirm the food intake of the children by unobtrusive observation through the use of trained observers. Direct observation at school lunch time may affect the actual amount of food consumed as the students become aware that they are being watched.

A comparison of the lunch intake as estimated from plate waste with the student's food record would have revealed the accuracy of the dietary information provided by the children. This was not possible under the conditions of the study. Students were less careful in recording their lunch-intake at post-test evaluation. The sample population also showed less interest in the nutrition education program as the study progressed. These two factors may have influenced lunch recording and knowledge gain. To assure the accuracy of the student's self-reports of foods consumed, it is important to maintain an acceptable level of enthusiasm for form completion. It is possible that reducing the number of days for which food records were kept from five to three days would prevent decline of student's interest and accuracy.

Familiarity has been determined to be an important aspect of food preference in children. Children's unfamiliarity with the some of the foods served at the school might have impeded any positive influence of nutrition education on the acceptance of the fruits and vegetables.

The period during which the study is conducted is very critical. The best time to conduct research study using school children would be during the middle of the school year. It is suggested that at the end of the academic year children were less cooperative. In the present study, which was conducted from April to June, 1993, the students were attentive and interested in the nutrition education program and the evaluation instruments at the pretest period but their interest showed decline towards the end of the study period which may have affected the posttest evaluation as the students were not completing the evaluation sheets with the same enthusiasm.

The five-week nutrition education program was intended to be taught over a period of five weeks, one lesson per week. Due to time constraint and on the request of the school principal and classroom teachers, the program had to be taught in one week. This may not have given the children enough time to internalize the new eating behaviors or show change in their food consumption pattern. Future researchers can avoid some of the problems encountered in this study by assessing the resources available for the education intervention which includes the audience's time.

The present study focused only on the predictive capability of self-perceptions of competence to food choices and nutrition knowledge of children. The sample population in this study consisted of low-income, black children. It is possible that the characteristics of this homogenous group may have limited the variance of the variables used in the study and may have reduced the magnitude of the relationship. The self-efficacy scale used in the study was not designed for black children. An instrument specifically developed for black low-income group children may be able to tap their self-efficacy levels more correctly. Therefore it is suggested that the study be repeated with a more heterogeneous group of children or a variety of demographic groups.

Future researchers studying the predictive capability of the self-efficacy theory to eating behavior should be aware of the findings of the present investigation which revealed that children with higher levels of self-efficacy did not show significantly higher food

choice scores or greater change in food choices scores from pretest to posttest or perform better on the nutrition knowledge test after the nutrition education program. However, further studies are warranted. It is recommended that measures of self-efficacy specific to the behavior of interest continue to be explored. For example, self-perceptions of efficacy specific to diet might be further developed and tested to determine if self-efficacy is related to food choices of children. Several findings in the present study, while not providing any support to the proposed hypotheses, may have implications for self-efficacy theory. The results should be considered as exploratory and prove satisfactory in furnishing a foundation for future investigations of self-efficacy and eating behavior in children.

SUMMARY

Forty-five fifth-grade students participated in a study designed to test the relationship of self-efficacy to changes in food choices, food acceptance, and nutrition knowledge of children. Students participated in five 45 minute lessons emphasizing fruits and vegetables. Pretest and posttest measurements of self-efficacy, changes in food choices and food acceptance, and changes in nutrition knowledge were performed. The pretest and posttest fruit and vegetable consumption of the children were estimated from the self-maintained five-day food records of the school lunch. The nutrition knowledge scores were assessed by comparing performance on a written test before and immediately after the program. Harter's Self-Perception Profile for Children with the addition of six items related to Nutritional Competence was used to measure the self-efficacy levels of the children. Hypotheses were designed to test significant contributions of the self-efficacy theory to the dependent variables, changes in food choices, changes in nutrition knowledge, and food acceptability. Self-efficacy theory appears to be useful in the health behavior area because of its predictive capability and enhancement of task-specific perceptions.

A series of 3 x 3 contingency tables were set up to test the hypotheses. Self-efficacy was treated as the independent variable and change in food choices, change in nutrition knowledge, and change in food acceptance as the dependent variables. The chi-square tests indicated that there were no significant relationships.

The present study did not confirm a relationship between self-efficacy and change in food choices and nutrition knowledge of the children after an education intervention program. Subjects with higher self-efficacy measures did not practice more nutritious food behavior or show greater change in their food choices as a result of the nutrition education program. Subjects with higher levels of self-efficacy in Scholastic Competence subscale also did not show greater gain in nutrition knowledge scores. Children with higher levels

of efficacy in the Scholastic Competence domain did not show greater gain in nutrition knowledge scores.

In general, this study did not support the predictive power and enhancement of task-specific perceptions of the self-efficacy theory. The study had several limitations which need to be considered when interpreting the findings of the study. First, the reliability of the Nutritional Competence subscale was not satisfactory and may have yielded deviating results. The items for the Nutritional Competence subscale were developed by the author and reviewed by Harter but had not been validated before use. Since random sampling was not done in selecting the sample population, they may not be representative of fifth-grade children in Portland. Therefore, the results cannot be generalized and extended to a larger population of fifth-grade students. The predictive capability of the self-efficacy measures for children should be further tested for application in nutrition education programs for children.

