INVESTIGATING THE ROLE OF FAMILY AND CONSUMER SCIENCES TEACHERS IN NUTRITION EDUCATION IN TEXAS SECONDARY SCHOOLS

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BY

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To the Dean of the Graduate School:

I am submitting herewith a dissertation written by Mary Katherine Hines entitled "Investigating The Role of Family and Consumer Sciences Teachers in Nutrition Education in Texas Secondary Schools". I have examined this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Ph.D. in Nutrition

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DEDICATION

To the children of the world:

Remember that to be different is not remarkable,
but to make a difference has no expiration date.

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ABSTRACT

MARY KATHERINE HINES, M.S.

INVESTIGATING THE ROLE OF FAMILY AND CONSUMER SCIENCES TEACHERS IN NUTRITION EDUCATION IN TEXAS SECONDARY SCHOOLS

AUGUST 2012

This research was designed to explore the role of family and consumer sciences (FCS) educators in teaching nutrition content to students as one intervention to combat the rising obesity rates in the United States. The purpose of this research was to determine secondary level FCS educators' attitudes and self-efficacy concerning school-based nutrition education and their perceived comfort levels regarding teaching nutrition topics. A questionnaire was developed to assess teacher attitudes regarding school-based nutrition education, perceptions regarding teaching self-efficacy and comfort in teaching nutrition topics.

Demographic information on gender, age, ethnicity, educational background, teaching experience, and certifications was also collected. Survey participants (819) were secondary FCS teachers who were members of the Family and Consumer Sciences Teachers Association of Texas and/or teachers of Lifetime Wellness and Nutrition and/or Food Science as provided by the Texas Education Agency (TEA). The questionnaire was administered both as a paper version and on-line which was available through PsychData©

A majority of the 197 survey respondents were white/non-Hispanic females with a mean age of 48 years and 13 years of experience teaching courses with nutrition content. Over half had a Bachelor's degree with additional coursework or higher degree. A positive correlation was found between self-efficacy and age ($r = 0.145$, $p = .050$) and between self-efficacy and years of teaching experience ($r = 0.185$, $p = .012$). Comfort in teaching 30 nutrition topics classified into five categories was measured using a 5-point Likert type scale. Pairwise comparisons showed that FCS teachers had significantly higher comfort levels ($p < .001$) for teaching nutrition education (4.53 ± 0.73); nutrient functions (4.49 ± 0.79 and general nutrition (4.49 ± 0.74) compared to comfort levels for teaching disease prevention (4.19 ± 0.84) and nutrient metabolism (4.09 ± 0.90).

Survey results support the development of training materials that improve FCS teacher knowledge on topics related to nutrient metabolism and disease prevention. School administrators and legislators at the local, state, and national levels need to become aware of the role that FCS teachers can play in expanding nutrition education in U.S. schools.

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CHAPTER I

INTRODUCTION

There is national concern regarding the increasing incidence of overweight and obese children in the United States. The accepted measurement that is used to standardize data collected from national surveys is the Centers for Disease Control (CDC) and Prevention Growth Charts for children younger than 19 years old in the United States. By current definitions the classification of "overweight" occurs when an individual height and weight lies between the 85th and 95th percentile on the growth chart. The classification of "obese" occurs when the height and weight correspond to greater than the 95th percentile (CDC, 2009). Over the past fifty years, the rate of obesity in children has gradually increased with the greatest increase occurring within the last twenty years. Between 1960 and 1980 the percentages for each age group are as follows: 6-23 months (7%), 2-5 y (5%), 6-11 y (4-7%), and 12-19 y (5%). Between 1988 and 2008 the percents for each age group are as follows: 6-23 months (9-10%), 2-5y (7-10%), 6-11 y (11-20%), and 12-19y (11-18%). For the 2007-2008 reporting period, three categories, >85th, > 95th and > 97th were available for ages 2-19 years. For the > 97th percentile, the percents for each age group are as follows: 2-5y (7%), 6-11 y (15%) and 12-19 y (13%) (Hedley et al., 2004; Ogden, Flegal, Carroll, & Johnson, 2002; Ogden et al., 2006; Ogden, Carroll, Curtin, Lamb, & Flegal 2010).

The increasing prevalence of overweight children and adolescents in Texas from 2000-2001 was studied by Hoelscher and coauthors (2004). The children who were overweight included 26% of 4th graders, 19% of 8th graders, and 15% of 11th graders. The incidence of childhood obesity in Texas at that time was higher than the national average of 16% for ages 6-19. In an effort to address this public health concern, the then Texas Agriculture Commissioner, Susan Combs, took a proactive approach by implementing changes in school food service under the Texas Public School Nutrition Policy (TPSNP) effective August 2004 (TDA, 2004). According to the Texas Department of State Health Services (TDSHS, 2010), the incidence of overweight or obese high-school students was 32% in 2007. The Texas Senate passed Bill 530 (Cooper, 2007) introducing physical fitness measurements for 3rd through 12th grade students in 8,000 public and private schools utilizing Cooper Aerobics Clinic's FITNESSGRAM effective fall 2007.

The health consequences of overweight and obesity for any age have been stated by many professionals to include increased risk of premature death, heart failure, diabetes, cancer, breathing problems, arthritis, reproductive complications, hypertension, metabolic syndrome, and other medical problems (CDC/MMWR, 2009). Additionally, CDC (CDC/NCCDPHP, 2004) reported that the estimated medical expenses from health problems associated with overweight and obesity accounted for 9.1% of the total U.S. medical expenditures in 1998 ($78.5 billion), and $92.6 billion in 2002. By 2006, FDA indicated that not only did obesity claim thousands of lives, but that the corresponding

healthcare expenses were $117 billion annually (Cianci, 2006). The economic burden (annual hospital costs) of obesity-related diseases tripled from 1979 to 1999 for children age 6-17 years (Wang & Dietz, 2002). According to the Texas Department of Health (TDH, 2004), the economic burden of obesity and its related health risks will increase from approximately $10.5 billion from 2001 to nearly $39 billion by 2040 if this epidemic continues in Texas.

Local Wellness Policy

One proposed solution to this health crisis is the incorporation of nutrition intervention in the schools (Bergman & Gordon, 2010). Congress took action by inserting a provision into the Child Nutrition Reauthorization Act of 2004 (US Congress, 2004) which required that each US school district adopt a Local Wellness Policy (LWP) by fall 2006. The goals of the LWP included nutrition education and allowed the local educational agency to determine the appropriate activities. The LWP also required the school districts to set goals for both nutrition education and physical education.

Some reported weaknesses of the LWP have included lack of enforcement and specific guidelines. As such, the nutrition education components vary by individual states and school districts (Belansky, Chriqui, & Schwartz, 2009). The existing models proposed for the LWP have focused on school food service directors (Johnson & Fitzgerald, 2005). However, not all school nutrition program directors have education in the field of nutrition, so they may not have interest in advancing classroom nutrition education among students (Reeves, 2006). With their educational background and

classroom experience, family and consumer sciences (FCS) teachers may be the best qualified to provide nutrition education in support of Local Wellness Policies.

School-Based Nutrition Education

Several professional organizations support the concept of nutrition education in American schools. Three organizations, the American Dietetic Association (now the Academy of Nutrition and Dietetics), the Society for Nutrition Education, and the School Nutrition Association, recommend comprehensive sequential nutrition education for all students from preschool through grade 12 in American schools (Briggs, Mueller, & Fleischhacker, 2010). The Food and Nutrition Service of the U.S. Department of Agriculture has developed two programs to encourage nutrition education in schools: Team Nutrition and the HealthierUS School Challenge (HUSSC). Team Nutrition provides free educational resources that promote nutrition curriculum and education in schools, while HUSSC provides awards to schools participating in the National School Lunch Program who meet standards promoting a healthy school environment. The standards focus on improved nutrition content of school meals, nutrition education and physical education (USDA/FNS, 2011). Alliance for a Healthier Generation (AHG) also encourages nutrition education in schools. This program sponsored by the American Heart Association and the William J. Clinton Foundation also gives awards to schools that have improved school meals and increased nutrition education and physical education for students (AHG, 2009). Although all of these programs encourage school-

based nutrition education, there is no exact curriculum and no requirements regarding who should teach nutrition education.

The population of Texas is ethnically diverse. Results from the Bienestar (well-being) program (Trevino et al., 1998) provided strong evidence that school-based nutrition education integrated with family- and community-based programs and activities can reduce the incidence of diabetes risks, which include body fat and dietary fat intake, among Mexican-American children. Ritchie, Crawford, Hoelscher, and Sothern (2006) suggested that these types of programs be considered by school systems in general.

Celebuski and Farris (1996) conducted a survey that evaluated the nutrition education in U.S. public schools grades K-12. The results indicated that nutrition education was concentrated in the health and science classes, and that the intensity and quality of the nutrition messages were unknown. Bergman and Gordon (2010) suggested the integration of nutrition into all subject areas in school. In 2009, the state of New York proposed legislation that would require that nutrition education be integrated into school curriculum (NCSL, 2010).

Sometimes elementary school teachers have experienced difficulties when teaching nutrition. In a study conducted by Auld, Romaniello, Helmendinger, Hambridge, and Hambridge (1999), some of the explanations that were given are the following: (a) nutrition-related topics are not a scheduled part of the curricula; (b) the teachers do not feel qualified to teach special topics; and finally, (c) there is no money provided by the school district for special activities. Auld et al. (1999) observed that

when nutrition education efforts are not continued, the positive outcomes become only temporary, not on-going nor long-term.

On the secondary school level, family and consumer sciences teachers are required to take nutrition and food science courses as part of their own college curriculum. Several Texas universities, including Texas Woman's University (TWU), offer Bachelor of Science degrees leading to Composite Certification in Family and Consumer Sciences or a Specialized Certification in Hospitality, Nutrition, and Food Science (TWU/FS, 2011). FCS educators teach elective courses that include nutrition components in secondary schools throughout the state of Texas. Some of the nutrition topics covered are reading and interpreting food labels, functions of nutrients, long term effects of food choices on health, and many more. The Texas Education Agency specifies the following secondary school courses that provide educational content concerning nutrition and diet: Principles of Human Services (Grade 9), Lifetime Nutrition and Wellness (Grades 10-12), and Food Science (Grades 11-12) (TEA, 2010).

Survey

The evolution of the basic questionnaire as a research tool has been described in detail by Dillman (2007). The updated recommended approach that utilizes computer technologies is called the Tailored Design Method. This survey method allows the researcher to combine mailings with on-line computer surveys to expedite and improve response rates and reduce errors. The researcher may utilize a mixed-mode involving timed mailings which might include a pre-notice letter, a paper questionnaire, a reminder

postcard, a replacement questionnaire, an incentive, and thank you note combined with an on-line survey and personal emails.

Rationale

If a successful nutrition education curriculum was offered in U.S. schools, childhood obesity would likely not be on the rise. A review of literature suggests that there are many approaches to the topic of school-based nutrition education. The personal discovery that nutrition education was available in secondary schools happened during an invitation to participate in an in-service for family and consumer sciences teachers. The topics were MyPyramid and food labeling. The desire to bring compulsory fitness and nutrition to all schools grades K-12, at last had real promise of fulfillment. Therefore, this present study proposed an approach that included the additional subject area of family and consumer sciences. This study explored the possibility of using the available infrastructure which includes qualified educators and existing curriculum to empower secondary students to be responsible for their health.

Purpose of Study

The purpose of this research was to determine secondary level FCS educators' perceptions of the benefits of school-based nutrition education, self-efficacy in teaching nutrition education, and comfort levels regarding teaching various nutrition-related topics.

Objectives

The objectives for this study were to: (a) determine FCS educators' attitudes concerning school-based nutrition education, (b) evaluate the self-efficacy of FCS educators regarding teaching nutrition topics, and (c) assess the comfort level of FCS educators regarding teaching nutrition-related topics.

Hypotheses

The null hypotheses for this study were:

H_0^1. There is no significant relationship between the mean scores of FCS educators' attitudes concerning nutrition education and the following variables: age, ethnicity, certification, years employed, highest level of education, and community size.

H_0^2. There is no significant difference between the mean scores of FCS educators' perception of teaching self-efficacy and the following variables: age, ethnicity, certification, years employed, highest level of education, and community size.

H_0^3. There is no significant relationship between the mean scores of FCS educators' comfort level in teaching nutrition topics (nutrition education, general nutrition, disease prevention, nutrient metabolism, functions of nutrients) and the following variables: age, ethnicity, certification, years employed, highest level of education, and community size.

Expected Outcomes

Study results were expected to determine whether FCS educators possess positive attitudes about nutrition education and self-efficacy concerning teaching nutrition to secondary students. They were also expected to provide insight on which nutrition topics should be emphasized when developing training materials to assist FCS educators with teaching nutrition in secondary schools as their roles in LWP programs evolve. This research has the potential of increasing the awareness of every school district nationwide of the importance of family and consumer sciences teachers and FCS programs. The collective information can become a component of a strategy to influence local, state, and national nutrition education programs in secondary schools.

Limitations of the Research

The survey was distributed to secondary family and consumer sciences teachers in the state of Texas only. The data do not, therefore, represent FCS educators in other states throughout the United States. Also, only 197 of the approximately 1,300 FCS teachers certified to teach nutrition-related courses in Texas secondary schools completed the survey, so results do not necessarily represent the opinions of all FCS teachers in the state of Texas. A characteristic of self-selection may have entered since those who were particularly interested in the subject and perhaps more confident may have volunteered to answer the survey (Polland, 2005). The data also do not represent the opinions and knowledge of teachers of other subjects such as biological or earth sciences, health, or physical education. The data represents only opinions of secondary level educators and

does not represent educators at the elementary school levels. The majority of the schools were public and therefore results may not represent private schools.

Assumptions

For this study, the researchers assumed that the participants understood the survey questions and responded truthfully and to the best of their knowledge. Furthermore, it was assumed that FCS teacher attitudes regarding nutrition education, perceptions of self-efficacy, and comfort level in teaching various nutrition topics were identifiable and measurable. It was also assumed that survey rating scales were accurate in measuring FCS teacher attitudes regarding nutrition education, self-efficacy for teaching nutrition to secondary students, and comfort levels in teaching various nutrition topics.

Definition of Terms

The terms, nutrition education, classroom nutrition education, or school-based nutrition education, specifically refer to educational content taught within the confines of a classroom and as part of a course curriculum. The purpose of this definition is to distinguish the classroom component from all other nutrition messages that may be distributed in the forms of posters, public service announcements, health fairs, school assemblies, school food service, school nurse handouts, advertisements, marketing or similar activities and sources.

CHAPTER II

REVIEW OF LITERATURE

The US has gone through many transitions in its history and one of those has been the decline is in the physical health of its school children. A brief overview of some changes that have taken place in the educational environments explains some of the factors that over time may have contributed to the current health outlook. Some health professionals have suggested that one possible solution to child overweight is to include nutrition courses in school curricula (Bergman & Gordon, 2010; Ritchie et al., 2006; Veugelers & Fitzgerald, 2005). This present study sought to investigate certain aspects of school-based nutrition education and family and consumer sciences educators who actively teach nutrition courses.

School Environments

Impact of Budget Cuts

School environments were altered by two recessions of the 1970s and 1980s which influenced family, school, and community economics. Schools examined budget categories that could be revised. As money diminished, physical education (sports) programs were threatened, reduced, or lost. Vending contracts for soda and snack machines became a means of replacing the loss of funding (Jacobson, 2005). One of the specific benefits for marketing contracts was to allow companies to air commercials on the *Channel One News* which is a daily program seen by millions of secondary students

across the US. The Third School Nutrition Dietary Assessment (SNDA-III) reported that for the SY 2004-2005, 27% of elementary schools, 87% of middle schools, and 98% of high schools had vending machines (Story, 2009).

The American Academy of Pediatrics published a Policy Statement in 2004 regarding *Soft Drinks in Schools* (Murray et al., 2004). The report listed the health concerns related to the high consumption of soft drinks by children at school. The beverages are ready availability through the vending contract agreements. The concerns stated in brief are as follows: overweight and obesity due to extra calories; risk of osteoporosis and fractures due to decreased calcium consumption; dental caries and enamel erosion. The American Dental Association issued a statement in 2001 explaining that the acid in the soft drinks could cause teeth erosion and that phosphoric acid could reduce calcium absorption and contribute to osteoporosis. The excessive amounts of sugar consumed may be associated with the increase in obesity and type II diabetes. Additional health consequences have been reported to be heart disease, kidney stones, and reactions to additives (Jacobson, 2005).

Budget cuts affected school food service in the early 1990s and also many institutional services of colleges, universities, jails, prisons, hospitals, and nursing homes. Some food services were out-sourced to food management companies recognized for airline and arena food service (USGAO, 2003). Many facilities gradually changed from home-cooked style to prepackaged heat and serve choices thereby reducing the need for kitchen equipment and skilled staff. During the late 1980s and early 1990s, the food

court design that penetrated the shopping malls, airports, universities, etc. was also adopted by some secondary schools as a means of making a profit (Moyers, 2002).

Changes in Physical Education

Physical education (PE) classes changed in content, amount and requirement options in Texas from 1960 to 2010. Changes to the type of activities taught and the length of time required (semesters/credits) began in the mid 1970s. These changes continued and influenced design of new school buildings similar to the kitchen facility requirements. By 1995, the graduation requirements for Texas public high schools included one and one-half credits (three semesters) of PE and one-half credit of health. As of the SY 2010-2011, the requirement were reduced to one credit (two semesters) of PE and the health credit was removed (TSBOE, n.d.). It has been reported that some schools in the U.S. do not have any adequate indoor or outdoor physical education facilities. As a response to budget cuts and demands for academic performance some school-based physical activity (PE and recess) and health education contact hours have been reduced or eliminated (Kelder et al., 2009; Trost, 2007).