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APPENDICES

Appendix 1a: Letter of approval from Oregon State University Committee for the Protection of Human Subjects

OFFICE OF VICE PRESIDENT FOR RESEARCH, GRADUATE STUDIES, AND INTERNATIONAL PROGRAMS

Appendix 1a:

OREGON STATE UNIVERSITY
Administrative Services A312 Corvallis, Oregon · 97331-2140
503-737-3437 · FAX 503-737-3093 · INTERNET kellerg@comail.orst.edu

February 25, 1993

Principal Investigator:

The following project has been approved for exemption under the guidelines of Oregon State University's Committee for the Protection of Human Subjects and the U.S. Department of Health and Human Services:

Principal Investigator: Margy Woodburn

Student's Name (if any): Sisy Manaloor

Department: Nutrition and Food Management

Source of Funding:

Project Title: The Effects of a Nutrition Education Program on the Dietary Behavior Change of Fifth Grade Children with Varying Degrees of Self-Efficacy

Comments:

A copy of this information will be provided to the Chair of the Committee for the Protection of Human Subjects. If questions arise, you may be contacted further.

Mary E. Nunn
Sponsored Programs Officer

cc: CPHS Chair

Appendix 1b : Approval form from the Director, Jefferson Cluster of Schools, Portland

APPROVAL FOR CONDUCTING THE RESEARCH STUDY AT WOODLAWN ELEMENTARY SCHOOL

I hereby grant Sisy Manaloor, graduate student, Oregon State University, Corvallis, permission to conduct the proposed research study at Woodlawn Elementary School.

E M. Wilson

Signature of the Director,
Jefferson Cluster of Schools, Portland

Appendix 1c : Letter to the Principal, Woodlawn Elementary School, Portland

March 15, 1993

From,
Sisy Manaloor
6609 SW 154th place
Beaverton, 97007, Oregon

To
The Principal
Woodlawn Elementary School
Portland

Dear Ms. Harris,

This letter is written to formally request permission to conduct a research study at Woodlawn school. The study will be the basis for the thesis required for a Master's degree from Oregon State University. It is done under the guidance and direction and Dr. Margy Woodburn, Head of the Department, Nutrition and Food Management, Oregon State University.

The purpose of my study is to examine the ability of self-efficacy measures of the fifth grade children to predict their eating behavior change. The study also intends to measure the proximate effects of a nutrition education program utilizing self-efficacy enhancement techniques on the nutrition knowlwedge and eating behavior change of the children. The findings could be prove to be a very practical educational tool which can be used by the schools to help children make healthy food choices. If permission is granted, the results will be made available to you. Any publications resulting from the study could recognize the school for providing assistance or could withhold identity of the school, whichever you prefer. Regardless, the children's confidentiality will be protected at all times. Only their scores will be recorded and used for the analysis.

Specifically, I need to administer a self-perception profile scale, a nutrition knowledge test, a food acceptability test, and a short nutrition education program to approximately 50 fifth grade students. The testing could be conducted as a class. The self-perception profile scale consists of 30 questions of forced choice format. The children indicate an "X" against the answer which best describes them. I would be present during the entire time and read out the statements aloud while the children follow along. The Nutrition Knowledge Test consists of 15 multiple choice questions. The food acceptability test consists of a list of various foods and students are asked to rate whether they like or dislike them. The nutrition education program will be conducted during March and April, 1993. The entire program will take 6 weeks. There will be one class per week and each class will not exceed 45 minutes. The instruments will be administered again at the end of the nutrition education intervention program as a post-test measure.

A copy of the Self-Perception Profile Scale, the Nutrition Knowledge Test, the Food Acceptability test and a summary of the nutrition education program is enclosed to provide you with the information on the exact nature of the questions and nutrition instruction to be presented.

Should approval be granted, I'll follow any procedural guidelines that have been established. Please feel free to call me at 641-9131. I appreciate your help and consideration. Please sign the attached approval form and return it to me by March 17, 1993.

Thanking You,

Sincerely,

Sisy Manaloor

Sisy Manaloor
Graduate student
Department of Nutrition and Food Management
Oregon State University, Corvallis

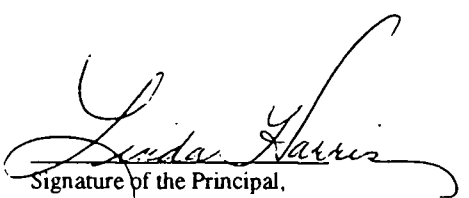
Approved and directed by:

Margy Woodburn

Margy Woodburn
Professor and Head
Department of Nutrition and Food Management
Oregon State University, Corvallis

APPROVAL FOR CONDUCTING THE RESEARCH STUDY AT WOODLAWN ELEMENTARY SCHOOL

I hereby grant Sisy Manaloor, graduate student, Oregon State University, Corvallis, permission to conduct the proposed research study at Woodlawn Elementary School.



Signature of the Principal,
Woodlawn Elementary School

Appendix 1d : Letter to the Principal, Martin Luther King Jr. School, Portland

April 13 1993

From
Sisy Manaloor
6609 SW 154th place
Beaverton, 97007, Oregon

To
The Principal
Martin Luther King Jr. School
Portland, OR

Dear Ms. Davis.

This letter is written to formally request permission to conduct a pilot study at Martin Luther King Jr. School. The study will be the basis for the thesis required for a Master's degree from Oregon State University. It is done under the guidance and direction of Dr. Constance Georgiou, Associate Professor of Nutrition and Food Management in the College of Home Economics, Oregon State University and Dr. Margy Woodburn, Head of the Department, Nutrition and Food Management, Oregon State University.

The purpose of this study is to examine the ability of self-efficacy measures of the fifth grade children to predict their eating behavior change. The study also intends to find out the relationship between the degree of self-efficacy and change in nutrition knowledge of the children after the nutrition education program. The findings could be a very practical and educational tool which can be used to help children make healthy food choices. If permission is granted, the results will be made available to you. Any publications resulting from the study could either recognize the school for providing assistance or could withhold identity of the school, whichever you prefer. Regardless, the children's identity will be protected at all times. Only their scores will be recorded and used for the analysis.

Specifically, I need to administer a brief questionnaire, a nutrition knowledge test, a food acceptability test, and a short nutrition education program to approximately 50 fifth grade students. The testing could be conducted as a class. The questionnaire consists of 30 questions of forced choice format. The children indicate an 'X' against the answer which best describes them. I would be present during the entire time and read out the statements aloud while the children follow along. The Nutrition Knowledge Test consists of 20 multiple choice questions. The nutrition education program will be conducted during April/May, 1993. The entire program will take 6 weeks. There will be one class per week and each class will not exceed 45 minutes. The questionnaire, nutrition knowledge test will be administered again at the end of the nutrition education intervention program as a post-test measure.

A copy of the Self-Perception Profile for Children, the Nutrition Knowledge Test, and the Food acceptability Test is enclosed to provide you with the information on the exact nature of the questions.

Should approval be granted, I'll follow any procedural guidelines that have been established. Please feel free to call me at 641-9131. I appreciate your help and consideration. Please sign the attached approval form and return it to me at the earliest.

Thanking You

Sincerely,

Approved and directed by:

Sisy Manaloor
Graduate student
Department of Nutrition and Food Management
Oregon State University, Corvallis

Margy Woodburn
Professor and Head
Department of Nutrition and Food Management
Oregon State University, Corvallis

Appendix 1e : Letter to the Parents

INFORMED CONSENT

Dear parent.

I am a graduate student in the Department of Nutrition and Food Management at Oregon State University, Corvallis. Your child's class has been selected to participate in a research study sponsored by Department of Nutrition and Food Management. The objective of the study is to determine the ability of your child to successfully make changes in his/her eating habits to improve their nutritional intake.

I am requesting your permission to allow your child to participate in this study. If your child takes part in this study, he/she will receive a short nutrition education program designed to increase your child's knowledge of fruits and vegetables and the importance of including these foods in their daily diet. This study will take place at your child's school during regular school hours and will take 45 minutes of class time each week for 5 weeks. The entire study will take only two months.

The study has the approval of Linda Harris, the school principal, and your child's class teacher. The study has also been approved by Oregon State University. After the project is completed, a summary of the study results will be provided to interested parents. Your child's participation/non-participation in this study will not affect his placement or grade in class. The results of the study will not be used to alter his class placement or his class grade.

The findings of the study will be very useful in developing appropriate nutrition education programs which can be used in schools to help children make healthy food choices. Participating students will benefit by becoming more knowledgeable and confident in choosing healthy foods and enhance their ability to apply the nutrition concepts that they learnt in the class.

I would greatly appreciate your cooperation in giving permission for your child's participation. Please sign and return one copy of the attached Informed Consent form to me through Mrs. Devasia by March 18. 1993. You may keep the second copy for your reference.

If you have any questions or would like more information , please feel free to call me at 641-9131 or my committee at (503) 737-3561, Monday to Friday between 8 to 5 p.m.

Thank you for your cooperation and interest in this project.

Sincerely,

Sisy Manaloor

Sisy Manaloor
Graduate student
Department of Nutrition and Food Management
Oregon State University, Corvallis

Approved and directed by:

Margy Woodburn

Margy Woodburn
Professor and Head
Department of Nutrition and Food Management
Oregon State University, Corvallis

INFORMED CONSENT APPROVAL FORM FOR PARTICIPATION IN RESEARCH STUDY

I understand the nature of this research study and grant permission to let my child participate in the study. My child understands his/her part in the study and has agreed to participate willingly. I have been given the opportunity to ask any questions and I know how to contact the researcher if there arises any other questions or doubts.

_____ _____

Parents signature Date

Request for study results

Please check one of the boxes below to indicate if you would like to receive a summary of the results of this study

[ ] Yes [ ] No

Dietary Restrictions

Please indicate below if your child has any food allergies, food intolerance or other dietary restrictions.

Appendix 1f : Informed Consent Form

I agree to participate as a volunteer in the research study being conducted by the investigator named above. The study and my role in it have been fully explained to me. I have also been explained about all the procedures in which I will be involved during the research study.

I agree to answer the questionnaires, the nutrition knowledge test and the food acceptability test as correctly and completely as possible. I will follow the instructions given to me in the class when the nutrition education lessons are being taught.

I understand that the answers and responses I give will be kept confidential with regard to my identity. I am aware that the research results will be reported for the group as a whole, and that my name will not be associated with any of the data.

I understand that my participation in this study is voluntary and that I am free to withdraw my consent and discontinue participation in the study at any time.