The Texas Senate passed Bill 530 (Cooper, 2007; TLOH, 2007) introducing physical fitness measurements for 3rd through 12th grade students in 8,000 public and private schools utilizing Cooper Aerobics Clinic's FITNESSGRAM effective SY2007. Previously, Senate Bill 19 passed in 2001, but did not require any fitness testing (TLOH, 2001). Texas does require moderate to vigorous physical activity for specific amounts of time during the school week for kindergarten through eighth grade. However, the

implementation of SB 19 has varied by the school districts in the state and this emphasizes the need that policies should provide the funding and monitoring in order to achieve the intended outcomes (Kelder et al., 2009). As of 2008, Illinois was the only state in the U.S. requiring physical education for all grades K-12 (Cooper, 2007). Results from the FITNESSGRAM for Texas boys in grades 3-7 for SY 2007-2008, showed that 17-29% of those tested passed the fitness tests, while girls scored slightly higher (21-33%). That same year girls in grades 8-12 experienced an 8-19% pass rate, while 9-18% of the boys passed. The scores improved slightly for the SY2008-2009 in almost every grade level. However, based on the percent that passed there is still a dramatic reduction in fitness from elementary to middle to high school for both genders (TAHPERD, n.d.).

In spite of reductions in physical education classes and reduced recess time for school children nationwide, research indicates that physically active children perform better in the classroom. Daily physical activity and fitness show a positive relationship to academic achievement (Grissom, 2005; Trost, 2007). In fact, some research indicates that overweight and obesity are associated with lower levels of academic performance (Taras & Potts-Datema, 2005).

Adult and Youth Obesity Trends

The World Health Organization (WHO) has defined "overweight" as being an abnormal fat accumulation and "obesity" as being an excessive accumulation of fat both of which may impair health. The Body Mass Index (BMI) is the ratio of the mass of the

person in kilograms by the height of the person in meters squared (kg/m^2). It is termed a weight-for-height index that is used to classify overweight and obesity in various adult populations. Whenever WHO reports trends, it defines the cut-off values for "overweight" as a BMI equal to or greater than 25, and "obese" as a BMI equal to or greater than 30. These ranges are collectively used for both genders and all ages of adults (WHO, n.d.).

Adults

There are limitations when interpreting data collected using the BMI (kg/m^2) system. A person's mass measurement does not distinguish between fat and lean tissue, nor does it indicate the location of the fat mass or the percentage of body fat. However, it is convenient to measure and apply universally (Flegal, Carroll, Ogden, & Curtin, 2010). The classifications are as follows: Underweight is below 18.5; healthy weight is between 18.5 and 24.9; overweight is between 25.0 and 29.9 (CDC, 2009). The classifications for obese are as follows: Class I (30.0-34.9), Class II (35.0-39.9), Class III (40.0-49.9) sometimes called morbid obesity, and super obese BMI $\geq$ 50 kg/m^2 (Buchwald, 2005).

Between 1999 and 2008, the category indicating above healthy weight (BMI > 25), which includes overweight and all obese categories, was 65-68 % of the US population over 20 years old (Flegal, Carroll, Ogden, & Johnson, 2002; Flegal et al., 2010; Hedley et al., 2004; Ogden et al., 2006). Prior to 1999, The BMI > 30 (Grade I obese) was the only category reported.

The obesity prevalence for adults in Texas has been provided by CDC from 1987 to 2008 (CDC, n.d.). These data correspond to a BMI greater than 30. The years and percentages are as follows: 1987 (10%); 2000 (20%); 2008 (29%). The Texas Department of State Health Services (TDSHS, 2010) indicated the prevalence of those persons either overweight or obese in Texas during 2009 was 67% of the adult population. This corresponds to a BMI greater than 25.

Youth

Similar to the adult trends, as the population has gotten heavier, the category designations for childhood overweight and obesity have changed. These categories were reported by Ogden, Carroll, Curtin, Lamb, and Flegal (2010) explaining that an expert committee recommended revisions. The categories for US children and adolescents now reflects the change to upgrade the "between the 85th and 95th percentiles" to be called *overweight* and "at or above 95th percentile" to be called *obese* (CDC, 2009). For the years 2007-2008, the new category *greater than 97th percentile* was added (Ogden et al., 2010). For the 2007-2008 reporting period, all three categories, >85th, > 95th and > 97th were available for ages 2-19 years. For the > 97th percentile, the percents for each age group are as follows: 2-5y (7%), 6-11 y (15%), and 12-19 y (13%) (Ogden et al., 2010). As of 2007, 32% of Texas high-school students were either overweight or obese corresponding to greater than the 85th percentile as compared to 34% nationally (Ogden et al., 2010; TDSHS, 2010).

Consequences of Obesity

The World Health Organization (WHO) informs individuals (over age 15) that chronic diseases resulting from overweight and obesity can be prevented. They state that overweight is fundamentally an energy imbalance resulting from diet and activity patterns. WHO instructs individuals to limit total fat and sugar consumption, and recommends decreasing saturated fats and increasing unsaturated fats while reducing salt intake. Additionally, they recommend an increase in consumption of fruits, vegetables, legumes, whole grains and nuts. Since the goal is to achieve energy balance (energy consumed equals energy expended) and a healthy weight, at least 30 minutes of regular, moderate intense physical activity on most days is also recommended (WHO, 2010; WHO, n.d.).

Burdens: Health and Economic

The health consequences of overweight and obesity for any age have been stated by many professionals to include increased risk of premature death, heart failure, diabetes, cancer, breathing problems, arthritis, reproductive complications, hypertension, metabolic syndrome, and other medical problems. (CDC: MMWR, 2005; CDC: MMWR, 2009; USDHHS, 2001).

The economic burden on a state level was reported by Susan Combs, the Texas Controller of Public Accounts, who estimated that obesity cost Texas businesses $3.3 billion attributed to health care costs, absenteeism, decreased productivity and disability for 2005. Obesity and related illnesses could cost Texas businesses $15.8 billion

annually by 2025 if there is no reduction in prevalence (Combs, 2007). Dr. Eduardo Sanchez, the Texas Commissioner of Health, (TASB, 2004) stated that "...the physical health of Texas will determine its fiscal health."

Premature Death

Texas is one of the states with a high prevalence of overweight adults and children. In reference to the obesity epidemic in Texas (Cathion, 2004), Dr. Eduardo Sanchez, the Texas Commissioner of Health, stated "This generation of children may be the first in Texas history to have a shorter life expectancy than their parents."

The School Environment: Toward a Recovered Nation

School Wellness Policies

Many experts throughout the years have recognized that one solution to this health crisis is the incorporation of nutrition intervention in the schools (Ritchie, Crawford, Hoelscher, & Sothern, 2006; USDHHS/NPB, 1994). Congress took action by inserting a provision into the Child Nutrition Reauthorization Act of 2004 (US Congress, 2004) which required that each U.S. school district adopt a Local Wellness Policy (LWP) by fall 2006. The overall objectives of the LWP were to promote student wellness and establish healthy school nutrition environments that would ideally reduce childhood obesity with its related diseases. Goals for nutrition education, physical education and wellness-related endeavors are components that should have been included in the individual LWP programs (Matz, 2005). The Healthy, Hunger-Free Kids Act of 2010, continued the LWP in addition to making no provision for funding (US Congress, 2010).

While much of the emphasis for the LWPs has been focused on the total school food environment, some professionals have emphasized that a comprehensive and coordinated approach is the most effective in addressing the various factors involved in the total health of the student (Briggs, Mueller, & Fleischhacker, 2010). These multidisciplinary approaches allow for the utilization of expertise both inside and outside of the school setting.

The overall weaknesses of the LWP have included lack of enforcement, use of vague language and nonspecific guidelines. As such, the nutrition education requirements of the LWP have been reported to vary by individual states and school districts (Belansky, Chriqui, & Schwartz, 2009; Friedman, 2009). The existing models proposed for the LWP have focused on school food service directors (Johnson & Fitzgerald, 2005). However, not all nutrition program directors have education in the field of nutrition, so they may not have interest in advancing classroom nutrition education among students. The School Nutrition Association found that some school districts around the country were finding creative ways to meet the challenges of the LWP, which included classroom nutrition education and poster contests (Gryder, 2008). However, many schools are still having difficulty specifically addressing the nutrition education component. Some researchers found that the schools may have the goals but are not actually able to meet certain standards (Moag-Stahlberg, Howley, & Luscri, 2008). A common barrier reported was that the regular curriculum did not allow for a

separate nutrition education component, so nutrition topics would need to be integrated with the mainstream courses (Longley & Sneed, 2009).

Texas Policies

The Joint Interim Committee on Nutrition and Health in Public Schools reviewed activities in Texas and published their report in December 2004 (JIC, 2004). The report examined many aspects of the obesity health crisis and presented ways to include businesses, communities, schools, public health, and individuals in a massive cooperative effort to educate the general population of strategies to reduce the obesity prevalence in Texas. One aspect that is of particular interest is the recommendation to "educate children so that they have the knowledge and skills necessary for making healthy choices in food and lifestyles." Another important recommendation was to assess the barriers preventing or limiting nutrition education and daily physical activity from being incorporated into school curricula.

Former Texas Agriculture Commissioner, Susan Combs, took a proactive approach by implementing changes in school food service programs under the Texas Public School Nutrition Policy (TPSNP) effective August 2004 (TDA, 2004). Some of the policy highlights included changes to food preparation methods by eliminating deep-fat frying; restrictions on availability of foods of minimal nutritional value such as candy and certain snack items; restrictions regarding sugared, carbonated beverages; limitations on the amounts of fats and sugars per serving; specifications related to the availability of competitive foods; and restrictions related to the serving sizes of certain foods and

beverages (Speice & Boyd, 2004). The overall purpose of the TPSNP has been to promote a healthy dietary environment in the public schools. In response to this challenge, The Pediatric Obesity Prevention Study (Pohl et al., 2006) conducted research to determine some of the effects of the policy among fourth grade schoolchildren within Bell and Harris counties during the spring semester of the 2004-2005 school year. The authors indicated that the TPSNP can be instrumental in initiating healthier food consumption for both the students and their families. Parents of minority children, who as a group have been statistically at an increased risk of obesity, were more likely to change their habits at home. This evidence is most encouraging from both policy and educational perspectives. One might conclude that a healthy school food environment, coupled with nutrition education for both parents and students, matched with increased physical activity in and away from school will be a combination of behavior strategies that should promote a life style of health.

Nutrition Education

In spite of efforts to promote school-based nutrition education as a logical approach to general public health, many barriers exist and there is also an apparent lack of supporting scientific research. Funding agencies always want proof and apparently there is very little of the type normally acquired. Study designs, length of times, settings, target populations, and a variety of other variables have provided little consistent evidence to support SBNE as a stand-a-alone intervention (CDC/MMWR, 2005). Researchers Brown and Summerbell (2009) determined from their literature search that a

combined diet and physical activity approach might prevent the student from becoming overweight in the long term. Other researchers, however, found no statistics to support that the combination approach was any more effective in achieving the long term reduction of obesity than a single focus of either dietary or physical activity. In fact, they conclude that the goal of obtaining long term positive health behaviors may be hard to achieve due to economic limitations faced by some schools and communities (Shaya, Flores, Gbarayor, & Wang, 2008). Canadian researchers, Veugelers and Fitzgerald (2005), reported that of the three types of programs they compared, overall higher outcomes of reduced rates of overweight and obesity, increased fruit and vegetable consumption, and increased physical activity were observed for students participating in the Annapolis Valley Health Promoting Schools Project. Additionally, they emphasize that these types of multifaceted school-based programs should be implemented and funded because of their high potential for reducing childhood obesity.

Many US programs have been developed over the years to address the issue of behavior change through nutrition and physical education for school age children. These programs may be of federal, state, or private origin in both development and funding. Some include aspects that specifically involve both inside school and outside school personnel. A few of these programs will be discussed.

The Food and Nutrition Service of the U.S. Department of Agriculture has developed programs through the years to encourage nutrition education in schools as well as to demonstrate the recognition that the learning environment of the schools should be

utilized to teach children what is needed for a healthy life. The Nutrition Education Training (NET) program was established by Congress (PL-95-166) in 1977 as the nutrition education and training component of the Child Nutrition Programs of the USDA and predates more recent federal attempts to incorporate nutrition education into the classroom. State agencies were provided grants to develop educational and training materials for teachers, food service personnel, parents, and students. In the federal fiscal year of 1999, NET ceased to be funded (Martin & Hoover, 1993; USDA/FNS, n.d.; USDHHS/NPB, 1994).

The USDA Team Nutrition (TN) program announced in 1995 by First Lady Hilary Clinton was designed to implement the School Meals Initiative for Healthy Children. Team Nutrition provides free educational resources that promote nutrition curriculum and education in schools. The comprehensive program includes materials for the home and community (USDA/FNS, n.d.).

A collaborative research study funded by the National Heart Lung and Blood Institute called the Child and Adolescent Trial for Cardiovascular Health (CATCH) evaluated an elementary school-based program targeting the risk factors for cardiovascular disease. After the research trial had been successfully conducted by four universities from California, Minnesota, Texas, and Louisiana, the researchers at the University of Texas at Houston changed the name to a Coordinated Approach to Child Health (CATCH) to reflect that the program could be implemented in any elementary school nationwide. CATCH has been adopted in many Texas schools as part of their

coordinated school health programs since 1999 (UTH/SPH, n.d.). As an example, for the SY2002-2003, Trenton Elementary School (Collin County, Texas) adopted the CATCH program to provide a consistent message from parents, teachers, and school food services that being active and choosing healthy foods improves academics as well as long term health (Boyett, 2002).

The HealthierUS School Challenge (HUSSC) is a voluntary program established in 2004 as an extension of President George W. Bush's HealthierUS initiative. The HUSSC provides awards to schools participating in the National School Lunch Program (NSLP) that meet standards promoting a healthy school environment. The standards focus on improved nutrition content of school meals, nutrition education and physical education (USDA/FNS, 2007). The award period may be for four years and as of May 9, 2011, 1001 schools had been certified. The Texas winners that were listed included 16 different school districts and 228 schools with the majority being elementary (USDA/FNS, 2011). As of February 2010, the Let's Move! (LM) campaign introduced by First Lady Michelle Obama incorporated the HUSSC program (LM, 2010).

Action for Healthy Kids (AFHK) was founded in 2002 as a public-private partnership of over seventy organizations. The former U. S. Surgeon General, Dr. David Satcher, was the founding chairman (AFHK, 2011). Dr. Satcher's forward remarks for *The Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity* emphasized his commitment to seeing the obesity trends for the Nation reversed while recognizing that schools must be included in the strategies (USDHHS, 2001).

Alliance for a Healthier Generation (AHG) encourages nutrition education in schools of any grade level. This program founded in 2005 by the American Heart Association and the William J. Clinton Foundation gives awards to schools that have improved school meals, increased nutrition education and physical education for students (AHG, 2009).

The Bienestar (well-being or wellness in Spanish) Health Program that was introduced into both parochial and public elementary schools (4th grade) in San Antonio, Texas over three different academic years (1996-97, 1998-1999, and 2001-2002) proved that a comprehensive school-based health program could reduce the incidence of diabetes risk factors in a population (Mexican-American) with a high prevalence of type 2 diabetes. The targeted risk factors for diabetes are overweight and dietary fat intake. Therefore, the goals of the studies were to measure reductions in percent body fat and/or dietary fat intake (Trevino et al., 1998; Trevino et al., 2004; Trevino, Hernandez, Yin, Garcia, & Hernandez, 2005). The Bienestar Health Program includes four components: Health and Physical Activities, Health Club, School Food Service, and Parent/Family Activities. Each component has a designated schedule, educational materials and instructors. During the 1996-1997 school year (2 schools/102 students), the students successfully increased their dietary fruit and vegetable intake while decreasing dietary fat intake and the kilocalories associated with the fat. While their diabetes health knowledge increased, physical activity did not increase and percent body fat did not decrease (Trevino et al., 1998). During the 1998-1999 school year (9 schools/387 students), the

students improved physical fitness scores. These results indicated that the program could be successful in elevating the physical activity levels critical to preventing diabetes in this at-risk population (Trevino et al., 2005). The focus of the study during the 2001-2002 school year (44 schools/1419 students) was fasting capillary glucose (FCG) levels. The positive outcomes for the intervention group were reduced FCG levels, increased fitness scores, and increased dietary fiber intake. This study did not find statistically significant differences in dietary fat intake or percent body fat between the intervention and control groups (Trevino et al., 2004). The Bienestar Health Program is committed to continued research to determine the cost effectiveness and long term outcomes of this school-based health intervention. Even if there is an agreement with other professionals as to the desire for nutrition integrity in the schools (Bergman & Gordan, 2010) with sequential lessons from pre-K through 12th grade, the efforts of Bienestar alone indicate an enormous amount of expertise, personnel, cooperation, commitment, and money to achieve significant positive outcomes.

The Bienestar program was adapted by researchers (Shaw-Perry et al., 2007) to reach African-American children in San Antonio, Texas. The African-American population also experiences high frequencies of type 2 diabetes and the corresponding risk factors. This adapted program was called NEEMA (wellness in Swahili) and maintained the essential components of Bienestar. Results of the 14-week pilot study during the spring semester of 2005 for 58 African-American 4th graders were increased fitness, decreased FCG and decreased percent body fat.

The National Conference of State Legislatures (NCSL) provides reports concerning policy options regarding childhood obesity. The 2009 update mentions that the USDA found that nutrition education, especially involving longer duration and more contact hours, coupled with community and parental involvement result in more positive outcomes regarding behavior change. Existing laws requiring various school-based nutrition education components have been enacted for 14 states as of 2009, Texas being one of them (NCSL, 2010).

Many of the programs (voluntary or legislated) may have before and after school sessions to facilitate the physical and nutrition education components with the primary focus being the elementary school level. Another aspect of these programs has been the traditional emphasis on the health and/or physical education courses as the targeted classroom component for the nutrition education segment for all grade levels. There seems to be an endless amount of valuable teaching materials available, but if the student is not required to remember the content through actual testing, there may be little or no motivation to place significance to the topic from the students' perspective. What other avenues are available and especially for the secondary level students who are increasingly selecting their own food, entertainment, and physical activities?

Family and Consumer Sciences Educators

The Action for Healthy Kids survey report (AHK, 2008) asked their stakeholders to comment on the "single best way to achieve positive changes in school wellness." One of the comments under the category of improving the curriculum mentioned "healthier

food preparation in Family and Consumer Science" as one of the actions that could contribute to the school wellness. In general, as the knowledge of food composition changes, recipe modifications also change to incorporate healthier ingredients. The FCS lab classes are often involved in this type of exercise which then teaches the students how to modify their recipes at home.