I understand the University does not provide a research subject with compensation or medical treatment in the event the subject is injured as a result of participation in the research project.

I understand what I am being asked to do, and I agree to participate and cooperate the researcher in this study.

_____ _____

Student's signature or name Date

Appendix 2: Nutrition Education Program

LESSON 1 : NUTRITION : FOUNDATION FOR A HEALTHY BODY

Grade level : Fifth Grade

Length of class : 45 minutes

Objectives :

1 The students will learn that nutrition is the study of the food they eat, the nutrients they contain, and how their body uses it.
2 The student will understand that good nutrition depends on eating the right kind of foods.
3 The student will learn that good nutrition keeps them healthy, enables them to live and grow, and provides them with the energy to work and play.

Time and Activities :

Table 19. Summary of lesson 1 of the nutrition education program taught to the two fifth-grade classes in the research study.

	Activity	Time
General introduction. Hand out nutrition folder.	Each child will write his/her name on the folder. Tell students about the objectives of the lesson and activities they will do in the class	3 mins
Song on Healthy Choices.	Listen and sing a song about Making Healthy Choices	5 mins
Initiate student's thoughts on nutrition.	Each student writes their own definition of nutrition and keeps it in the folder	3 mins
Discuss about nutrition in relation to their bodies and health.	Use questions to lead a discussion with students about good nutrition and good health	15 mins
Matching and puzzle	Play the game in the class. Put the slide up and ask students to solve it.	10 mins
Summary/Review an homework	Talk about the key points learnt	10 min.

LESSON 2 : THE BASIC FIVE

Grade Level : Fifth grade

Length of class : 45 minutes

Objectives :

1. The student will be able to recognize foods from the various food groups and sort food into one of the five food groups or extra/combination group.
2. The student will learn the importance and role of each food group in relation to nutrition and health.

Time and Activities :

Table 20. Summary of lesson 2 of the nutrition education program taught to the two fifth-grade classes in the research study.

	Activity	Time
Review what they learnt in the previous class.	Define nutrition, emphasize why we need to eat variety of foods.	3 minutes
Tell them the objectives and activities for that days lesson	Use transparency on Objectives.	2 minutes
Five Food Groups song	Listen to song on tape and sing the song together. Sung to the tune of "Twinkle, twinkle little star"	5 minutes
How to choose the right foods	Introduce the food guide pyramid and explain how to interpret and use it for good nutrition	7 minutes
Introduce the Basic Five Food Groups. Discuss each food group in detail	Ask to elicit response from students about the foods included in each food group, the servings needed from each group, the importance of each food group, the nutrients provided by each group, and what constitutes one serving from each food group.	15 minutes
Food Time Crossword puzzle	Play puzzle game in class. Put up the slide, read the clues and let different children come up to the front and fill in the crossword puzzle.	10 minutes
Summary/Review	Talk about the key points learnt in the class	3 minutes

LESSON 3 : NUTRIENTS --- THE NOURISHING INGREDIENTS IN FOODS

Grade Level : 5th grade

Length of class : 45 minutes

Objectives :

1. The student will realize that food is made up of many and different nutrients needed for growth and health.
2. The nutrients required by the body is present in and is obtained through foods.
3. No single food or food group, by itself, has all the nutrients required for optimal growth and health.
4. Each nutrient has specific function in the body. Nutrients work in combination with other nutrients.
5. The student will be able to identify the main nutrients provided by each food group.

Time and Activities :

Table 21. Summary of lesson 3 of the nutrition education program taught to the two fifth-grade classes in the research study.

	Activity	Time
Review lesson two	Go over the highlights of the Food Guide Pyramid and its uses. Collect and review homework	5 minutes
Tell them the objectives and activities for that days lesson	Use transparency on Objectives.	2 minutes
Five Food Groups song	Sing together only the part about fruit group foods of the Five Food Groups song	5 minutes
Nutrients in fruits and vegetables	Use the flip chart on nutrients in fruits and vegetables	20 minutes
Food Time Crossword puzzle	Play puzzle game in class. Put up the slide, read the clues and let different children come up to the front and fill in the crossword puzzle.	10 minutes
Summary/Review	Talk about the key points learnt in the class	3 minutes

LESSON 4 : FRUITS AND VEGETABLES : TREASURES FROM OUR GARDEN AND ORCHARD

OBJECTIVES:

1. The children will learn about the variety of fruits and vegetables that are available for them to choose from.
2. The children will discuss about how we get our fruits.
3. The children will look at their own eating habits regarding fruits.

Time and Activities :

Table 22. Summary of lesson 4 of the nutrition education program taught to the two fifth-grade classes in the research study.

	Activity	Time
Review lesson three	Briefly review the main nutrients provided by fruits and vegetables. Discuss previous day's homework	3 minutes
Define objectives and activities for lesson 4.	Use transparency on Objectives.	2 minutes
"Variety" song	Sing together "Variety" song to the tune of "Old Mac Donald had a farm".	5 minutes
Where do we get fruits and vegetables? What are the different ways to prepare them?	Use discussion and question and answer to tell the children about the variety of fruits and vegetables and the different ways we can eat them. Use real fruits and vegetables to show children some of the common and uncommon fruits and vegetables, the variety in colors, shapes, sizes, and taste.	20 minutes
View film	Watch film on different fruits and vegetables	10 minutes
Summary/Review	Talk about the key points learnt in the class. Distribute handouts and homework.	5 minutes

LESSON 5 : VEGETABLES ARE VERY GOOD INDEED

Objectives :

1. The children will learn that vegetables are actually different parts of the plant.
2. The children will be able to name the vegetable and identify what part of the plant it is.
3. The children will see, feel, talk and taste various vegetables that will be served to them.