In 1994, the familiar Home Economics profession changed the name to Family and Consumer Sciences. When the name changed so did the course content (Warren, n.d.). A report drafted for TEA by Region VI Education Service Center in Texas stated that the Family and Consumer Sciences division of the Career Technology Education (CTE) programs included 87 courses, 2,305 full time staff and had a total enrollment of 227,263 for the 2004-2005 school year (TEA/ESC6, 2007). In Nebraska, for the 2001-2002 school year, approximately 62,000 students were enrolled in FCS courses with 8,500 in food and nutrition and 1,225 in food sciences taught by almost 450 FCS teachers (Baum, 2003). Of the eight FCS Standards, Standard IV is Nutrition, Wellness, and Food Science. For this standard, the family and consumer sciences teacher is expected to understand the principles of food science, food technology and nutrition and their relationships to growth, development, health, and wellness; apply this understanding to support informed decision-making that promotes good health; and understand career opportunities in nutrition, wellness and food science (SBEC, n.d.).

The FCS curriculum is versatile and aims to provide the student with course content that can be applied to either personal or career development. An article featured

in the *Dallas Morning News* indicated that beginning nutrition and food sciences courses teach generalized personal health and fitness, whereas the advanced courses will prepare the student for the food service industry (Boney, 2000). As of the 2010-2011 school year, Food Science has been added to the Career and Technical Education (CTE) courses that satisfy the science graduation requirements for Texas (TSBOE, n.d.). All teachers assigned to teach food science will be required to participate in TEA-approved training prior to teaching the course effective school year 2012-2013. Those assigned to teach this course during the previous two school years prior to the effective date, will have 12 months to complete the training from the date the training is first offered (TTU, 2010).

Currently, there is no teacher certification specifically in nutrition out of the 97 certification areas offered by the Texas Education Agency (TEA) (TEA, 2011). There are two professional certifications offered that have nutrition content: Family and Consumer Sciences Composite Certificate and Family and Consumer Sciences Specialized Certificate in Hospitality, Nutrition, and Food Science (AAFCS, 2010; TEA, 2011). Many FCS educators are qualified to teach elective courses that include nutrition components in secondary schools throughout the state of Texas. The TEA specifies the following secondary school courses that provide educational content concerning nutrition and diet: Skills for Living (Middle School); Principles of Human Services (Grade 9); Lifetime Nutrition and Wellness (Grades 10-12); and Food Science (Grades 11-12). The Texas Education Knowledge and Skills (TEKS) that are required for the Lifetime Nutrition and Wellness course (Appendix A) and the Food Science course (Appendix A)

are rigorous, detailed, and very scientific (TEA, 2010). The significance of these TEKS when comparing school-based nutrition education programs is the emphasis on the scientific aspect of nutrition. The TEKS emphasize specific nutrition topics in the areas of nutrition education, general nutrition, functions of nutrients, disease prevention, and nutrient metabolism.

Family and consumer sciences specialists are not limited to nutrition education and intervention programs, but in fact, participate in a variety of research areas as discussed by Schlenker (2001). Some of these areas include the following: (a) dietary and nutrient requirements, (b) nutrition and public policy, (c) food behavior and nutrition intervention, and (d) food product development and food safety. This indicates that the FCS discipline is broad and scientific. When the Nutrition Education and Training (NET) program was active and still funded, Texas relied on the Home Economics Curriculum Center of Texas Tech University to develop an integrated curriculum for grades pre-K through 12 which was then distributed to all school districts in Texas (Martin & Hoover, 1993). Texas Tech University (TTU) has also been involved with the curriculum and professional development for FCS courses (TEA/ESC6, 2007). The *Scope and Sequence* series for both Food Science and Lifetime Nutrition and Wellness, which include a resource list that corresponds to the study units, is provided by TTU (TTU, n.d. a; TTU, n.d. b).

Some professionals have made strong cases for involving FCS in the fight to reduce obesity. Authors Lichtenstein and Ludwig (2010) suggest that basic cooking,

food safety, menu planning, calorie counting, label reading and shopping skills be part of a required course curriculum for all students in high schools nationwide. The necessity to have someone else prepare meals, is fast becoming an over-dependency that progressively erodes the basic survival skills which lead to personal independence and control for the young and old alike.

As the argument for requiring students to take the food and nutrition component of FCS is gaining ground, Peregrin (2010) has suggested opportunities for Registered Dietitians (RD) to consider obtaining teaching certificates and utilizing their skills in the classroom.

Recent newspaper articles (Ridley, 2010; Scattergood, 2010; Veit, 2011) have echoed the sentiment that the classic supervised training in the kitchen should help equip the youth of today with not only the ability to cook but to develop a confidence to create their own healthy recipes. Many students even in elementary school can feel quite comfortable creating their own recipes from breakfast and lunch items to dinner and dessert offerings. These authors are advocates who encourage the continuation and even mandatory teaching of food and nutrition components of FCS courses even in the face of budgetary constraints, confusion regarding the course content, their value or their name. Whether or not this will become a reality is yet to be determined, but at least it is being discussed and probably long overdue. Also, one should not overlook the "science" in these courses.

Educator Attributes Related to School-Based Nutrition Education

Attitudes: Classroom Environment

The classroom nutrition course has several influential characteristics separate and apart from the actual course content. These factors may include the school food service, the health promotion messages from the school administration and staff, peer influences, family influences, media advertisements and the role modeling of the instructors. These influences collectively support or contradict the teaching material that is presented to the student. Several studies have investigated the role of the teacher in the messages that students eventually incorporate into their own belief systems and ultimately their behaviors. The questions might be: Are teachers becoming what they teach? Do they believe what they teach? Or do they say one thing and do something else? Who and what are they in relation to the course content? What barriers exist that may inhibit a visible connection between the course content and actual personal health?

Several studies have specifically investigated the relationship between the knowledge, beliefs and attitudes of the teacher regarding body image, weight control strategies, and exercise practices and the possibilities of transference of any unhealthy beliefs and practices to the student. Australian home economics and physical education college students in their last month of teacher training were surveyed by O'Dea and Abraham (2001). The personal practices followed by some of these teachers-in-training reflected eating disorders both treated and untreated. Study results also indicated that these trainees lacked knowledge about the adolescent nutritional requirements, eating

disorders, fad diets, and healthy weight control strategies. Recommendations from the study were that teaching institutions may need to specifically address the issue of assessment of their students' knowledge regarding body image and disordered eating. This would have a two fold benefit: one for the individual trainee and second for the adolescent student population under the care of these future home economics or physical education teachers. The burden of teaching course content related to nutrition, health, physical fitness, and wellness is that of being a knowledgeable role model.

In a subsequent study, Yager and O'Dea (2009) continued the investigation of body image, disordered eating, dieting and exercise with health-physical education (HPE) and non health-physical education teacher trainees. In addition to self-reported eating disorders, the HPE trainees reported higher incidence of over-exercise or exercise disorders than the non-HPE trainees. The lesson here is that all teachers in subjects related to food, health, and physical education should evaluate their own personal dietary and fitness strategies and seek appropriate treatment, when needed, to effectively deliver health messages to their students.

The classroom food practices of teachers have been explored to specifically evaluate the impact these may have on the students. Practicing middle school teachers (6^{th}, 7^{th}, and 8^{th} grades) were surveyed to evaluate the school food environment, the teacher's personal health, the teacher classroom food practices, and the teacher eating patterns at school (Kubik, Lytle, Hannan, Story, & Perry, 2002). At that time, the use of foods as incentives or rewards for students was common place in the middle school.

Candy, cookies, doughnuts, sweetened drinks, and pizza were cited as foods offered in the classroom and sometimes used as fund raisers. Teachers frequented vending machines to purchase sweetened drinks and high-fat, high-sugar snacks. In general, the findings revealed that the middle school teachers were not role models for healthy eating. Health promotion programs that are faculty and staff oriented may bring needed awareness and knowledge regarding nutrition and dietary behaviors.

A modified version of the questionnaire developed by Kubik et al. (2002) was utilized by Rossiter, Glanville, Taylor and Blum (2007) to survey prospective Canadian elementary and secondary education teachers. The use of food as a reward was indicated by those who had a low belief in the importance of the school in promoting healthy food choices. The scores on the nutrition knowledge segment were low and this suggested that the prospective teachers may not have sufficient nutrition training to be able to establish a healthy classroom environment through both modeling and practice. The authors recommended that a compulsory nutrition component be included in the health education curricula for the college training programs.

Self-Efficacy: Beyond Teacher Confidence

Self-efficacy as defined by Holli, Calabrese, and Maillet (2003) "refers to a person's belief in his or her ability to succeed with a specific task". The concept of self-efficacy often applies to counselor settings where behavior changes are desired for individuals with habits such as alcohol, cigarettes, substance abuse and eating dysfunctions. Research involving self-efficacy for intervention studies, has shown that

an increase in knowledge, training, and other enhancing experiences with the task improve the self-efficacy toward accomplishing the task (AbuSabha & Achterberg, 1997). However, self-efficacy also crosses over into other realms not necessarily related to any personal behaviors that need to be modified such as dietary or physical activity.

School-based health, physical education, and nutrition programs usually focus on the behaviors of the student and include curricula adapted to the grade level with appropriate motivational components to influence and change the behaviors of the student toward a more healthful lifestyle. The student is not the only one in the classroom that needs self-efficacy. The issue of self-efficacy for the teacher would apply to both the need to overcome personal unhealthy behaviors if any (Yager & O'Dea, 2009) and to teach the subject with knowledge and enthusiasm. Britten and Lai (1998) specifically focused on the self-efficacy of the elementary teacher (Hawaiian) rather than on the student. The survey that was developed included questions related to nutrition training, self-efficacy for teaching nutrition, time spent teaching nutrition, nutrition knowledge, and belief in the importance of teaching nutrition. The overall findings suggested that nutrition education training programs for the elementary level educator specifically address teacher self-efficacy as a means of improving the desired implementation of any proposed curricula and of increasing positive student outcomes.

A survey developed by Brenowitz and Tuttle (2003) included a Nutrition-Teaching Self-Efficacy Scale (NTSES) that was presented to Maryland elementary teachers. These authors wanted to improve the ability of researchers to quantify the self-

efficacy of the teacher as it specifically applied to teaching nutrition. Their findings supported earlier research (Britten & Lai, 1998) that more time is spent teaching nutrition when the teacher has a high teaching self-efficacy rating.

Canadian researchers, Klassen and Chiu (2010) explored practicing teachers' self-efficacy and job satisfaction as related to gender, years of experience and job stress. These survey respondents were 1430 conference attendees who taught all grade levels and all disciplines from western Canada. These researchers did not study self-efficacy factors specific to the teaching of nutrition, but experiences that impact all educators such as instructional strategies, classroom management, and student engagement. Job satisfaction was higher for those teachers who had greater self-efficacy for either classroom management or instructional strategies.

In summary, school environments changed as a response to monetary restraints resulting in reductions in physical and health education and increase in convenience, processed foods offered at schools. Concurrently, overweight and obesity trends for both adult and youth have increased resulting in public health challenges related to health care, disabilities, and overall productivity and quality of life issues. Efforts to improve these factors have included national, state, local and private policies and programs designed to improve consumer awareness of the need for behaviors that include healthy food choices and increased physical activity. Family and consumer sciences educators and courses have the potential of offering the secondary student the necessary education to achieve the desired outcomes that promote a lifestyle of health for a lifetime.

CHAPTER III

METHODS

All research methods were approved by the Institutional Review Board of Texas Woman's University before the study began (Appendix B).

Survey Instrument

A questionnaire (Appendix C) was developed by the researchers to collect data from middle and high school FCS educators in Texas. Three surveys served as models for collecting data regarding nutrition education (Bharucha, 2008; Celebuski & Ferris, 1996; Futrell, 2006). Futrell (2006) surveyed elementary teachers with questions related to both attitudes about nutrition education and teacher self-efficacy towards teaching nutrition. This survey also had questions to assess nutrition knowledge. Bharucha (2008) surveyed child nutrition directors and school administrators with questions regarding Local Wellness Policies and various aspects of school nutrition education. Celebuski and Ferris (1996) collected information from U.S. public schools (K-12). Their survey had some questions regarding attitudes and behaviors and other questions about education level, teaching materials, and characteristics of the available nutrition education at the respondent's school. All three surveys (Bharucha, 2008; Celebuski & Ferris, 1996; Futrell, 2006) asked for demographic information that varied according to the individual study. The final survey was a composite of various concepts and question

formats that were modified to specifically apply to secondary FCS teachers and to meet the research objectives of this study.

The current survey was intended to assess: (a) attitudes regarding school-based nutrition education, (b) perceptions regarding self-efficacy for teaching nutrition, and (c) comfort in teaching 30 nutrition topics that were divided into five categories. The following nutrition categories were based on the Texas Education Knowledge and Skills for both the Lifetime Nutrition and Wellness (Appendix A) course and the Food Science (Appendix A) course (TEA, 2010): nutrition education, general nutrition, disease prevention, nutrient metabolism, and functions of nutrients. The questionnaire included eight statements reflecting attitudes about nutrition education and five statements related to self-efficacy in teaching nutrition. Level of agreement with these statements was assessed using a 5-step Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. Comfort in teaching nutrition topics was measured by a 5-step Likert scale that ranged from 1 = very uncomfortable to 5 = very comfortable (Harris, Boushey, Bruemmer, & Archer, 2008). The survey also asked questions related to educator demographics including age, educational background, teaching experience, and certifications. Questions related to school demographics involved grades included at the school, community size, and information concerning the school's Local Wellness Policy (LWP). The questionnaire was validated for content and readability by six educators (3 FCS, 2 nutrition, and 1 dual nutrition/ FCS). The survey was then revised based on their comments and suggestions.

The questionnaire (Appendix C) was then converted to an online format using the PsychData® secured website (PsychData®). A convenience sample of 35 FCS educators was invited by e-mail (Appendix D) and reminder telephone calls to pilot test the survey. Fourteen educators completed the survey as a pilot test. Cronbach's-alpha analysis was used to test the inter-item reliability of the Likert-scale questions. Inter-item reliability of attitudes toward nutrition education was .927, and for teaching self-efficacy, it was .791. For comfort in teaching the various nutrition topic categories, inter-item reliability was as follows: nutrition education, .721; general nutrition, .801; disease prevention, .354, nutrient metabolism, .657, and functions of nutrients, .878. Since generally a value of the Cronbach's-alpha coefficient that is greater than .65 is considered acceptable, the researchers examined the topics listed under disease prevention (DeVellis, 1991; Gleason, Harris, Sheenan, Boushey, & Bruemmer, 2010). Researchers felt that all participants might not have understood the terms "hypertension", "anorexia", and "bulimia". These topics were revised for clarity with "hypertension" defined as "high blood pressure" and "anorexia" and "bulimia" defined as "eating disorders". After the changes were made, the Cronbach's-alpha coefficient for the disease prevention category increased to .913 in the final survey.

Participants

Survey participants were secondary FCS educators in the state of Texas. Names of educators were obtained from two sources. The first source for the sample was the Texas Education Agency. A list of educators certified to teach either the Lifetime

Nutrition and Wellness course (Code = 13024500) or the Food Science course (Code = 13023000) was requested from the Public Education Information Management System (PEIMS) Ad Hoc Reporting Division at the Texas Education Agency. This list included names of 1,374 teachers representing 219 Texas counties for the school year 2010-2011. Due to the cost of postage for two mailings, a smaller sample set was prepared by the TWU biostatistician. An original sample of 590 teachers was prepared which represented all of the Food Science teachers (selected sample) and the remaining represented a random sample of those who were teaching Lifetime Nutrition and Wellness. After duplicate names were eliminated (some teachers taught on more than one campus), the final sample included 579 names.

The second source was teachers who were members of the Family and Consumer Sciences Teachers Association of Texas (FCSTAT, 2011). This professional organization was established in 1963 and currently has over 3,000 members who represent secondary and post-secondary educators, administrators, cooperative extension educators, retired members, and students enrolled in FCS education programs. For a service charge, the FCSTAT staff created a list of members who were currently teaching courses with nutrition content in Texas secondary schools. The staff was sent both lists from TEA (1,374 and 590) to aid in determining which members were currently teaching these courses. Since the list of 1,374 names from TEA had only district email addresses, FCSTAT agreed to send the emails to members who appeared on the 590 subset. Since not all teachers from the 590 sample were members, FCSTAT staff then matched their

membership list to the original complete list from TEA. This method provided 569 members that could be contacted by email. A cross match of the names from both lists indicated that FCSTAT added 240 new names to the TWU 590 sample. When all duplicate names were eliminated, the total came to 819 contacts (240 and 579).

Both the list of FCSTAT teacher members and the list of FCS educators obtained from TEA were used to recruit study participants. It was determined that a minimum sample size of 144 participants was needed to conduct appropriate statistical analyses using g* power, based on a moderate effect size, a minimum power .80, and alpha of .05 (Moore & McCabe, 1999).

Data Collection

FCSTAT staff assisted with this study by e-mailing a cover letter (Appendix E) inviting teacher participation that provided an online link to the survey posted on PsychData®. The researchers thought that e-mails sent by FCSTAT were likely to be viewed as a credible source by FCS educators and would also survive firewalls set up by school districts. This e-mail invitation was sent to a sample of 569 FCS teachers. Approximately two weeks later, a cover letter (Appendix F) and paper survey with return address postage provided were direct-mailed to the list of 579 educators obtained from TEA using the school address provided. Two weeks after this, a second e-mail (Appendix E) was sent to the FCSTAT members as a reminder, and a postcard reminder (Appendix F) was direct-mailed to the teacher list obtained from TEA. As an incentive

for participating in the survey, teachers were promised the chance to win one of thirty $20.00 Barnes & Noble gift cards in a drawing.