Time and Activities :

Table 23. Summary of lesson 5 of the nutrition education program taught to the two fifth-grade classes in the research study.

	Activity	Time
Review lesson four	Briefly review the variety of fruits and vegetables. Discuss previous day's homework	3 minutes
Define objectives and activities for lesson 5.	Use transparency on Objectives.	2 minutes
"Variety" song	Sing together "Variety" song to the tune of "Old Mac Donald had a farm".	5 minutes
Vegetables are different parts of the plants	Use discussion and question and answer to tell the children about the different root and leafy vegetables and flowers and stem that are vegetables and can be eaten.	20 minutes
Food tasting	Have children taste fresh vegetables in the classroom.	10 minutes
Summary/Review	Talk about the key points learnt in the class. Distribute handouts and homework.	5 minutes

Appendix 3 : Self-Efficacy Questionnaire

WHAT I AM LIKE
SELF-PERCEPTION PROFILE FOR CHILDREN
(Not Copyrighted)

Name _____

Birthday : Month_____ Day _____ Year _____

Boy or Girl (circle which)

	Really True	Sort of True				Sort of True	Really True
1	[ ]	[ ]	Some kids feel they are very good at their school work	BUT	Other kids worry about whether they can do the school work assigned to them	[ ]	[ ]
2	[ ]	[ ]	Some kids find it hard to make friends	BUT	For other kids it is pretty easy.	[ ]	[ ]
3	[ ]	[ ]	Some kids are happy the way they look	BUT	Other kids are not happy with the way they look.	[ ]	[ ]
4	[ ]	[ ]	Some kids often do not like the way they behave	BUT	Other kids usually like the way they behave.	[ ]	[ ]
5	[ ]	[ ]	Some kids feel that its easy to change the kind of foods they eat	BUT	Other kids feel its hard to change the kind of foods they eat.	[ ]	[ ]
6	[ ]	[ ]	Some kids are pretty slow in finishing their school work	BUT	Other kids can do their school work quickly.	[ ]	[ ]
7	[ ]	[ ]	Some kids have a lot of friends	BUT	Other kids don't have very many friends.	[ ]	[ ]
8	[ ]	[ ]	Some kids wish their body was different	BUT	Other kids like their body the way it is.	[ ]	[ ]
9	[ ]	[ ]	Some kids usually do the right thing	BUT	Other kids often don't do the right thing.	[ ]	[ ]
10	[ ]	[ ]	Some kids are afraid their friends might think they are different if they eat an unpopular vegetable	BUT	Other kids don't care if their friends think they are different if they eat an unpopular vegetable.	[ ]	[ ]

	Really True	Sort of True				Sort of True	Really True
11	[ ]	[ ]	Some kids feel like they are just as smart as other kids their age	BUT	Other kids aren't so sure and wonder if they are as smart.	[ ]	[ ]
12	[ ]	[ ]	Some kids are always doing things with a lot of kids	BUT	Other kids usually do things by themselves.	[ ]	[ ]
13	[ ]	[ ]	Some kids wish their physical appearance(how they look) was different	BUT	Other kids like their physical appearance the way it is.	[ ]	[ ]
14	[ ]	[ ]	Some kids usually act the way they know they are supposed to	BUT	Other kids often don't act the way they are supposed to.	[ ]	[ ]
15	[ ]	[ ]	Some kids eat a lot of fruits and vegetables daily	BUT	Other kids do not eat a lot of fruits and vegetables daily.	[ ]	[ ]
16	[ ]	[ ]	Some kids often forget what they learn	BUT	Other kids remember things easily.	[ ]	[ ]
17	[ ]	[ ]	Some kids are popular with others their age	BUT	Other kids are not very popular.	[ ]	[ ]
18	[ ]	[ ]	Some kids wish that something about their face or hair looked different	BUT	Other kids like their face and hair the way it is.	[ ]	[ ]
19	[ ]	[ ]	Some kids behave themselves very well	BUT	Other kids often find it hard to behave themselves.	[ ]	[ ]
20	[ ]	[ ]	Some kids wouldn't try a food they had never eaten before	BUT	Other kids would try a food they had never eaten before.	[ ]	[ ]
21	[ ]	[ ]	Some kids do well at their classwork	BUT	Other kids don't do well at their classwork.	[ ]	[ ]