Statistics

Descriptive statistics, including means, standard deviations, frequencies, and percentages, were summarized to provide a description of the sample. All statistical analyses were performed using IBM® SPSS® version 19 software (IBM®/SPSS®, 2011). For Hypothesis 1, Spearman's correlation coefficient was used to examine differences between continuous variables (age, years employed) and FCS educator attitudes concerning nutrition education. Independent t tests and Analysis of Variance (ANOVA) were used to test for differences between categorical variables (ethnicity, certification, level of education, community size) and educator attitudes toward nutrition education. Due to non-normal distribution of data, various non-parametric tests such as Mann-Whitney U, Wilcoxon W, and Kruskal Wallis chi-square were also conducted (Harris et al., 2008). For Hypothesis 2, Spearman's correlation coefficient was conducted to determine the relationships among continuous demographic variables (age, years employed) and self-efficacy scores. Non-parametric tests such as Mann-Whitney U, Wilcoxon W, and Kruskal Wallis chi-square were used to evaluate differences between categorical variables (ethnicity, certification, level of education, community size) and self-efficacy scores. For Hypothesis 3, Spearman's correlation coefficient was used to determine relationships between continuous variables (age, years employed) and comfort levels for teaching various categories of nutrition topics. Non-parametric tests including

Mann-Whitney U, Wilcoxon W, and Kruskal Wallis chi-square were used to test differences between categorical variables (ethnicity, certification, level of education, community size) and comfort levels for teaching various categories of nutrition topics. To investigate potential differences across category scores for all three hypotheses, a series of Multivariate Analysis of Variance (MANOVA) tests were conducted (Boushey, Harris, Bruemmer, & Archer, 2008; Cronk, 2006).

CHAPTER IV

RESULTS AND DISCUSSION

Response Rate

The number of FCS teachers that responded to the survey included 15 for the pilot study and 182 for the main study for a total of 197. The majority responded on-line (75%) and the remainder by mail (25%). The total number of individuals contacted from both recruitment lists was 819. This resulted in an overall response rate of 24%. A pattern was observed for both the on-line and mail-in responses in that some respondent names were not part of either original mailing list. These were designated as substitute respondents perhaps for teachers who were not engaged in teaching the nutrition content. There was a total of 14 (6 mail-in; 7 on-line) substitute respondents and their interest in the subject helped to improve the response rate (Colasanto, n.d.). Most of the educators (86%) completed the open-ended question that asked for any suggestions regarding ways to influence students to adopt habits for a healthy lifestyle.

Demographic Characteristics

The demographic information that was collected including gender, age, ethnicity, educational background, and teaching experience is presented in Table 1. The majority of the respondents were white/non-Hispanic (82%) women (99%) with a mean age of 49 years. Many FCS educators had Bachelor's degrees with additional coursework or a higher degree (48%). The mean number of years teaching FCS courses in general was 14

years with 13 years teaching experience for FCS courses with nutrition content. These respondent characteristics are similar to those of the practicing teachers from many disciplines that were surveyed by Klassen and Chiu (2010): Anglo-European Canadian (92%), women (69%), mean age 40 years with 13 years overall teaching experience and highest level of education not obtained.

Table 1
Demographic characteristics of responding FCS teachers

Category	Number	Percentage
Gender (N = 197)[a]		
Female	194	98.5
Male	3	1.5
Age (N = 195)[b]		
20-29	19	9.7
30-39	24	12.3
40-49	34	17.4
50-59	92	47.1
60-69	26	13.3
Ethnicity (N = 197)		
White/Non-Hispanic	161	81.7
Hispanic	20	10.2
Black/Non-Hispanic	11	5.6
Asian/Pacific Islander,	3	1.0
Native American Indian	1	0.5
Other [c]	1	0.5
Highest Level of Education Attained (N = 190)		
Bachelor's	98	51.6
Bachelor's with courses toward Master's	45	23.7
Master's	40	21.1
Master's with courses toward Doctorate	5	2.6
Doctorate	2	1.1

(Continued)

Total years teaching FCS courses (N = 190)[d]		
0-10	88	46.3
11-19	49	25.8
20-29	29	15.3
30-39	22	11.6
40-42	2	1.1
Total years teaching FCS courses with nutrition (N = 191)[e]		
0-10	96	50.3
11-19	46	24.1
20-29	27	14.1
30-40	22	11.5

Note. [a]N varies due to missing data; [b]Mean = 48.7 ± 11.12; [c]Not specified; [d]Mean = 14.0 ± 10.76; [e]Mean = 13.4 ± 10.46

The types of certifications that the FCS teachers had are shown in Table 2. The majority of the respondents (81%) held a composite Certificate in Family and Consumer Sciences, and one-half had a ServSafe certificate. The majority of the respondents (83%) indicated that FCS was not a second teaching certification area.

The teaching grade level, types of nutrition courses, and the types of teaching materials are also included in Table 2. The majority of the respondents were teaching in high school (89%) with 56% teaching a complete stand-alone course. The courses cited were Lifetime Nutrition and Wellness (46%), Principles of Human Services (25%), Food Science (13%) and several other courses, each below 10%. Teaching materials were from many sources including those developed by the teacher (28%), textbooks (28%) and state-mandated materials (22%). The Texas Tech University (TTU) Career Center markets resources from many sources and this data reflects this variety (TTU, n.d. a; TTU, n.d. b).

Table 2

Characteristics of FCS teacher respondents and FCS courses taught in Texas secondary schools

Category	Number	Percentage
Teaching Certifications Specific to FCS (N = 183)*		
Composite Certificate in Family and Consumer Sciences	149	81.4
Home Economics/Lifetime/Vocational	23	12.6
Specialized Certificate in Hospitality, Nutrition and Food Sciences	7	3.8
Specialized Certificate in Human Development and Family Studies	4	2.2
Professional Certifications (N = 195)*		
ServSafe	98	50.3
Family and Consumer Sciences	91	46.7
Registered Dietitian	6	3.1
Grade Level (N = 189)		
High school	168	88.9
Both middle and high schools	15	7.9
Middle school	6	3.2
Currently teaching nutrition content as ___ (N = 194)		
A complete stand-alone course	108	55.7
A unit in a course	51	26.3
Both as a unit and as a stand-alone course	24	12.4
I am not teaching nutrition content at this time	11	5.7
Currently teaching courses with nutrition content *		
Lifetime Nutrition and Wellness	145	45.7
Principles of Human Services	78	24.6
Food Science	42	13.2
Culinary Arts (I and II)/Hospitality/Restaurant	24	7.6
Child Development/Guidance/Parenting School Aged Child	14	4.4
Skills for Living	9	2.8
Human Growth and Development	3	0.9
Counseling and Mental Health/Health	2	0.6
Teaching Materials used are ___ *		
Teacher developed	156	28.4
Textbooks	153	27.8
State-mandated	120	21.8
Professional association-developed or Texas Tech University	72	13.1
District-mandated	33	6.0
Variety: Internet, gov't, multimedia, personal, news, books, etc.	16	2.9

Note. * Responses number more than respondents due to multiple selections

The community size represented by the respondents is given in Table 3. The overwhelming majority (84%) of the respondents were from rural, suburban, and small metropolitan areas.

All U.S. schools participating in the National School Lunch Program were required to implement a Local Wellness Policy (LWP) by the beginning of the 2006-2007 school year. However, five years after this date, 22% of survey respondents indicated their school did not have a LWP (Table 3). Also nearly 40% of respondents did not know if their school had a LWP. It is possible that there were additional schools that did not have a LWP in place. Likewise, other schools may have a LWP but the teachers were unaware of that fact. Participation in the drafting and planning of the LWP was a privilege experienced by fewer than 10% of the respondents. The specification for a mandatory classroom nutrition requirement from the LWP was suggested by only seven (9%) of the 74 respondents who answered this question. When further questioned regarding the number of minutes of required nutrition education taught per week, the respondents' answers were 15, 30, 45, 160, and 180 minutes with no predominance among the responses. These responses about the LWP may not be surprising given the fact that some school districts, like Dallas Independent School District (DISD), utilize the health classes and the school food service to participate in the nutrition education component (DISD, n.d.). Specific knowledge about the details of their schools' LWP may not be a major concern to FCS teachers since many are involved daily in teaching nutrition content from their own courses.

Table 3
Community size and Local Wellness Policy for schools represented by FCS teachers

Category	Number	Percentage
Community Size (N = 192)		
Rural (<2,500)	69	35.9
Suburban (2,500-50,000)	58	30.2
Small Metropolitan (50,001-500,000)	35	18.2
Medium Metropolitan (500,001-1 million)	15	7.8
Large Metropolitan (>1 million)	15	7.8
Does your school have a Local Wellness Policy? (N =192)		
I don't know	75	39.1
Yes	75	39.1
No	42	21.9
If 'yes', does LWP include mandatory classroom nutrition? (N =75)		
No	49	65.3
I don't know	19	25.3
Yes	7	9.3
Were you involved in planning the school's LWP? (N = 74)		
No	67	90.5
Yes	7	9.5

The Research Questions

Several variables that would have contributed to analyses as originally planned either could not be used or were modified. The age and years of teaching experience variables were collected and analyzed as continuous variables but are displayed in the tables as categorical. Due to the limited cases of different types of certifications, this variable could not be used for analysis. Similarly, there were not sufficient number of males represented (2%) to allow for comparisons between genders. The ethnicity variable was collapsed into two groups, White/Non-Hispanic and Other (Asian/Pacific Islander, Black/Non-Hispanic, Hispanic, and Native-American Indian). The level of education variable was collapsed into three groups, Bachelor's degree, Bachelor's degree

with some Master's coursework, and Master's degree or higher. In addition, the community size variable was collapsed into three groups, metropolitan, suburban, and rural. All metropolitan sizes (above 50,000) were grouped as one. The overall summary of the null hypotheses as they relate to the FCS teacher attitudes toward nutrition education, teacher perceptions of teaching self-efficacy, and teacher perceptions of comfort levels teaching nutrition topics appears in Table 4.

Table 4
Summary of FCS teacher attitudes toward nutrition education, teacher perceptions of teaching self-efficacy, and teacher perceptions of comfort levels teaching nutrition topics

Statement	N[a]	Overall Means Mean ± SD
Attitudes toward Nutrition Education [b]	187	3.67 ± 0.49
Teaching Self-Efficacy [b]	186	4.14 ± 0.83
Comfort Teaching ALL Nutrition Topics [c]	187	4.35 ± 0.72
Nutrition Education [c]	187	4.53 ± 0.73
Functions of Nutrients [c]	187	4.49 ± 0.79
General Nutrition [c]	187	4.49 ± 0.74
Disease Prevention [c]	187	4.19 ± 0.84
Nutrient Metabolism [c]	187	4.09 ± 0.88

Note. [a] The number of responses for each statement varies due to missing data.
[b] Likert Scale: 1 = Strongly Disagree to 5 = Strongly Agree
[c] Likert Scale: 1 = Very Uncomfortable to 5 = Very Comfortable

Attitudes toward Nutrition Education

The first null hypothesis research question on the questionnaire was presented in a series of eight statements regarding FCS teacher *Attitudes toward Nutrition Education.* Two questions each represented attitudes related to the role of the school, parents and community, the student, and the teacher. As indicated in Table 4, the *Attitudes toward*

Nutrition Education section had the lowest mean and standard deviation (3.67 ± 0.49). A summary of the FCS teacher *Attitudes toward Nutrition Education* appears in Table 5. Results are presented from the highest agreement of the Likert scale to the lowest regardless of appearance on the survey.

Table 5
FCS teacher attitudes toward nutrition education [a]

Statement	N [b]	Mean ± SD
FCS teachers can be role models for nutrition and fitness.	185	4.41 ± 0.76
School-based nutrition education can influence eating habits at home	177	4.11 ± 0.70
Classroom nutrition education can play a significant role in reversing the prevalence of childhood overweight and obesity	187	3.99 ± 0.87
The student is responsible for his/her eating behaviors.	185	3.91 ± 0.98
Students enrolled in FCS courses with a nutrition component develop healthy eating behaviors.	187	3.58 ± 0.84
My school supports school-based nutrition education	186	3.54 ± 0.93
Parents in my community support school-based nutrition education.	186	3.27 ± 0.83
At my school the amount of school-based nutrition education currently offered is enough to change student eating behaviors.	187	2.59 ± 1.04
Overall Mean ± SD		3.67 ± 0.49

Note [a] Likert Scale: 1 = Strongly Disagree to 5 = Strongly agree.
[b] Number of responses varies due to missing data.

A review of the means for each attitude statement reveals that six out of eight are below 4 on agreement. One is below 3: *At my school the amount of school-based nutrition education currently offered is enough to change student eating behaviors.* The attitudes expressed regarding the position of the schools are supported by Miller (2009), who reminded readers that the LWP has not been funded by the federal government. The costs of providing school programs to reduce childhood obesity and misinformed

constituents (parents and community) were two of the barriers to implementing school-based nutrition education as listed by Dodson et al. (2009). Parents may not feel qualified to address the issue of nutrition education in schools if the family has existing diet-related health issues or they may not know how to discuss diet and physical activity with their children (Borra et al., 2003). Some FCS teachers themselves may struggle with internal conflicts between the nutrition content and their own beliefs and behaviors; therefore expectations of positive student outcomes may be questioned (O'Dea & Abraham, 2001).

The Spearman correlation coefficients for the FCS teacher *Attitudes toward Nutrition Education* based on the continuous variables of age and years of teaching experience are given in Table 6. The results indicate that neither age nor years of teaching experience had a significant effect on the expressed attitudes of the FCS teachers.

Table 6
Correlation coefficients for FCS teacher attitudes toward nutrition education [a] based on age and years of teaching experience

Research Question	N [b]	Spearman r	p
Age	185	.027	.713
Years of Teaching Experience	186	.062	.398

Note. [a] Likert Scale: 1 = Strongly Disagree to 5 = Strongly Agree
[b] The number of responses for each statement varies due to missing data.

The FCS teacher *Attitudes toward Nutrition Education* based on ethnicity is presented in Table 7. The results, based on the White/Non-Hispanic group, are presented

from the highest agreement of the Likert scale to the lowest regardless of appearance on the survey. Careful inspection of the means shows that the results are almost identical to the overall means of the respondents shown in Table 5. Since the majority (82%) of the respondents belonged to the White/Non-Hispanic group, there may be an ethnicity bias represented as well as a gender bias (98% female) (Colasanto, n.d.). These overall results may not, therefore, represent the views of FCS educators who are male or who represent ethnicities other than White/Non-Hispanic.

Table 7
FCS teacher attitudes toward nutrition education [a] *based on ethnicity*

	White/ Non-Hispanic		Other [b]	
Statement	N [c]	Mean ± SD	N[a]	Mean ± SD
FCS teachers can be role models for nutrition and fitness.	152	4.41 ± 0.77	33	4.39 ± 0.79
School-based nutrition education can influence eating habits at home	144	4.08 ± 0.72	33	4.24 ± 0.56
Classroom nutrition education can play a significant role in reversing the prevalence of childhood overweight and obesity	153	3.96 ± 0.87	34	4.12 ± 0.91
The student is responsible for his/her eating behaviors.	151	3.93 ± 0.94	34	3.79 ± 1.15
Students enrolled in FCS courses with a nutrition component develop healthy eating behaviors.	153	3.56 ± 0.83	34	3.65 ± 0.88
My school supports school-based nutrition education	152	3.53 ± 0.94	34	3.59 ± 0.89
Parents in my community support school-based nutrition education.	152	3.27 ± 0.85	34	3.26 ± 0.75
At my school the amount of school-based nutrition education currently offered is enough to change student eating behaviors.	153	2.57 ± 1.04	34	2.71 ± 1.06
Overall Mean ± SD		3.65 ± 0.49		3.71 ± 0.48

Note. [a] Likert Scale: 1 = Strongly Disagree to 5 = Strongly agree
[b] Asian/Pacific Islander, Black/Non-Hispanic, Hispanic, and Native-American Indian
[c] Number of responses varies due to missing data.

The differences between *Attitudes toward Nutrition Education* for the two ethnic groups were compared using an independent-samples *t* test. No significant difference was found (t (185) = -0.593, p = .554). The mean and standard deviation (SD) of the White/Non-Hispanic group (3.65 ± 0.49) were not significantly different from the mean of the Other group (3.71 ± 0.48). The Mann-Whitney U/Wilcoxon W correlation coefficient (Z) for nonparametric analysis of the two groups showed that no significant differences were found (Z = -1.074, p = .283). The one-way MANOVA did not find any significant effect on the attitudes based on ethnic group (F (1, 171) = 1.325, p = .251, partial η^2 = .008). These results indicate that the ethnicity did not significantly influence the attitudes.

The FCS teacher *Attitudes toward Nutrition Education* based on level of education is shown in Table 8. The presentation of the results for the mean and standard deviation are based on the Bachelor's group. The rank order is from the highest agreement of the Likert scale to the lowest regardless of appearance on the survey. The Kruskal-Wallis Chi-Square correlation coefficient (χ^2) for nonparametric analysis of three education groups showed that no significant differences were found (χ^2 = 0.071, p = .965). The one-way MANOVA (Table 8) multivariate analysis failed to find a significant correlation. However, both the univariate tests and Tukey HSD post-hoc analyses showed significant effects based on education for two of the attitude statements. For the statement, *School-based nutrition education can influence eating habits at home,* the Master's/plus group expressed significantly higher agreement than the Bachelor's group

($p = .008$). For the statement, *At my school the amount of school-based nutrition education currently offered is enough to change student eating behaviors,* the Bachelor's/plus group had significantly higher agreement than the Master's plus group ($p = .029$). However, all three education groups rated this statement below 3 on the Likert scale which indicated general disagreement. Additionally, all three groups ranked four of the eight statements below 4 on the Likert scale indicating disagreement or undecided.

Table 8
One-Way MANOVA of FCS teacher attitudes toward nutrition education based on level of education (N = 171)

Statement	F	p	B (n = 86) Mean ± SD	B + (n = 43) Mean ± SD	M/+ (n= 42) Mean ± SD
FCS teachers can be role models for nutrition and fitness.	1.54	.217	4.40 ± 0.58	4.40 ± 0.66	4.60 ± 0.73
The student is responsible for his/her eating behaviors.	1.16	.317	4.09 ± 0.85	3.93 ± 0.88	3.86 ± 0.95
School-based nutrition education can influence eating habits at home	4.67	.011	[a] 4.02 ± 0.69	[ab] 4.09 ± 0.57	[b] 4.40 ± 0.73
Classroom nutrition education can play a significant role in reversing the prevalence of childhood overweight and obesity	1.38	.254	3.94 ± 0.77	4.02 ± 0.71	4.19 ± 0.92
My school supports school-based nutrition education	0.85	.431	3.58 ± 0.87	3.53 ± 0.91	3.36 ± 1.03
Students enrolled in FCS courses with a nutrition component develop healthy eating behaviors.	1.83	.163	3.52 ± 0.75	3.65 ± 0.78	3.81 ± 0.92
Parents in my community support school-based nutrition education.	0.06	.943	3.29 ± 0.78	3.28 ± 0.88	3.24 ± 0.85
At my school the amount of school-based nutrition education currently offered is enough to change student eating behaviors.	3.33	.038	[ab] 2.64 ± 0.93	[a] 2.91 ± 1.02	[b] 2.33 ± 1.20

Note. Likert scale: Likert Scale: 1 = Strongly Disagree to 5 = Strongly agree.
Bachelor's degree: B; Bachelor's degree plus additional coursework: B +
Master's degree plus additional coursework or higher degree: M/+.
Multivariate F (16.00, 322.00) = 1.48, $p = .105$ partial $\eta^2 = .068$.
Means with different superscripts differed significantly. Tukey post hoc test, $p < .05$ (2-tailed).

The overall trend revealed the highest attitude means were given by those with the most education for half of the statements and the remaining half were evenly distributed amongst the other two groups. Therefore, the amount of education does influence the attitudes and possibly the belief in positive student outcomes.

The FCS teacher *Attitudes toward Nutrition Education* based on the size of the community is shown in Table 9. The results, based on the metropolitan group, are presented from the highest agreement of the Likert scale to the lowest regardless of appearance on the survey. The means for half of the statements are below 4 on the Likert scale indicating disagreement or undecided. The overall means show the following trend: suburban (3.70 ± 0.41) was greater than metropolitan (3.65 ± 0.55) which was greater than or equal to rural (3.65 ± 0.50). Despite the fact that means were all below 4 for the statement "*My school supports school-based nutrition education,*" the rural community size ranked highest. The Kruskal-Wallis Chi-Square correlation coefficient (χ^2) for nonparametric analysis of the three community size groups showed that no significant differences were found ($\chi^2 = 0.097, p = .953$). The one-way MANOVA (Table 9) multivariate analysis found some significant correlations. Univariate tests and Tukey HSD post-hoc analyses also showed some significant effects in attitudes based on community size. For the statement, *Classroom nutrition education can play a significant role in reversing the prevalence of childhood overweight and obesity*, FCS teachers from metropolitan communities had significantly higher agreement than those from rural communities ($p = .030$). For the statement, *My school supports school-based nutrition*

education, FCS teachers from rural communities agreed more strongly with this statement than those from metropolitan areas ($p = .010$). However, for the statement, *Parents in my community support school-based nutrition education,* there was only a marginal difference between metropolitan and suburban groups ($p = .071$).

Table 9
One-Way MANOVA of FCS teacher attitudes toward nutrition education based on community size (N = 173)

Statement	F	p	M (n = 57) Mean ± SD	S (n = 53) Mean ± SD	R (n= 63) Mean ± SD
FCS teachers can be role models for nutrition and fitness.	0.89	.412	4.53 ± 0.71	4.40 ± 0.57	4.37 ± 0.77
Classroom nutrition education can play a significant role in reversing the prevalence of childhood overweight and obesity.	3.31	.039	[a] 4.19 ± 0.79	[ab] 4.02 ± 0.69	[b] 3.81 ± 0.93
School-based nutrition education can influence eating habits at home.	1.93	.149	4.19 ± 0.61	4.21 ± 0.66	3.98 ± 0.79
The student is responsible for his/her eating behaviors.	1.26	.285	4.11 ± 0.90	3.98 ± 0.82	3.84 ± 0.99
Students enrolled in FCS courses with a nutrition component develop healthy eating behaviors.	0.37	.689	3.54 ± 0.97	3.68 ± 0.67	3.60 ± 0.79
My school supports school-based nutrition education.	4.38	.014	[a] 3.25 ± 1.07	[ab] 3.55 ± 0.87	[b] 3.73 ± 0.75
Parents in my community support school-based nutrition education.	3.11	.047	3.05 ± 0.88	3.40 ± 0.77	3.37 ± 0.79
At my school the amount of school-based nutrition education currently offered is enough to change student eating behaviors.	0.10	.906	2.65 ± 1.08	2.57 ± 1.07	2.63 ± 1.01

Note. Likert scale: Likert Scale: 1 = Strongly Disagree to 5 = Strongly agree.
Metropolitan: M; Suburban: S; Rural: R
Multivariate F (16.00, 326.00) = 1.92, $p = .018$ partial $\eta^2 = .086$.
Means with different superscripts differed significantly. Tukey post hoc test, $p < .05$ (2-tailed).

The metropolitan group ranked highest for half of the statements. Respondents from the suburban or rural communities ranked in first place for the other half of the statements. However, suburban and rural respondents also had higher agreement for their school and parents supporting school-based nutrition education. Speculation regarding the role of the community size and the impact it has on school policy and programs may reflect the closer associations between citizens in smaller communities and their ability to express interest in their fellow man.

Teaching Self-Efficacy

The second null hypothesis research question on the questionnaire was presented in a series of five statements regarding the FCS teacher perceptions of *Teaching Self-Efficacy*. The statements represented perceptions of self-efficacy regarding teaching experience, nutrition knowledge, and the ability to teach students or staff. As indicated in Table 4, the overall mean for level of agreement for teaching self-efficacy was 4.14 ± 0.83 indicating a positive level of agreement. The summary of the FCS teacher perceptions of *Teaching Self-Efficacy* appears in Table 10. Results are presented from the highest agreement of the Likert scale to the lowest regardless of appearance on the survey. Scales used to measure self-efficacy vary as observed by AbuSabha and Achterberg (1997) including options for 1-3, 1-4, 1-5, and 1-6. When Brenowitz and Tuttle (2003) developed their *Nutrition-Teaching Self-Efficacy Scale* they chose a 1-4 option. Since this present study used the 1-5 scale, it became evident that comparisons of any surveys even in the same field of interest might be difficult. The 1-5 scale has a clear

middle ground of the "undecided" choice at position "3." This makes for a boundary between agreement and disagreement for both the respondent and the researcher. Unlike the 1-3 scale, the 1-5 scale offers an extra level of agreement or disagreement so that the respondent can, in fact, *partially* agree or disagree.

Table 10
FCS teacher perceptions of teaching self-efficacy [a]

Statement	N [b]	Mean ± SD [c]
I am confident that I have enough experience.	185	4.27 ± 0.95
I am confident that I have enough nutrition knowledge	183	4.23 ± 0.95
I feel qualified to teach the entire student body.	185	4.18 ± 1.00
I can teach any student regardless of their interest in nutrition.	186	4.12 ± 0.86
I feel confident in presenting nutrition education content to other teachers in my school and district.	184	3.88 ± 1.02
Overall Mean ± SD		4.14 ± 0.83

Note. [a] If classroom nutrition education became a state or federal mandate, do you feel qualified to teach the subject to all the students and not just to those enrolled in the FCS courses?
[b] Number of responses varies due to missing data.
[c] Likert Scale: 1 = Strongly Disagree to 5 = Strongly agree

Spearman's correlation coefficient (*rho*) was used to determine relationships between the continuous variables of age and years of experience with self-efficacy (Table 11). Positive correlations were found between self-efficacy and both age and years of teaching experience. The results indicate that both age and years of teaching experience had a significant effect on the perceptions of self-efficacy for the FCS teachers. The statistical significance for the years of teaching experience was even stronger than for the age of the teacher. However, results can be interpreted to indicate that as a teacher both ages and concurrently increases in teaching experience, the individual's confidence level

increases. A generalized statement of the findings would be that older, more experienced teachers have higher levels of teaching self-efficacy. However, the research by Klassen and Chiu (2010) additionally revealed that the years of experience showed a nonlinear relationship with their self-efficacy variables of teaching strategies, classroom management, and student engagement. The teaching self-efficacy increased from early to mid-career and then declined during the later years. The graph of the curve showed a peak at around 23 years of teaching experience.

Table 11
Correlation coefficients for FCS teacher perceptions of teaching self-efficacy [a] *based on age and years of teaching experience*

Research Question	N [b]	Spearman r	p
Age	184	0.145*	.050
Years of Teaching Experience	185	0.185*	.012

Note. [a] Likert Scale: 1 = Strongly Disagree to 5 = Strongly Agree
[b] The number of responses for each statement varies due to missing data.
* Correlation is significant at the .05 level (2-tailed).

The FCS teacher perceptions of *Teaching Self-Efficacy* based on ethnicity are presented in Table 12. The results, based on the White/Non-Hispanic group, are presented from the highest agreement of the Likert scale to the lowest regardless of appearance on the survey.

The Mann-Whitney U/Wilcoxon W correlation coefficient (Z) for nonparametric analysis of two groups showed that no significant differences were found ($Z = -0.295$, $p = .768$) for the perceptions of teaching self-efficacy and the two ethnic groups. The one-

way MANOVA did not find any significant effect on the perceptions of teaching self-efficacy based on ethnic group (F (1, 177) = 1.885, p = .171, partial η^2 = .011). These results indicate that there was no correlation between ethnicity and perceptions of teaching self-efficacy.

Table 12
FCS teacher perceptions of teaching self-efficacy[a] *based on ethnicity*

		White/ Non-Hispanic		Other[b]
Statement	N[c]	Mean ± SD	N[a]	Mean ± SD
I am confident that I have enough experience.	151	4.30 ± 0.94	34	4.15 ± 1.02
I am confident that I have enough nutrition knowledge	149	4.28 ± 0.90	34	4.06 ± 1.13
I feel qualified to teach the entire student body.	151	4.22 ± 0.97	34	4.00 ± 1.13
I can teach any student regardless of their interest in nutrition.	152	4.11 ± 0.89	34	4.21 ± 0.77
I feel confident in presenting nutrition education content to other teachers in my school and district.	151	3.90 ± 1.01	33	3.79 ± 1.08
Overall Mean ± SD		4.16 ± 0.81		4.05 ± 0.92

Note. [a] Likert Scale: 1 = Strongly Disagree to 5 = Strongly Agree
[b] Asian/Pacific Islander, Black/Non-Hispanic, Hispanic, and Native-American Indian
[c] Number of responses varies due to missing data.

The FCS teacher perceptions of *Teaching Self-Efficacy* based on level of education are shown in Table 13. The results, based on the Bachelor's group, are presented from the highest agreement of the Likert scale to the lowest regardless of appearance on the survey. According to the mean rank, the trend indicates those teachers with courses beyond the bachelor's degree or those having higher degrees have higher self-efficacies for the different statements.

Table 13

One-Way MANOVA of FCS teacher perceptions of teaching self-efficacy based on level of education (N = 177)

Statement	F	p	B (n = 90) Mean ± SD	B + (n = 43) Mean ± SD	M/+ (n= 44) Mean ± SD
I am confident that I have enough nutrition knowledge.	0.10	.910	4.24 ± 0.87	4.21 ± 0.97	4.30 ± 1.03
I am confident that I have enough experience.	1.20	.305	4.19 ± 0.95	4.19 ± 0.85	4.41 ± 0.92
I feel qualified to teach the entire student body.	0.64	.530	4.12 ± 0.95	4.28 ± 0.98	4.30 ± 1.03
I can teach any student regardless of their interest in nutrition.	1.55	.214	4.06 ± 0.80	4.33 ± 0.84	4.09 ± 0.94
I feel confident in presenting nutrition education content to other teachers in my school and district.	2.98	.053	[a] 3.74 ± 1.01	[ab] 4.07 ± 0.91	[b] 4.14 ± 1.00

Note. Likert scale: Likert Scale: 1 = Strongly Disagree to 5 = Strongly agree.
Bachelor's degree: B
Bachelor's degree plus additional coursework: B +
Master's degree plus additional coursework or higher degree: M/+.
Multivariate F (10.00, 340.00) = 2.02, p = .031 partial η^2 = .056.
Means with different superscripts differed marginally, p = .081. Tukey post hoc test, $p < .05$ (2-tailed).

The differences between the perceptions of *Teaching Self-Efficacy* and the levels of education were compared using the Kruskal-Wallis Chi-Square correlation coefficient (χ^2) for nonparametric analysis. The analysis of the three education groups showed a significant difference ($\chi^2 = 6.381$, $p = .041$) with the correlation being significant at the .05 level (2-tailed). The one-way MANOVA (Table 13) multivariate analysis found a significant effect on the perceptions of *Teaching Self-Efficacy* based on education groups. However, the univariate analysis only showed a marginally significant correlation for one of the five self-efficacy statements: *I feel confident in presenting nutrition education content to other teachers in my school and district* ($p = .053$). The correlation is significant at the .05 level (2-tailed). The Tukey HSD post-hoc analysis showed a

marginally significant difference between the Master's/plus and Bachelor's groups (p = .081) with Master's/plus having a higher self-efficacy.

The data showed a clear trend that FCS educators with higher levels of education had higher self-efficacy scores. Additionally, the more education the teachers had, the more confident they were in their ability to teach other teachers or staff members about nutrition. This result may be of importance should policies change in the future, and informed educators such as the FCS teachers participate in training events.

FCS teacher perceptions of *Teaching Self-Efficacy* based on the size of the community are shown in Table 14. Results, based on the metropolitan group, are presented from the highest agreement of the Likert scale to the lowest regardless of appearance on the survey.

Table 14
FCS teacher perceptions of teaching self-efficacy[a] *based on community size*

	Metropolitan		Suburban		Rural	
Statement	N[b]	Mean ± SD	N[b]	Mean ± SD	N[b]	Mean ± SD
I am confident that I have enough nutrition knowledge	63	4.38 ± 0.92	55	4.20 ± 0.91	65	4.12 ± 0.99
I am confident that I have enough experience.	63	4.35 ± 0.94	56	4.30 ± 0.97	66	4.17 ± 0.95
I feel qualified to teach the entire student body.	63	4.24 ± 1.06	56	4.18 ± 0.99	66	4.12 ± 0.97
I can teach any student regardless of their interest in nutrition.	63	4.14 ± 0.90	57	4.21 ± 0.84	66	4.03 ± 0.86
I feel confident in presenting nutrition education content to other teachers in my school and district.	62	4.02 ± 0.98	56	3.80 ± 1.07	66	3.82 ± 1.01
Overall Mean ± SD		4.23 ± 0.83		4.14 ± 0.81		4.05 ± 0.84

Note. [a] Likert Scale: 1 = Strongly Disagree to 5 = Strongly agree
[b] Number of responses varies due to missing data.

The Kruskal-Wallis Chi-Square correlation coefficient (χ^2) for nonparametric analysis of the three community size groups showed that no significant differences were found ($\chi^2 = 1.947, p = .378$). The one-way MANOVA did not find any significant effect on the perceptions of *Teaching Self-Efficacy* based on community size group (F (10, 344.00) = 0.683, $p = .741$, partial $\eta^2 = .019$). These results indicate that there was no correlation between community size and the perceptions of teaching self-efficacy. Apparently other FCS teacher characteristics such as age, years of teaching experience, and level of education are more important influences than size of the community.

Comfort Teaching Nutrition Topics

The third null hypothesis research question on the questionnaire, *Comfort Teaching Nutrition Topics*, was presented in a series of 30 topics classified into five different categories. The categories of the topics were nutrition education, general nutrition, disease prevention, nutrient metabolism, and functions of nutrients. The summary of the FCS teacher perceptions of *Comfort Teaching Nutrition Topics* appears in Table 4. The overall mean and standard deviation for the comfort teaching all the nutrition topics was 4.35 ± 0.72. All categories had means above 4 which indicated comfort teaching these topics.

Results of the 30 topics for the FCS teacher perceptions of *Comfort Teaching Nutrition Topics* (Table 15) are presented in the order of the topic category first and then by individual topic both in order from the highest agreement of the Likert scale to the

lowest regardless of appearance on the survey. Four topics in the *Nutrient Metabolism* category have means below 4 indicating discomfort or undecided.

Table 15
FCS teacher perceptions of comfort levels teaching nutrition topics

Nutrition Education (NE) Statement	N[a]	Mean ± SD [b]
Food serving sizes	182	4.74 ± 0.65
Reading and interpreting food labels	182	4.74 ± 0.56
The Food Guide Pyramid	182	4.72 ± 0.64
The Dietary Guidelines	186	4.48 ± 0.83
Recommended Dietary Allowances (RDA) of basic nutrients	184	4.39 ± 0.88
MyPlate	186	4.35 ± 0.98
Functions of Nutrients (FN) Statement	N[a]	Mean ± SD [b]
Functions of water in the body	182	4.55 ± 0.80
Functions of carbohydrate in the body	186	4.51 ± 0.81
Functions of protein in the body	187	4.50 ± 0.82
Functions of vitamins in the body	185	4.49 ± 0.80
Functions of fat in the body	187	4.45 ± 0.82
Functions of minerals in the body	186	4.44 ± 0.84
General Nutrition (GN) Statement	N[a]	Mean ± SD [b]
Long-term effects of food choices on health	183	4.68 ± 0.62
Current lifestyle habits that increase health risks	186	4.57 ± 0.80
Fad diets and advertising claims	184	4.54 ± 0.82
Nutritional value of fast foods and convenience foods	186	4.54 ± 0.80
Relationship of activity level and caloric intake to health and weight management	186	4.47 ± 0.87
Effects of food allergies on individual and family health	184	4.21 ± 0.98
Disease Prevention (DP) Statement	N[a]	Mean ± SD [b]
Prevention, treatment and management of childhood obesity	186	4.32 ± 0.90
Prevention, treatment and management of eating disorders (i.e. anorexia and bulimia)	186	4.24 ± 0.90
Prevention, treatment and management of hypertension (i.e. high blood Pressure)	186	4.13 ± 0.97
Prevention, treatment and management of diabetes	187	4.08 ± 0.98
Nutrient Metabolism (NM) Statement	N[a]	Mean ± SD [b]
Relationship between food intake and body weight	187	4.48 ± 0.81
The human body's use of energy and calories	184	4.26 ± 0.96
Physiology of digestion	185	4.13 ± 1.11
Saturated and unsaturated fatty acids	185	4.12 ± 0.99
Energy imbalances in weight-related disorders and diseases	183	3.97 ± 1.07
Basal activity metabolism	185	3.96 ± 1.09
Metabolism of nutrients	186	3.94 ± 1.03
Regulation of glucose in the body	185	3.83 ± 1.05

Note .[a] The number of responses varies due to missing data.
[b] Likert Scale: 1 = Very Uncomfortable to 5 = Very Comfortable

The method of testing nutrition knowledge of educators often involves some type of an examination where specific questions vary by subject and research design (Britten & Lai, 1998; O'Dea & Abraham, 2001; Rossiter et al., 2007). This present study adopted a different approach. Based on the advice and wisdom of experienced researchers, the decision was made to ask the FCS educators which topics they felt comfortable teaching. Earlier research (Britten & Lai, 1997) mentioned that if an elementary teacher believed that the subject of nutrition was too complicated to master, then in all likelihood that individual would not teach it. By general comparison, most secondary level FCS teachers have had some college courses, professional training, experience, and resource materials on the subject of nutrition. However, knowledge in the field of nutrition is constantly growing and evolving, and teachers who have not had recent continuing education in the area might not feel comfortable teaching all nutrition topics. So by specifically inquiring about the level of comfort for a variety of nutrition topics, researchers hoped to discover those topics that teachers were less comfortable teaching. Then data collected could be utilized later for the development of teacher training on these topics. The ultimate goal would be to increase the self-efficacy of FCS educators for teaching nutrition.