	Really True	Sort of True				Sort of True	Really True
22	[ ]	[ ]	Some kids wish that more people their age liked them	BUT	Other kids feel that most people their age do like them.	[ ]	[ ]
23	[ ]	[ ]	Some kids think they are good looking	BUT	Other kids think that they are not very good looking.	[ ]	[ ]
24	[ ]	[ ]	Some kids do things they know they shouldn't do	BUT	Other kids hardly ever do things they know they shouldn't do.	[ ]	[ ]
25	[ ]	[ ]	Some kids are pretty sure they could choose fresh fruits instead of cookies	BUT	Other kids are not very sure they could choose fresh fruits instead of cookies.	[ ]	[ ]
26	[ ]	[ ]	Some kids have trouble figuring out the answers in school	BUT	Other kids can almost always figure out the answers.	[ ]	[ ]
27	[ ]	[ ]	Some kids would like to have a lot more friends	BUT	Other kids have as many friends as they want.	[ ]	[ ]
28	[ ]	[ ]	Some kids are happy with their height and weight	BUT	Other kids wish their height and weight were different.	[ ]	[ ]
29	[ ]	[ ]	Some kids get into trouble because of the things they do	BUT	Other kids usually don't do things that get them in trouble.	[ ]	[ ]
30	[ ]	[ ]	Some kids think they eat nutritious and healthy foods	BUT	Other kids are not sure if they are eating nutritious and healthy foods.	[ ]	[ ]

Adapted from Harter, S., Self -Perception Profile for Children, University of Denver, 1985.

Appendix 4: Scoring Key

What I Am Like

SCORING KEY

SELF-PERCEPTION PROFILE FOR CHILDREN
(Revision of the Perceived Competence Scale for Children

Susan Harter, Ph.D., University of Denver, 1985

1.	4	3	Some kids feel that they are very *good* at their school work	BUT	Other kids *worry* about whether they can do the school work assigned to them.	2	1
2.	1	2	Some kids find it *hard* to make friends	BUT	Other kids find it's pretty easy to make friends.	3	4
3.	4	3	Some kids do very *well* at all kinds of sports	BUT	Other kids *don't* feel that they are very good when it comes to sports.	2	1
4.	4	3	Some kids are *happy* with the way they look	BUT	Other kids are *not* happy with the way they look.	2	1
5.	1	2	Some kids often do *not* like the way they *behave*	BUT	Other kids usually *like* the way they behave.	3	4
6.	1	2	Some kids are often *unhappy* with themselves	BUT	Other kids are pretty *pleased* with themselves.	3	4
7.	4	3	Some kids feel like they are *just as smart* as as other kids their age	BUT	Other kids aren't so sure and *wonder* if they are as smart.	2	1
8.	4	3	Some kids have *alot* of friends	BUT	Other kids *don't* have very many friends.	2	1

	Really True for me	Sort of True for me			Sort of True for me	Really True for me
9.	1	2	Some kids wish they could be alot better at sports	**BUT**	Other kids feel they are good enough at sports.	3	4
10.	4	3	Some kids are *happy* with their height and weight	**BUT**	Other kids wish their height or weight were *different.*	2	1
11.	4	3	Some kids usually do the *right* thing	**BUT**	Other kids often *don't* do the right thing.	2	1
12.	1	2	Some kids *don't* like the way they are leading their life	**BUT**	Other kids *do* like the way they are leading their life.	3	4
13.	1	2	Some kids are pretty slow in finishing their school work	**BUT**	Other kids can do their school work *quickly.*	3	4
14.	1	2	Some kids would like to have alot more friends	**BUT**	Other kids have as many friends as they want.	3	4
15.	4	3	Some kids think they could do well at just about any new sports activity they haven't tried before	**BUT**	Other kids are afraid they might *not* do well at sports they haven't ever tried.	2	1
16.	1	2	Some kids wish their body was *different*	**BUT**	Other kids *like* their body the way it is.	3	4
17.	4	3	Some kids usually *act* the way they know they are *supposed* to	**BUT**	Other kids often *don't* act the way they are supposed to.	2	1
18.	4	3	Some kids are *happy* with themselves as a person	**BUT**	Other kids are often *not* happy with themselves.	2	1
19.	1	2	Some kids often *forget* what they learn	**BUT**	Other kids can remember things easily.	3	4
20.	4	3	Some kids are always doing things with *alot* of kids	**BUT**	Other kids usually do things *by themselves.*	2	1

	Really True for me	Sort of True for me				Sort of True for me	Really True for me
21.	4	3	Some kids feel that they are *better* than others their age at sports	BUT	Other kids *don't* feel they can play as well.	2	1
22.	1	2	Some kids wish their physical appearance (how they look) was *different*	BUT	Other kids *like* their physical appearance the way it is.	3	4
23.	1	2	Some kids usually get in *trouble* because of things they do	BUT	Other kids usually *don't* do things that get them in trouble.	3	4
24.	4	3	Some kids *like* the kind of *person* they are	BUT	Other kids often wish they were someone else.	2	1
25.	4	3	Some kids do *very well* at their classwork	BUT	Other kids *don't* do very well at their classwork.	2	1
26.	1	2	Some kids wish that more people their age liked them	BUT	Other kids feel that most people their age *do* like them.	3	4
27.	1	2	In games and sports some kids usually *watch* instead of play	BUT	Other kids usually *play* rather than just watch.	3	4
28.	1	2	Some kids wish something about their face or hair looked *different*	BUT	Other kids *like* their face and hair the way they are.	3	4
29.	1	2	Some kids do things they know they *shouldn't* do	BUT	Other kids *hardly ever* do things they know they shouldn't do.	3	4
30.	4	3	Some kids are very *happy* being the way they are	BUT	Other kids wish they were *different*.	2	1
31.	1	2	Some kids have *trouble* figuring out the answers in school	BUT	Other kids almost *always* can figure out the answers.	3	4
32.	4	3	Some kids are *popular* with others their age	BUT	Other kids are *not* very popular.	2	1