The results of the Spearman correlation coefficients for FCS teacher perceptions of comfort levels teaching nutrition topics based on age and years of teaching experience appear in Table 16. The topic categories are presented in the order of the highest to lowest based on age regardless of the order on the survey. Positive correlations were

found between *Comfort Teaching Nutrition Topics* and both age and years of teaching experience. The results indicate that the age of the respondent had a positive effect on the perceived comfort levels teaching the topics in the category of *Nutrition Education* (p = .024). Two of the five categories had marginally significant effects on the comfort levels: *Nutrient Metabolism* (NM) p = .065 and *Disease Prevention* (DP) p = .066. The most striking contrast is the comfort level of teaching NE, which has the highest ranking for the general population of respondents and the lowest for the age of the teacher. These results suggest that the more difficult topics, FN, DP, and NM, may take time to develop the knowledge and skills needed to teach them. Perhaps the basic content of NE reveals a significant difference between the older and younger teachers due to the repetitiveness of the subject. However, a more in depth analysis may actually suggest that the younger teacher might be devoting more time to the complex topics and dropping behind on the simpler topics.

Table 16
Spearman correlation coefficients for FCS teacher perceptions of comfort levels teaching nutrition topics based on age and years of teaching experience

	Age (N = 185)		Years (N = 186)	
Statement	r	p	r	p
Comfort Teaching ALL Nutrition Topics	0.134	.069	0.116	.116
General Nutrition (GN)	0.039	.598	0.069	.348
Functions of Nutrients (FN)	0.129	.080	0.170*	.020
Disease Prevention (DP)	0.135	.066	0.129	.080
Nutrient Metabolism (NM)	0.136	.065	0.086	.243
Nutrition Education (NE)	0.166*	.024	0.151*	.039

Note. * Correlation is significant at the 0.05 level (2-tailed).

Results indicate that the *Years of Teaching Experience* of the respondent had a positive effect on the perceived comfort levels teaching the topics in the categories of *Functions of Nutrients* ($p = .020$) and *Nutrition Education* ($p = .039$). Teaching comfort order for *Years of Teaching Experience* is as follows: GN > NM > DP > NE > FN. These results can be contrasted to the statistical evaluation for all the categories for comfort determined by 187 respondents as a whole (NE > FN ≥ GN > DP > NM) and for teaching comfort order for *Age* (GN > FN > DP ≥ NM >NE). The rankings for both the *Years of Teaching and Age* indicate that older teachers with more years of teaching experience are more comfortable teaching GN and DP than respondents as a whole. It can be speculated that when faced with limited class time these two topics have the most impact on the individual lives of the students. In addition, the knowledge of the actual relevance of these topics to the students may be acquired with both age and years of teaching experience.

The FCS teacher perceptions of *Comfort Teaching Nutrition Topics* based on ethnicity is presented in Table 17 (Appendix G). The results, based on the White/Non-Hispanic group, are presented from the highest agreement of the Likert scale to the lowest regardless of appearance on the survey. The overall order of the categories is *Nutrition Education* (NE), *General Nutrition* (GN), *Functions of Nutrients* (FN), *Disease Prevention* (DP), *and Nutrient Metabolism* (NM).

The Mann-Whitney U/Wilcoxon W correlation coefficient (Z) for nonparametric analysis of two groups showed the most significant difference between the groups is FN

($Z = -2.002, p = .045$). According to the mean ranks (White/Non-Hispanic = 97.43; Other = 78.56), whites are significantly more comfortable teaching FN than the other ethnicities. The one-way MANOVA was conducted on each topic category separately and the results are presented in Table 17 (Appendix G). The teaching comfort categories displayed a wide variety of comfort. The category with the most significant difference was NM followed by FN. GN had only one topic of significant discomfort. The most comfortable categories were NE and DP. The White/Non-Hispanic group had higher mean levels of comfort than the 'Other' ethnic group for teaching all of the 30 topics.

The FCS teacher perceptions of comfort levels teaching nutrition topics based on level of education appear in Table 18 (Appendix G). The overall order is based on the Bachelor's degree and the categories are as follows: *Nutrition Education* (NE), *General Nutrition* (GN), *Functions of Nutrients* (FN), *Disease Prevention* (DP), *and Nutrient Metabolism* (NM).

The Kruskal-Wallis Chi-Square (χ^2) correlation coefficient for nonparametric analysis indicated that there were significant differences between the levels of education groups. The category that showed a significant level of discomfort was DP ($\chi^2 = 6.611, p = .037$). According to the mean rank (Bachelor's = 84.13; Bachelor's plus = 108.20; Master's/plus = 97.30), those teachers with courses beyond the Bachelor's degree or those having higher degrees are significantly more comfortable teaching DP than those teachers with a Bachelor's degree. The post-hoc Mann-Whitney pair-wise comparisons between

the highest degree groups verify the non-parametric Kruskal-Wallis analysis ($Z = -2.489$, $p = .013$). There is a highly positive correlation between having more courses toward a Master's degree than only having a Bachelor's degree when comfort for teaching *Disease Prevention* topics is concerned. The one-way MANOVA was conducted on each topic category separately and the results are presented in Table 18 (Appendix G). Only one topic out of all 30, *Food Serving Sizes*, was significant for the post hoc Tukey between the Bachelor's and the Master's /plus groups ($p = .014$). About equal number of teachers have a Bachelor's (N = 98) degree compared to those with more courses or graduate degrees (N = 92). More education may prompt the teacher to master and teach the more difficult subjects.

The FCS teacher perceptions of comfort levels teaching nutrition topics based on community size appear in Table 19 (Appendix). The overall order is based on the Bachelor's degree and the categories are as follows: *Nutrition Education* (NE), *Functions of Nutrients* (FN), *General Nutrition* (GN), *Disease Prevention* (DP), *and Nutrient Metabolism* (NM).

The Kruskal-Wallis Chi-Square correlation coefficient (χ^2) for nonparametric analysis of the three community size groups showed that no significant differences were found ($\chi^2 = 2.659, p = .265$). The one-way MANOVA was conducted on each topic category separately and the results are presented in Table 19 (Appendix G). Only one topic out of all 30, *Long-term effects of food choices on health,* was significant for the Tukey HSD post hoc comparisons between the metropolitan and suburban community

size groups ($p = .048$). Overall means indicated a high level of comfort teaching all topics based on the community size.

Table 20
Overall correlations between the categories for FCS teacher perceptions of comfort levels teaching nutrition topics

	Mean ± SD	F	p
Comfort Teaching ALL Nutrition Topics N =187	4.35 ± 0.72	54.881	0.000
Nutrition Education (NE)	[a] 4.53 ± 0.73		
Functions of Nutrients (FN)	[a] 4.49 ± 0.79		
General Nutrition (GN)	[a] 4.49 ± 0.74		
Disease Prevention (DP)	[b] 4.19 ± 0.84		
Nutrient Metabolism (NM)	[c] 4.09 ± 0.89		

Note. Likert scale: Likert Scale: 1 = Strongly Uncomfortable to 5 = Strongly Comfortable
[a, b, c] Means with different superscripts differed significantly. $p < .05$

The overall correlations between the categories for FCS teacher perceptions of comfort levels teaching nutrition topics appear in Table 20. Pair-wise comparisons of the mean differences between each category of nutrition topics were performed and the mean differences were compared for significance. The comfort level for teaching *Nutrition Education* (NE) was not significantly different from teaching either *Functions of Nutrients* (FN) or *General Nutrition* (GN) topics. However, there was a significant difference between comfort teaching NE, FN, and/or GN when compared to either *Disease Prevention* (DP) and/ or *Nutrient Metabolism* (NM) ($p < .001$). Finally, there was a significant difference between comfort teaching DP and NM ($p = .008$). The highest degree of teaching comfort was observed for the NE, FN, and GN topics. By contrast, the lowest degree of teaching comfort was observed for the topics of DP and

NM. The means were almost identical for FN and GN. The comfort level order for ethnicity was NE > GN > FN >DP > NM and none of the means were the same as in the case of FN and GN above. So, in practical terms, the 82% white subgroup was a strong influence on overall comfort levels.

Table 21
Summary of themes from the open-ended survey question N = 177

Rank	Theme	n	Percent*
1	Food Labs	80	17.7
2	Teaching the Basics	62	13.7
3	Consequences of Poor Choices	56	12.4
4	Variety of Teaching Resources and Methods	48	10.6
5	Teachers as Role Models	45	10.0
6	Benefits of Healthy Choices	38	8.4
7	Relevancy to the Students	36	8.0
8	Community Involvement	32	7.1
9	Food Diaries	20	4.4
10	School Breakfast and Lunch Programs	11	2.4
11	Teaching Nutrition Early	9	2.0
12	Physical Education and Health Classes	8	1.8
13	Required Nutrition Courses	7	1.5
	*Total of Comments	452	100.0

The results of the open-ended question that appeared at the end of the main survey are given in Table 21. The respondents were asked a general question, "Based on your experience, what are the best ways to influence students to adopt habits for a healthy lifestyle over a lifetime?" Comments from 177 FCS teacher respondents were evaluated for common themes and then tabulated (Harris et al., 2009). Some of the predominant

themes were teachers as role models, student participation in food labs that teach cooking skills, teaching students the basic concepts of nutrition, and the consequences of poor food choices. It was very evident that these teachers have a passion for their work and believe in both the course content and in the students.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Many studies have been conducted over the years that have involved various aspects related to the health and well being of children and adolescents. This present study sought to evaluate the role of family and consumer sciences educators as advocates in the education of secondary level students regarding nutrition. The FCS educator's own perceptions of the role that the student, family, school and community play in facilitating the development of healthy lifestyle habits for students influence the environment of the classroom. Additionally, their own perceptions of their ability to teach and impart nutrition knowledge to the students, shapes and develops the learning atmosphere. A brief evaluation and summary of the findings are presented according to each hypothesis.

Summary

Attitudes toward Nutrition Education

H_0^1: *There is no significant relationship between the mean scores of FCS educators' attitudes concerning nutrition education and the following variables:* age, ethnicity, years of teaching experience, level of education, and community size. The results indicate that the age of the respondent, the ethnicity, and the years of teaching experience did not have a significant effect on the expressed attitudes of the FCS teachers. Therefore, the null hypothesis is accepted (fail to reject) for these variables. There was a significant effect by the level of education and by the community size on the

attitudes expressed by the FCS educators, therefore the null hypothesis is rejected for these two variables.

Those teachers with education above a bachelor's degree had the highest level of agreement that school-based nutrition education could influence eating habits at home. They also had the lowest level of agreement that their school currently offered enough nutrition education to change student eating habits. The metropolitan size community had the highest level of agreement that school-based nutrition education could play a significant role in reversing the prevalence of childhood overweight and obesity. By way of contrast, the rural community size had the highest level of agreement that their school supports school-based nutrition education.

Teaching Self-Efficacy

H_0^2: *There is no significant difference between the mean scores of FCS educators' perception of teaching self-efficacy and the following variables:* age, ethnicity, certification, years employed, highest level of education, and community size. The results indicate that the ethnicity and the community size did not have a significant effect on the perceived teaching self-efficacy of the FCS teachers. Therefore, the null hypothesis is accepted (fail to reject) for these variables. There was a significant effect by the age, years of teaching experience, and level of education on the perceived teaching self-efficacy of the FCS educators, therefore the null hypothesis is rejected for these three variables.

Higher levels of agreement for self-efficacy statements were observed for older teachers and those teachers with more years of teaching experience. A clear trend was observed that those teachers with higher levels of education had higher self-efficacy scores in general, and also felt confident to present nutrition content to other teachers in their school and district.

Comfort Teaching Nutrition Topics

$H_0^{3:}$ *There is no significant relationship between the mean scores of FCS educators' comfort teaching nutrition topics (nutrition education, general nutrition, disease prevention, nutrient metabolism, functions of nutrients) and the following variables*: age, ethnicity, certification, years employed, highest level of education, and community size. The age of the teacher had a significant effect for the perceptions of FCS comfort teaching only for the *Nutrition Education* topics. There was not a significant effect for all other categories. Therefore, for the variable of age, the null hypothesis is rejected for nutrition education and accepted for the remaining four nutrition topics. The years of teaching experience had a significant effect for the perceptions of FCS comfort teaching only for the *Functions of Nutrients* and the *Nutrition Education* topics. There was not a significant effect for all other categories. Therefore, for the years of teaching experience variable, the null hypothesis is rejected for functions of nutrients and nutrition education topics and accepted for the remaining three nutrition topics. The ethnicity had a significant effect for the perceptions of FCS comfort teaching only for the *Nutrient Metabolism*, *Functions of Nutrients,* and *General*

Nutrition topics. There was not a significant effect for all other categories. Therefore, for the variable of ethnicity, the null hypothesis is rejected for nutrient metabolism, functions of nutrients, and general nutrition and accepted for the remaining two nutrition topics. The level of education had a significant effect for the perceptions of FCS comfort teaching only for the *Nutrient Metabolism* topics. There was not a significant effect for all other categories. Therefore, for the level of education variable, the null hypothesis is rejected for nutrient metabolism and accepted for the remaining four nutrition topics. The size of the community had a significant effect for the perceptions of FCS comfort teaching only for the *General Nutrition* topics. There was not a significant effect for all other categories. Therefore, for community size, the null hypothesis is rejected for general nutrition and accepted for the remaining four nutrition topics.

Each variable had a different effect relative to the specific category of the nutrition topics. Perceived comfort teaching disease prevention topics was not significantly affected by any variable. The respondents perceived themselves as comfortable teaching all topics in all categories. The most comfortable topics were nutrition education, general nutrition, and nutrient functions, while the least comfortable topics were disease prevention and nutrient metabolism.

Conclusions

The majority of the respondents were middle aged white women with many years teaching experience in high school. Nearly half of the FCS teachers had educational degrees beyond a Bachelor's and the majority had the Composite Certification in Family

and Consumer Sciences. Nearly half were teaching Lifetime Nutrition and Wellness utilizing a variety of teaching materials. Over half of the respondents resided in the rural and suburban communities. There were two obviously under-represented groups that responded to the survey: men and ethnicities other than white. Texas has a very wide ethnic diversity, but that was not evident in this sample set.

Over half of the schools represented by respondents in this study did not have a Local Wellness Policy (LWP) or if they did, the teachers were unaware of that fact. If schools are required to have LWPs, then why do so many Texas schools not have them? Perhaps the federal government or state government needs to develop some measures that would enforce this requirement and reward schools that have successful LWPs. One of the intended goals of the LWP was to include nutrition education. Since Texas has a high rate of obesity among children and adolescents, incorporating nutrition education into the classrooms could be very beneficial toward reducing this trend.

FCS educators had overall positive attitudes toward nutrition education. They agreed that they could be role models for nutrition and fitness and that classroom nutrition education could play a significant role in reversing the prevalence of childhood overweight and obesity. Over half of these educators had more than 10 years of experience teaching FCS courses, and they did not agree that the amount of school-based nutrition education currently being offered was enough to change student eating behaviors. Apparently more nutrition education is needed in secondary school curricula if the rising tide of overweight and obesity in our youth is to be reversed. Enrollment in

FCS elective nutrition courses is only about 1% at this time. A logical suggestion would be to implement an increase in enrollment so that students can benefit from these courses.

There was an overall level of agreement from respondents for the perceptions of teaching self-efficacy. Teachers who were older, had more years of teaching experience and had higher levels of education had higher self-efficacy scores. FCS teachers with higher levels of education felt qualified to teach nutrition topics not only to students but to other teachers as well. This might be important should they be needed to assist in any training programs related to their LWP.

All of the independent variables of age, years of teaching experience, ethnicity, level of education and even community size, but to a lesser extent, had an overall significant effect on the perceived levels of comfort in teaching certain nutrition topics. There were topics in the nutrient metabolism category that had means below 4 indicating undecided or discomfort. Data showed that white/non-Hispanic educators demonstrated higher perceptions of comfort levels teaching certain nutrition topics than those of other ethnicities. For this group 29 topics were above 4 in comfort level. By contrast, the "other" ethnic group, which included Hispanics, African-American and other ethnicities, responded below 4 on all of the topics under nutrient metabolism. Most of the responses to the 30 topics were above 4 indicating a general overall comfort teaching these nutrition topics as based on level of education and community size. The overall conclusion was that the FCS teachers were comfortable teaching the majority of the 30 topics. However, a comparison between the categories for a difference in teaching comfort level proved

that the overall comfort rating is the following order: nutrition education, functions of nutrients, general nutrition, disease prevention, nutrient metabolism.

The majority of the FCS teachers provided their comments to the open-ended question requesting their suggestions for the best ways to influence students to adopt habits for a healthy lifestyle over a lifetime. These responses were divided into 13 main themes indicating that the teachers could be innovative and practical in response to teaching nutrition in an obesogenic culture and environment. Some of their suggestions included being a good role model, involving the community outside of the classroom, emphasizing teaching the food labs which include cooking skills, making the content relevant to the student, and several other important strategies.

Recommendations

Policy makers should consider including FCS as participants in the development and implementation of the Local Wellness Policies for their communities. These teachers have both educational background in nutrition and teaching experience. They are involved daily in the classroom setting teaching the subject of nutrition. They may be an overlooked resource in the arsenal to fight childhood obesity. In addition, if LWPs have traditionally involved the health classes to teach nutrition, then those states that have reduced health requirements might reconsider increasing the requirements to 1 semester with the option of taking a FCS nutrition course.

Courses that include nutrition education such as Lifetime Nutrition and Wellness and Food Science should be available to all high school students. Regardless of career

path, all high school students should be required to take at least one of these courses. Participation in these courses would ensure that students receive nutrition education to improve more nutritious food choices and a healthier lifestyle. This would be likely to lower rates of chronic disease and medical costs when these students reach adulthood.

Although FCS teachers expressed self-efficacy in teaching nutrition, they were less comfortable teaching some topics than others. Also, the groups of teachers that included Hispanics and African Americans expressed lower levels of self-efficacy than those who were White/Non-Hispanic. If the role of teaching nutrition education by FCS educators is expanded, then in-service training should be provided on topics where teachers felt less comfortable. This would include topics in the categories of nutrient metabolism and disease prevention. An excellent opportunity to offer training on these topics is provided by the Texas FCS educator conference held for several days each August. The development of on-line teaching modules on various topics could make continuing education on nutrition topics available to all teachers throughout the state of Texas. Also, American Association of Family and Consumer Sciences has been offering webinars on many topics that are available nationally at a reasonable cost (AAFCS, 2012).

There is a very real and practical side to health that is a daily event: eating and exercise. FCS courses are already grade appropriate and challenging. Obesity afflicts every ethnicity and both genders. Our culture promotes unhealthy lifestyles related to food choices and physical activity. Classroom nutrition education is one step that can be

taken to help students become healthy productive citizens. After all, the health of individuals affects the overall health of the Nation. To be productive and competitive, we must to be healthy.

REFERENCES

AbuSabha, R., & Achterberg, C. (1997). Review of self-efficacy and locus of control for nutrition- and health-related behavior. *Journal of the American Dietetic Association, 97*(10), 1122-1132.

Action for Healthy Kids (April 2008). *The state of school wellness: Action for Healthy Kids stakeholder research.* Summary Report. http://www.actionforhealthykids.org/resources/files/finalafhkstateofschoolwellnessresearchreportapri202008.pdf

Action for Healthy Kids (2011). *About us.* Retrieved from http://www.actionforhealthykids.org/about-us/

Alliance for a Healthier Generation (2009). *Healthier schools program framework.* Retrieved from http://www.healthiergeneration.org

American Association of Family and Consumer Sciences (2010). *Professional assessments and certifications.* Retrieved from http://www.aafcs.org/CredentialingCenter/Certification.asp

American Association of Family and Consumer Sciences (2012). *Webinars: New experience in training* Retrieved from http://www.aafcs.org/DevelopmentCenter/Webinars.asp

Auld, G. W., Romaniello, C., Heimendinger, J., Hambidge, C., & Hambidge, M. (1999, December). Outcomes from a school-based nutrition education program alternating special resource teachers and classroom teachers. *Journal of School Health, 69*(10), 403-408.

Baum, S. (2003). Response to ABC and the Miss America pageant. *Focus: A newsletter for Family & Consumer Sciences teachers. Nebraska Department of Education.* Retrieved from http://www.nde.state.ne.us/FCS/Nov--2003.pdf

Belansky, E., Chriqui, J.F., & Schwartz, M.B. (2009, June). Local School Wellness Policies: How are schools implementing the congressional mandate? Robert Wood Johnson Foundation Research Brief. Retrieved from http://www.rwjf.org/files/research/20090708localwellness.pdf

Bergman, E. A. & Gordon, R. W. (2010). Position of the American Dietetic Association: Local support for nutrition integrity in schools. *Journal of the American Dietetic Association, 110* (8), 1244-1254. doi:10.1016/j.jada.2010.06.014

Bharucha, V. (2008). *A comparison of Texas not-for-profit private and public middle schools' efforts to promote healthy eating behaviors* (Unpublished master's thesis). Texas Woman's University, Denton, Texas.

Boney, B. (2000, February 15). On the front burner. High school classes teach life skills that go beyond the kitchen. *The Dallas Morning News,* p. A16-A17.

Borra, S. T., Kelly, L., Shirreffs, M. B., Neville, K., & Geiger, C. J. (2003). Developing health messages: Qualitative studies with children, parents, and teachers help identify communications opportunities for healthful lifestyles and the prevention of obesity. *Journal of the American Dietetic Association, 103*(6), 721-728. doi: 10.1053/jada.2003.50140

Boushey, C. J., Harris, J., Bruemmer, B. & Archer, S. L. (2008). Publishing nutrition research: A review of sampling, sample size, statistical analysis, and other key elements of manuscript preparation, part 2. *Journal of the American Dietetic Association, 108*(4), 679-688. doi: 10.1016/j.jada.2008.01.002

Boyett, P. (2002, October). The wellness revolution: Stepping up to the plate to fight childhood obesity. *DallasChild, pp. 22-28.*

Brenowitz, N., & Tuttle, C. R. (2003). Development and testing of a nutritional-teaching self-efficacy scale for elementary school teachers. *Journal of Nutrition Education and Behavior, 35*(6), 308-311.

Briggs, M., Mueller, C. G., & Fleischhacker, S. (2010). Position of the American Dietetic Association, School Nutrition Association, and Society for Nutrition Education: Comprehensive school nutrition services. *Journal of the American Dietetic Association, 110* (11), 1738-1749. doi:10.1053/jada.2010.08.035

Britten, P., & Lai, M. K. (1998). Structural analysis of the relationship among elementary teachers' training, self-efficacy, and time spent teaching nutrition. *Journal of Nutrition Education and Behavior, 30*(4), 218-224.

Brown, T. & Summerbell, C. (2009). Systematic review of school-based interventions that focus on changing dietary intake and physical activity levels to prevent childhood obesity: an update to the obesity guidance produced by the National Institute for Health and Clinical Excellence. *Obesity Reviews, 10,* 110-141.

Buchwald, H. (2005). 2004 ASBS Consensus Conference. Consensus conference statement. Bariatric surgery for morbid obesity: Health implications for patients, health professionals, and third-party payers. *Surgery for Obesity and Related Diseases* 1, 371-381. (Reprinted from *Journal of American College of Surgeons, 2005, 200*, 593-604).

Cathion, P. R. (2004, May 27). *Texas kids among the most overweight in the U.S., says largest state study to date.* The University of Texas Health Science Center at Houston, Office of Public Affairs News Release.

Celebuski, C. & Farris, E. (1996, July). Nutrition education in public elementary and secondary schools. National Center for Education Statistics. U.S. Department of Education. Retrieved from http://nces.ed.gov/pubs/96852.pdf

Centers for Disease Control and Prevention (n.d.). *Obesity trends among U.S. adults.* Retrieved from http://www.cdc.gov/obesity/data/trends.html

Centers for Disease Control and Prevention (2009, January 27). *About BMI for children and teens.* Retrieved from http://www.cdc.gov/healthyweight/assessing/bmi/childrens_bmi/about_childrens_bmi.htm

Centers for Disease Control and Prevention (2009, December 8). *Defining overweight and obesity.* Retrieved from http://www.cdc.gov/obesity/defining.html

Centers for Disease Control and Prevention, Morbidity and Mortality Weekly Report (2005, October 7) *Public Health Strategies for Preventing and Controlling Overweight and obesity in School and Worksite Settings: A Report on Recommendations of the Task Force on Community Prevention Services.* Retrieved from http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5410a1.htm

Centers for Disease Control and Prevention, Morbidity and Mortality Weekly Report (2009, July 24) *Recommended Community Strategies and Measurements to Prevent Obesity in the United States.* Retrieved from http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5807a1.htm

Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion (2004). *Overweight and obesity economic consequences.* Retrieved from http://www.cdc.gov/nccdphp/dnpa/obesity/economic_consequences.htm

Cianci, S. (2006, June 2). *FDA receives Keystone Forum Report on Away-from-Home Foods improving consumers ability to manage calorie intake key to anti-obesity efforts.* Retrieved from http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/2006/ucm108661.htm

Colasanto, D. (n.d.). *Planning and using survey research projects. A guide for grantees of the Robert Wood Johnson Foundation.* Retrieved from http://www.rwjf.org/files/publications/RWJF_SurveyGuide_0804.pdf

Combs, S. (2007, March). *Counting costs and calories: measuring the cost of obesity to Texas employers.* Retrieved from http://www.window.state.tx.us/specialrpt/obesitycost/

Cooper Aerobics Center (2007, June 15). Texas Senate Bill 530 signed into law. Retrieved from http://www.cooperaerobics.com/printable.aspx

Cronk, B. C. (2006). *How to use SPSS®: A step-by-step guide to analysis and interpretation* (4th ed.). Glendale, California: Pyrczak Publishing.

Dallas Independent School District (n.d.). *Dallas Independent School District wellness policy handbook.* Retrieved from http://www.dallasisd.org/inside_disd/depts/stuserv/WellnessPolicyHandbook.pdf

DeVellis, R. F. (1991). *Scale development* (p. 85). Newbury Park, New Jersey: Sage Publications.

Dillman, D. A. (2007). *Mail and internet surveys: The tailored design method* (2nd ed.). Hoboken, New Jersey: John Wiley & Sons, Inc.

Dodson, E. A., Fleming, C., Boehmer, T. K., Haire-Joshu, D., Luke, D. A., & Brownson, R. C. (2009). Preventing childhood obesity through state policy: Qualitative assessment of enablers and barriers. *Journal of Public Health Policy, 30* (Supplement 1), S161-S176. doi: 10.1057/jphp.2008.57

Family and Consumer Sciences Teachers Association of Texas (2011). *Family and Consumer Sciences Teachers Association of Texas.* Retrieved from http://www.fcstat.org

Flegal, K. M., Carroll, M. D., Ogden, C. L., & Johnson, C. L. (2002). Prevalence and trends in obesity among US adults, 1999-2000. *Journal of the American Medical Association, 288*(14), 1723-1727. www.jama.com

Flegal, K. M., Carroll, M. D., Ogden, C. L., & Curtin, L. R.(2010). Prevalence and trends in obesity among US adults, 1999-2008. *Journal of the American Medical Association, 303*(3), 235-241. doi:10.1001/jama.2009.2014

Friedman, R. R. (2009). Rudd Report: School wellness policies-A policy brief. Yale Rudd Center for Food Policy & Obesity. Retrieved from http://yaleruddcenter.org/resources/upload/docs/what/reports/RuddReportSchoolWellnessPolicies2009.pdf

Futrell, T. (2006). *Texas elementary teachers' nutrition awareness and attitudes towards nutrition education* (Unpublished master's thesis). Texas Woman's University, Denton, Texas.

Gleason, P. M., Harris, J., Sheenan, P. M., Boushey, C., J., & Bruemmer, B. (2010). Publishing nutrition research: Validity, reliability, and diagnostic test assessment in nutrition-related research. *Journal of the American Dietetic Association, 110*(3), 409-419. doi: 10.1016/j.jada.2009.11.022

Grissom, J. B. (2005). Physical fitness and academic achievement. *Journal of Exercise Physiology online, 8*(1), 11-25.

Gryder, S. D. (2008). *Local school wellness policies. Well done. School nutrition professionals put wellness policies to work.* Alexandria, Va.: School Nutrition Association

Harris, J. E., Boushey, C., Bruemmer, B., & Archer, S. L. (2008). Publishing nutrition research: A review of nonparametric methods, part 3. *Journal of the American Dietetic Association, 108*(9), 1488-1496. doi: 10.1016/j.jada.2008.06.426

Harris, J. E., Gleason, P. M., Sheenan, P. M., Boushey, C., Beto, J. A., & Bruemmer, B. (2009). An introduction to qualitative research for food and nutrition professionals. *Journal of the American Dietetic Association, 109*(1), 80-90. doi: 10.1016/j.jada.2008.10.018

Hedley, A. A., Ogden, C. L., Johnson, C. L., Carroll, M. D., Curtin, L. R., & Flegal, K. M. (2004). Prevalence of overweight and obesity among US children, adolescents, and adults, 1999-2002. *Journal of the American Medical Association, 291*(23), 2847-2850. www.jama.com

Hoelscher, D. M., Day, R. S., Lee, E. S., Frankowski, R. F., Kelder, S. H., Ward, J. L., & Scheurer, M. E. (2004). Measuring the prevalence of overweight in Texas schoolchildren. *American Journal of Public Health, 94*(6), 1002-1008.

Holli, B. B., Calabrese, R. J., & Maillet, J. O. (2003). *Communication and education skills for dietetics professionals* (4th ed.) (p. 71). Baltimore, Maryland: Lippincott Williams & Wilkins.

IBM®/SPSS® (2011). *What's new in version 19?* Retrieved from http://publib.boulder.ibm.com/infocenter/spssstat/v20r0m0/index.jsp?topic=%2Fcom.ibm.spss.statistics.help%2Fwhatsnew_19.htm

Jacobson, M. F. (2005). *Liquid candy: How soft drinks are harming American's health.* Center for Science in the Public Interest. Retrieved from http://www.cspinet.org/new/pdf/liquid_candy_final_w_new_supplement.pdf

Johnson J. & Fitzgerald P. L. (2005). Your local school: Well crafted? Well balanced? *School Foodservice & Nutrition, August*, 26-32.

Joint Interim Committee on Nutrition and Health in Public Schools (2004, December). *Interim Report to the 79th Legislature.* Retrieved from http://www.agr.state.tx.us/foodnutrition/NutritionForm.pdf

Kelder, S. H., Springer, A. S., Barroso, C. S., Smith, C. L., Sanchez, E., Ranjit, N., & Hoelscher, D. M.(2009). Implementation of Texas Senate Bill 19 to increase physical activity in elementary schools. *Journal of Public Health Policy 30,* (SI), S221-S247. doi:10.1057/jphp.2008.64

Klassen, R. M., & Chiu, M. M. (2010). Effects on teachers' self-efficacy and job satisfaction: Teacher gender, years of experience, and job stress. *Journal of Educational Psychology, 102*(3), 741-756. doi: 10.1037/a0019237

Kubik, M. Y., Lytle, L. A., Hannan, P. J., Story, M., & Perry, C. L. (2002). Food-related beliefs, eating behavior, and classroom food practices of middle school teachers. *Journal of School Health, 72*(8), 339-345).

Let's Move! (2010). *Healthier school.* Retrieved from http://www.letsmove.gov/schools/index.html

Lichtenstein, A. H. & Ludwig, D. S. (2010). Bring back home economics education. *Journal of the American Medical Association, 303*(18), 1857-1858. doi:10.1001/jama.2010.592

Longley, C. H. & Sneed, J. (2009). Effects of federal legislation on wellness policy formation in school districts in the United States. *Journal of the American Dietetic Association, 109*(1), 95-101. doi: 10.1016/j.jada.2008.10.011

Martin, R. E. & Hoover, L. C. (1993). Final annual report of nutrition education and training needs assessment project for federal fiscal year 1993. *Texas Nutrition Education & Training.* Austin, Texas: Texas Department of Human Services.

Matz M. L. (2005). Washington watch: the wellness priority. *School Foodservice & Nutrition, August*, 64-66.

Miller, C. H. (2009). A practice perspective on the third school nutrition dietary assessment study. *Journal of the American Dietetic Association, 109*(2, Supplement 1), S14-S17. doi: 10.1016/j.jada.2008.11.006

Moag-Stahlberg, A. M., Howley, N., & Luscri, L. (2008). A national snapshot of local school wellness policies. *Journal of School Health, 78*(10), 562-568. no doi

Moore, D. S. & McCabe, G. P. (1999). *Introduction to the practice of statistics* (3rd ed.) (pp. 483-487). New York, New York: W. H. Freeman and Company.

Moyers, B. (2002, October 18). *School Inc.* Retrieved from http://www.pbs.org/now/society/schoolstats.html

Murray, R. D., Taras, H. L., Frankowski, B. L., McGrath, J. W., Mears, C. J., & Young, T. L. (2004). Policy Statement: Soft drinks in schools. *Pediatrics, 113*(1), 152-154.

National Conference of State Legislatures (2010, January). *Childhood obesity-2009 update of legislative policy options.* Retrieved from http://www.ncsl.org/default.aspx?tabid=19776

O'Dea, J. A. & Abraham, S. (2001). Knowledge, beliefs, attitudes, and behaviors related to weight control, eating disorders, and body image in Australian trainee home economics and physical education teachers. *Journal of Nutrition Education, 33*(6), 332-340. doi: 10.1016/S1499-4046(06)60355-2

Ogden, C. L., Flegal, K. M., Carroll, M. D., & Johnson, C. L. (2002). Prevalence and trends in overweight among US children and adolescents, 1999-2000. *Journal of the American Medical Association, 288*(14), 1728-1732. www.jama.com

Ogden, C. L., Carroll, M. D., Curtin, L. R., McDowell, M. A., Tabak, C. J., & Flegal, K. M. (2006). Prevalence of overweight and obesity in the United States, 1999-2004. *Journal of the American Medical Association, 295*(13), 1549-1555. www.jama.com

Ogden, C. L., Carroll, M. D., Curtin, L. R., Lamb, M. M., & Flegal, K. M. (2010). Prevalence of high body mass index in US children and adolescents, 2007-2008. *Journal of the American Medical Association, 303*(3), 242-249. doi:10.1001/jama.2009.2012

Peregrin, T. (2010). Home economics makes a comeback: Opportunities for RDs to become part of the curriculum. *Journal of the American Dietetic Association, 110*(11), 1626-1629. doi: 10.1016/j.jada.2010.09.022

Pohl, J. F., O'Rear, J., Rajab, M. H., Watts, M., Kim, H. S., Booth, T....Klish, W. (2006). Pediatric obesity in Texas: does the Texas Public School Nutrition Policy affect child nutrition? *Texas Medicine, 102*(10), 47-57.