	Really True for me	Sort of True for me				Sort of True for me	Really True for me
33.	1	2	Some kids *don't* do well at new outdoor games	**BUT**	Other kids are *good* at new games right away.	3	4
34.	4	3	Some kids think that they are good looking	**BUT**	Other kids think that they are not very good looking.	2	1
35.	4	3	Some kids behave themselves very well	**BUT**	Other kids often find it hard to behave themselves.	2	1
36.	1	2	Some kids *are* not very happy with the way they do alot of things	**BUT**	Other kids think the way they do things is *fine*.	3	4

Susan Harter, Ph.D., University of Denver, 1985

Appendix 5: Nutrition Knowledge Test

NUTRITION KNOWLEDGE TEST

Name: _____

Birth Date: _____

The purpose of this test is to determine your knowledge of nutrition at the present time. Please do not try to find the answers from books or your friends. It is important that you answer every question. Please do not leave any answers blank. Check only one answer for each question. If you are not sure of the correct answer, check the answer that you think is the closest.

Please let us read the following example to see how to respond to the questions:

We will do the first question together

1. Which food group is the lowest in calories?
   [ ] Milk and milk products
   [ ] Fruit and vegetable group
   [ ] Meat, fish and poultry group
   [ ] Bread, cereal, and grain group

Now answer the following questions as best as you can.

1. Which food group is the lowest in calories?
   [ ] Milk and milk products
   [ ] Fruit and vegetable group
   [ ] Meat, fish and poultry group
   [ ] Bread, cereal, and grain group

2. Which of the following food groups include foods that provide the most vitamin C?
   [ ] Vegetable and fruit group
   [ ] Milk and dairy products group
   [ ] Bread, cereal and grain group
   [ ] Meat, fish & poultry group

3. Which statement is true about the fruits and vegetable group?
   [ ] It is a major source of calories
   [ ] It is a major source of protein
   [ ] It is a major source of minerals and vitamins
   [ ] It is a major source of fats

4. Which of these is a good source of vitamin A?
   [ ] Red Cabbage
   [ ] Cauliflower
   [ ] Pineapple
   [ ] Pumpkin

5. How many servings of vegetables do children need daily?
   [ ] One serving
   [ ] Four servings
   [ ] Six servings
   [ ] Nine servings

6. A fruit very high in vitamin C is :
   [ ] Bananas
   [ ] Peaches
   [ ] Grapefruit
   [ ] Pears

7. Your daily vitamin C needs can be met by which of these foods?
   [ ] A cup of milk
   [ ] An orange
   [ ] A slice of bread
   [ ] A potato

8. Which one of the following is not an excellent source of vitamin C?
   [ ] Oranges
   [ ] Apples
   [ ] Grapefruits
   [ ] Strawberries

9. Which vitamin is particularly important for vision?
   [ ] Vitamin A
   [ ] Vitamin B
   [ ] Vitamin C
   [ ] Vitamin D

10. How often should children include a good source of vitamin C in their diet?
   [ ] Every meal
   [ ] Daily
   [ ]Weekly
   [ ] Every two weeks

11. Which of the following foods provide as much calcium as one glass of milk?
   [ ] Two servings of spinach
   [ ] Two slices of bread
   [ ] Three ounce steak
   [ ] Half cup pineapple

12. Which food contains a large amount of carotene?
   [ ] Cauliflower
   [ ] Beets
   [ ] Carrot
   [ ] Green beans

13. Which of these vegetables is the best source of vitamin C?
   [ ] Broccoli
   [ ] Green beans
   [ ] Carrot
   [ ] Peas

14. What does iron do for our body?
   [ ] Holds the body cells together
   [ ] Helps us see in the dark
   [ ] Have a good digestion
   [ ] Helps carry oxygen to our body cells

15. What are the main nutrient in fruits?
   [ ] Fats
   [ ] Vitamin A, C and fiber
   [ ] Protein
   [ ] Calcium

16. Which food group provides mainly calories?
    [ ] Fruits and vegetables
    [ ] Meat group
    [ ] Extra foods
    [ ] Bread and cereal group

17. Deep yellow vegetables are a good source of
    [ ] Vitamin C
    [ ] Iron
    [ ] Calcium
    [ ] Vitamin A

18. Vitamin A
    [ ] helps prevent constipation
    [ ] provides energy for work and play
    [ ] helps our eyes to see in the dark
    [ ] holds the body cells together

19. Fruits and vegetables are important because they provide
    [ ] Fats and cholesterol
    [ ] Protein
    [ ] Vitamin B
    [ ] Vitamins A, C, fiber and water

20. The food which furnishes the largest amount of calcium is
    [ ] Sugar
    [ ] Milk
    [ ] Orange
    [ ] Bread

21. Which one of the following prevents constipation?
    [ ] Calcium
    [ ] Fiber
    [ ] Iron
    [ ] Protein

22. In which food group would you find a lot of the nutrient water
    [ ] Bread and cereal group
    [ ] Meat, poultry, fish and beans group
    [ ] Fruit and vegetable group
    [ ] All of the above food groups

23. Which food group has the most vitamins?
    [ ] Meat, poultry, fish and beans
    [ ] Milk and cheese
    [ ] Extras
    [ ] Fruit and vegetable

24. Which of the following has more fiber?
    [ ] Egg
    [ ] Milk
    [ ] Fish
    [ ] Apple

25. Two important vitamins found in citrus fruits and deep green and yellow vegetables are :
    [ ] Vitamin C and vitamin A
    [ ] Vitamin D and vitamin K
    [ ] Vitamin B1 and vitamin B6
    [ ] Vitamin B2 and vitamin B12

Appendix 6a: Lunch Menus (Pretest)

Table 24. Lunch menu for the five pretest food-record days

Monday	Tuesday	Wednesday	Thursday	Friday
Macaroni Casserole	Taco Salad	Curly Q Potatoes	Corn Dog	Egg Roll w/Dip
Tossed Salad	Submarine Bun	Carrot Coins	Tuna and Cheese on Bun	Fried Rice
Kiwi Half	Mixed Vegetable	Chicken w/Lettuce	Celery Chunks w/Dip	Juicy Orange Slices
Oregon Trail Bar	Corn Bread	Pear Halves	Cheesy Breadsticks	Broccoli w/Cheese Sauce
Ham and Cheese on French Bread	Apple Wedges	Milk	Fruit Crisp	Fortune Cookie
Milk	Milk	Orange Juice	Milk	Turkey on Whole Wheat Bread
Orange Juice	Orange Juice		Orange Juice	Milk
				Orange Juice

Appendix 6b: Lunch Menus (Posttest)

Table 25. Lunch menu for the five posttest food-record day

Monday	Tuesday	Wednesday	Thursday	Friday
Layered Lasagna	Whole Kernel Corn	Hot Dog on Bun	Canadian Bacon Pizza	Corn Dog
Tossed Romaine and Spinach Salad	Mexican Taco w/Lettuce, Tomato and Salsa	Curly Q Potatoes	Ham and Cheese on French Bread	Baked Beans
Orange Slices	Orange Wedges	Carrot Coins	Pineapple Chunks	Celery Chunks
Milk	Submarine on Mini Bun	Red Delicious Apple Wedges	Romaine and Spinach Salad w/House Dressing	Strawberry Shortcake
Orange Juice	Low Fat Milk	Peanut Butter & Jelly Sandwich	Fruit Bread	Tuna and Cheese on Bun
Warm French Bread	Orange Juice	Milk	Milk	Low Fat Milk
	Warm Biscuit	Orange Juice	Orange Juice	Orange Juice

Appendix 7 : Food Record Sheet

Name:_____

FOODS THAT I ATE DURING LUNCH

WEDNESDAY

Instruction:

Please list below all the foods you ate and how much you ate during school lunch.

Foods	Ate All	Ate About Half	Ate About Quarter	Didn't Eat at All
1. Hot Dog on Bun				
2. Curly Q Potatoes				
3. Carrot Coins				
4. Red Delicious Apple Wedges				
5. PBJ on Whole Wheat Bread				
6. Milk				
7. Orange Juice				

Appendix 8: Food Acceptability Questionnaire

Food Acceptability test

Name: _____

Birth Date: _____

FOOD	Like	Dislike	Never tried
Apple			
Banana			
Brownies			
Broccoli			
Mushrooms			
Icecream			
Pear			
Spinach			
Milk			
Green beans			
Oranges			
Pizza			
Corn			
Carrot			
Eggs			
Peaches			
Spaghetti with meatballs			
Lettuce			
Pineapple			
Cabbage			
Chicken			
Strawberries			
Cantaloupe			

Adapted from Caprio, A.M. The effects of a nutrition education program on nutrition knowledge, vegetable acceptability, and school lunch vegetable waste by select fourth grade children. Master's thesis, College of Home Economics, Washington State University, 1977.

Appendix 9: Subscale Reliabilities

Table 26. Subscale reliabilities for the four samples from Harter's study.

	Scholastic Competence	Social Acceptance	Athletic Competence	Physical Appearance	Behavioral Conduct	Global Self-Worth
Sample A	.80	.80	.84	.81	.75	.84
Sample B	.85	.80	.86	.82	.77	.80
Sample C	.82	.75	.81	.76	.73	.78
Sample D	.80	.75	.80	.80	.71	.78

From Harter, S. Manual for the Self-Perception Profile for Children, University of Denver, 1985, p.14.

Appendix 10: Correlation Among Subscales

Table 27. Correlations among the subscales for the different samples used in Harter's study.

		Social Acceptance	Athletic Competence	Physical Appearance	Behavioral Conduct	Global Self-worth
Scholastic Competence	A	.34	.24	.32	.47	.48
	B	.24	.12	36	.47	.54
	C.	31	.18	.31	.29	.46
	C.	.63	.52	.48	.45	61
	D	.44	.35	38	.58	64
Social Acceptance			.44	38	.21	48
			.34	34	.20	.43
			.31	.29	.22	.41
			.45	.51	.29	.58
			.53	37	.41	.56
Athletic Competence				50	.10	44
				.34	.01	30
				43	.08	35
				50	28	52
				34	.25	45
Physical Appearance					27	54
					.19	66
					.12	62
					38	73
					.25	.72
Behavioral Conduct						47
						47
						.42
						57
						50

Sample Grades	
A	6-7
B	6-8
C.	5-6
C.	3-4
D	3-4

From Harter, S. Manual for the Self-Perception Profile for Children, University of Denver, 1985, p. 20.