Polland, R. J. (2005). *Essentials of survey research and analysis.* Retrieved from http://www.unf,edu/dept/cirt/events/past/polland_manual.pdf

PsychData® (n.d.). *About us.* Retrieved from https://psychdata.com/aboutus.asp

Reeves, R. S. (2006). Translating nutrition policies and messages into healthier children: ADA's role. *Journal of the American Dietetic Association, 106* (1), 19. doi: 10.1016/j.jada.2005.12.012

Ridley, K. (2010, August 29). Why home economics classes should be mandatory. *Change-News.* Retrieved from http://news.change.org/stories/why-home-economics-classes-should-be-mandatory

Ritchie, L. D., Crawford, P. B., Hoelscher, D. M., & Sothern, M. S. (2006). Position of the American Dietetic Association: Individual-, family-, school-, community-based interventions for pediatric overweight. *Journal of the American Dietetic Association, 106* (6), 925-945. doi: 10.1016/j.jada.2006.03.001

Rossiter, M., Glanville, T., Taylor, J., & Blum, I. (2007). School food practices of prospective teachers. *Journal of School Health, 77*(10), 694-700.

Scattergood, A. (2010, August 26). The evolution of home economics programs. *Los Angeles Times.* Retrieved from http://www.latimes.com/features/food/la-fo-homeec-20100826,0,7558366.story

Schlenker, E. D. (2001). The evolution of research in family and consumer sciences: food, nutrition, and health. *Family and Consumer Sciences Research Journal, 30*(2), 140-196.

Shaw-Perry, M., Horner, C., Trevino, R. P., Sosa, E. T., Hernandez, I., & Bhardwaj, A. (2007). NEEMA: A school-based diabetes risk prevention program designed for African-American children. *Journal of the national medical association, 99*(4), 368-375.

Shaya, F. T., Flores, D., Gbarayor, C. M., & Wang, J. (2008). School-based obesity interventions: A literature review. *Journal of School Health, 78* (4), 189-196. no doi

Speice, A. & Boyd, B. (2004, March 3). *Overview of the Texas Public School Nutrition Policy.* Retrieved from http://www.agr.state.tx.us/media/press_releases/0304/com_030304overview.htm

State Board for Educator Certification. (n.d.). Family and consumer sciences standards. Retrieved from http://www.sbec.state.tx.us/SBECOnline/standtest/standards/8-12fcs.pdf

Story, M. (2009). The third school nutrition dietary assessment study: Findings and policy implications for improving the health of US children. *Journal of the American Dietetic Association, 109* (2), S7-S13. doi: 10.1016/j.jada.2008.11.005

Taras, H. & Potts-Datema, W. (2005). Obesity and student performance at school. *The Journal of School Health, 75*(8), 291-295.

Texas Association of Health Physical Education Recreation and Dance (n.d.). *Physical fitness assessment initiative: Programmatic leveling analysis.* Retrieved from http://www.tahperd.org/HOME_PDFs/FG_SidebySideComparison_0809.pdf

Texas Association of School Boards (2004, January/February). Food for thought: New law compels joint study on public school nutrition. *Texas Lone Star, 22*(1). Retrieved from http://www.tasb.org/texas_lonestar/2004/jan_feb/fs_food_thought.shtml

Texas Department of Agriculture (2004). *Texas public school nutrition policy.* Retrieved from http://www.agr.state.tx.us/foodnutrition/policy/food_nutrition_policy.pdf

Texas Department of Health (2004). *The burden of overweight and obesity in Texas, 2000-2040: Executive summary.* Retrieved from http://www.dshs.state.tx.us/obesity/pdf/Cost_Obesity_ExecSumm.pdf

Texas Department of State Health Services (2010, May). *Texas overweight and obesity statistics.* http://www.dshs.state.tx.us/obesity/pdf/TxObesityData.doc

Texas Education Agency (2010, August). *Texas Essential Knowledge and Skills.* Retrieved from http://ritter.tea.state.tx.us

Texas Education Agency (2011, January 14). *Certification areas.* Retrieved from http://www.tea.state.tx.us/index2.aspx?id=7637

Texas Education Agency (2011, September 7). *Career and technical education.* Retrieved from http://www.tea.state.tx.us/index4.aspx?id=6583&menu_id=865&menu_id2=794

Texas Education Agency, Region VI Educational Service Center (2007, June). *An evaluation of Texas career and technology education programs funded under the Carl D. Perkins vocational education act. Final report, June 2007.* Retrieved from http://www.esc6.net

Texas Legislature Online History (2001, June 14). *SB 19: Legislative session 77(R).* Retrieved from http://www.legis.state.tx.us/BillLookup/Text.aspx?LegSess=77R&Bill=SB19

Texas Legislature Online History (2007, June 15). *SB 530: Legislative session 80(R).* Retrieved from http://www.legis.state.tx.us/tlodocs/80R/billtext/pdf/SB00530F.pdf#navpanes=0

Texas State Board Of Education (n.d.). *State Board of Education graduation requirements frequently asked questions-volume one.* Retrieved from http://ritter.tea.state.tx.us/curriculum/SBOE_GradReqs_FAQ_vol1.pdf

Texas Tech University (n.d. a). *Hospitality & tourism scope and sequence: Food Science.* Retrieved from http://www.depts.ttu.edu/hs/ccfcs/ss_files/Food_Sciences.pdf

Texas Tech University (n.d. b). *Human services scope and sequence: Lifetime nutrition and wellness.* Retrieved from http://www.depts.ttu.edu/hs/ccfcs/ss_files/Lifetime_Nutrition_and_Wellness.pdf

Texas Tech University (2010). *Teacher certification.* Retrieved from http://www.depts.ttu.edu/hs/ccfcs/PDFs/FCSCertifications.pdf

Texas Woman's University, Department of Family Sciences (2011, March). *Department of family Sciences undergraduate programs.* Retrieved from http;//www.twu.edu/family-sciences/undergraduate-programs.asp

Treviño, R. P., Pugh, J. A., Hernandez, A. E., Menchaca, V. D., Ramirez, R. R., & Mendoza, M., (1998). Bienestar: A diabetes risk-factor prevention program *The Journal of School Health, 68*(2), 62-67.

Treviño, R. P., Yin, Z., Hernandez, A., Hale, D. E., Garcia, O. A., & Mobley, C. (2004). Impact of the Bienestar school-based diabetes mellitus prevention program on fasting capillary glucose levels: A randomized controlled trial. *Archives of Pediatric and Adolescent Medicine, 158*(9), 911-917. Retrieved from www.archpediatrics.com

Treviño, R. P., Hernandez, A. E., Yin, Z., Garcia, O. A., & Hernandez, I. (2005). Effect of the Bienestar Health Program on physical fitness in low-income Mexican American children. *Hispanic Journal of Behavioral Sciences, 27*(1), 120-132. doi: 10.1177/0739986304272359

Trost, S.G. (2007, Fall). *Active education: Physical education, physical activity and academic performance.* Robert Wood Johnson Foundation. Retrieved from http://www.activelivingresearch.org/files/Active_Ed.pdf

University of Texas at Houston School of Public Health (n.d.). *Coordinated Approach to Child Health: Program history.* Retrieved from https://sph.uth.tmc.edu/catch/about_History.htm

U.S. Congress (2004, June 30). Public Law 108-265: Child Nutrition and WIC Reauthorization Act of 2004. *Local wellness policy.* (Section 204 of P. L. 108-265). Retrieved from http://www.fns.usda.gov/tn/Healthy/108-265.pdf

U.S. Congress (2010, December 13). Public Law 111-296: Healthy, Hunger-Free Kids Act of 2010. *Local wellness policy implementation.* (Section 204 of P. L. 111-296). Retrieved from http://www.gpo.gov/fdsys/pkg/PLAW-111pub1296/pdf/PLAW-111pub1296.pdf

U. S. Department of Agriculture, Food and Nutrition Services (n.d.). *Team Nutrition Policy Statement.* Retrieved from http://www.fns.usda.gov/tn/TN_PolicyStatement.pdf

U.S. Department of Agriculture, Food and Nutrition Services (2007, April). *Healthy meals, healthy schools, healthy kids; USDA school meals.* Retrieved from http://www.fns.usda.gov/cga/FactSheets/school_meals.pdf

U.S. Department of Agriculture, Food and Nutrition Services (2011, May 9). *HealthierUS School Challenge. Recognizing excellence in nutrition and physical activity: Texas award winners.* Retrieved from http://www.fns.usda.gov/tn/HealthierUS/Texas.html

U.S. Department of Health and Human Services (2001). *The Surgeon General's call to action to prevent and decrease overweight and obesity.* Rockville, MD: USDHHS, Office of the Surgeon General. Retrieved from http://www.surgeongeneral.gov/topics/obesity/calltoaction/CalltoAction.pdf

U.S. Department of Health and Human Services, Nutrition Policy Board (1994, September). Nutrition at school: Preparing for the future. *Public Health Reports, 109*(5), 706-709.

U.S. General Accounting Office (2003). *School lunch program: Efforts needed to improve nutrition and encourage healthy eating.* Retrieved from http://www.gao.gov/cgi-bin/getrpt?GAO-03-506

Veit, H. Z. (2011, September 5). Time to revive home ec. *The New York Times.* Retrieved from http://www.nytimes.com/2011/09/06/opinion/revive-home-economics-classes-to-fight-obesity-nytimes.com

Veugelers, P. J. & Fitzgerald, A. L. (2005). Effectiveness of school programs in preventing childhood obesity: a multilevel comparison. *American Journal of Public Health, 95* (3), 432-435. doi: 10.2105/AJPH.2004.045898

Wang, G., & Dietz, W. H. (2002). Economic burden of obesity in youths aged 6 to 17 years: 1979-1999. *Pediatrics, 109*(5):e81. doi:10.1542/peds.101.5.e81

Warren, N. (n.d.). *Standards, instruction, and student assessment. Standards and State Frameworks: Family and consumer sciences education.* Rhode Island Department of Elementary and Secondary Education. Retrieved from http://www.ridoe.net/standards/framework/famconsumersciencesed.htm

World Health Organization (n.d.). *Obesity and overweight fact sheet No. 311.* Retrieved from http://www.who.int.mediacentre/factsheets/fs311/en/index.html

World Health Organization (2010, February 24). *Report on the progress made in the 2008-2013 action plan for the global strategy for the prevention and control of noncommunicable diseases (June2008-February 2010).* Retrieved from http://www.int/ncdnet

Yager, Z. & O'Dea, J. (2009). Body image, dieting and disordered eating and activity practices among teacher trainees; implications for school-based health education and obesity prevention programs. *Health Education Research, 24*(3), 472-482. doi: 10.1093/her/cyn044

APPENDIX A
Texas Essential Knowledge and Skills for Career and Technical Education

Adopted to be effective August 23, 2010

Text of Adopted 19 TAC

Chapter 130. Texas Essential Knowledge and Skills for Career and Technical Education

Subchapter J. Human Services

§130.241. Implementation of Texas Essential Knowledge and Skills for Human Services.

The provisions of this subchapter shall be implemented by school districts beginning with the 2010-2011 school year.

§130.245. Lifetime Nutrition and Wellness (One-Half to One Credit).

(a) General requirements. This course is recommended for students in Grades 10-12. Recommended prerequisite: Principles of Human Services, Principles of Hospitality and Tourism, Principles of Health Science, or Principles of Education and Training.

(b) Introduction.

(1) This laboratory course allows students to use principles of lifetime wellness and nutrition to help them make informed choices that promote wellness as well as pursue careers related to hospitality and tourism, education and training, human services, and health sciences.

(2) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(c) Knowledge and skills.

(1) The student understands the role of nutrients in the body. The student is expected to:

(A) classify nutrients, their functions, and food sources and compare the nutritive value of various foods;

(B) assess the effects of nutritional intake on health, appearance, effective job performance, and personal life;

(C) analyze and apply various dietary guidelines throughout the life cycle, including pregnancy, infancy, childhood, and late adulthood; and

(D) compare personal food intake to recommended dietary guidelines.

(2) The student understands the principles of digestion and metabolism. The student is expected to:

(A) describe the processes of digestion and metabolism;

(B) calculate and explain basal and activity metabolisms and factors that affect each;

(C) apply knowledge of digestion and metabolism when making decisions related to food intake and physical fitness;

(D) locate community resources that promote physical activity and fitness; and

(E) explain the relationship of activity levels and caloric intake to health and wellness, including weight management.

(3) The student demonstrates knowledge of nutritionally balanced diets. The student is expected to:

(A) research the long-term effects of food choices;

(B) outline strategies for prevention, treatment, and management of diet-related diseases such as diabetes, hypertension, childhood obesity, anorexia, and bulimia;

(C) determine the effects of food allergies and intolerances on individual and family health;

(D) plan diets based on life cycle, activity level, nutritional needs, portion control, and food budget;

(E) develop examples of therapeutic diets;

(F) analyze advertising claims and fad diets with the recommendations of the Recommended Dietary Allowances;

(G) analyze current lifestyle habits that may increase health risks;

(H) identify community programs that provide nutrition and wellness services;

(I) examine the nutritional value of fast foods and convenience foods;

(J) read and interpret food labels; and

(K) examine and explain nutritional serving sizes.

(4) The student understands safety and sanitation. The student is expected to:

(A) demonstrate safe and sanitary practices in the use, care, and storage of food and equipment;

(B) explain types and prevention of food-borne illnesses; and

(C) practice appropriate dress and personal hygiene in food preparation.

(5) The student demonstrates knowledge of food management principles. The student is expected to:

(A) read and comprehend standard recipes;

(B) correctly use standard measuring techniques and equipment;

(C) demonstrate correct food preparation techniques, including nutrient retention;

(D) use food buying strategies such as calculating food costs, planning food budgets, and creating grocery lists;

(E) demonstrate food preparation techniques to reduce overall fat and calories;

(F) practice etiquette, food presentation, and table service appropriate for specific situations; and

(G) apply food storage principles.

(6) The student demonstrates effective work habits. The student is expected to:

(A) participate as an effective team member demonstrating cooperation and responsibility;

(B) apply effective practices for managing time and energy to complete tasks on time; and

(C) practice problem solving using leadership and teamwork skills.

(7) The student investigates careers in nutrition. The student is expected to:

(A) compare and contrast education or training needed for careers in nutrition;

(B) establish personal short-term and long-term career goals; and

(C) analyze entrepreneurial opportunities in nutrition.

Adopted to be effective August 23, 2010.

Text of Adopted 19 TAC

Chapter 130. Texas Essential Knowledge and Skills for Career and Technical Education

Subchapter I. Hospitality and Tourism

§130.221. Implementation of Texas Essential Knowledge and Skills for Hospitality and Tourism.

The provisions of this subchapter shall be implemented by school districts beginning with the 2010-2011 school year.

§130.230. Food Science (One Credit).

(a) General requirements. This course is recommended for students in Grades 11-12. Prerequisites: three units of science. Recommended prerequisite: Principles of Hospitality and Tourism. To receive credit in science, students must meet the 40% laboratory and fieldwork requirement identified in §74.3(b)(2)(C) of this title (relating to Description of a Required Secondary Curriculum).

(b) Introduction.

(1) Food Science. In Food Science students conduct laboratory and field investigations, use scientific methods during investigations, and make informed decisions using critical thinking and scientific problem solving. Food Science is the study of the nature of foods, the causes of deterioration, the principles underlying food processing, and the improvement of foods for the consuming public.

(2) Nature of science. Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process." This vast body of changing and increasing knowledge is described by physical, mathematical, and conceptual models. Students should know that some questions are outside the realm of science because they deal with phenomena that are not scientifically testable.

(3) Scientific inquiry. Food scientific inquiry is the planned and deliberate investigation of the natural world. Scientific methods of investigation are experimental, descriptive, or comparative. The method chosen should be appropriate to the question being asked.

(4) Science and social ethics. Scientific decision making is a way of answering questions about the natural world. Students should be able to distinguish between scientific decision-making methods (scientific methods) and ethical and social decisions that involve science (the application of scientific information).

(5) Science, systems, and models. A system is a collection of cycles, structures, and processes that interact. All systems have basic properties that can be described in space, time, energy, and matter. Change and constancy occur in systems as patterns and can be observed, measured, and modeled. These patterns help to make predictions that can be scientifically tested. Students should analyze a

system in terms of its components and how these components relate to each other, to the whole, and to the external environment.

(6) Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.

(c) Knowledge and skills.

(1) The student, for at least 40% of instructional time, conducts laboratory and field investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:

(A) demonstrate safe practices during laboratory and field investigations; and

(B) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.

(2) The student uses scientific methods and equipment during laboratory and field investigations. The student is expected to:

(A) know the definition of science and understand that it has limitations, as specified in subsection (b)(2) of this section;

(B) know that hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories;

(C) know scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly-reliable explanations, but they may be subject to change as new areas of science and new technologies are developed;

(D) distinguish between scientific hypotheses and scientific theories;

(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology;

(F) collect and organize qualitative and quantitative data and make measurements with accuracy and precision using tools and equipment;

(G) analyze, evaluate, make inferences, and predict trends from data; and

(H) communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.

(3) The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:

(A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking by the student;

(B) communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials;

(C) draw inferences based on data related to promotional materials for products and services;

(D) evaluate the impact of scientific research on society and the environment;

(E) evaluate models according to their limitations in representing biological objects or events; and

(F) research and describe the history of science and contributions of scientists.

(4) The student analyzes the role of acids and bases in the food sciences. The student is expected to:

(A) identify the properties of acids and bases;

(B) describe the pH scale and how it is used;

(C) use various indicators to measure the pH of solutions;

(D) describe the importance of pH in digestion and blood; and

(E) discuss ways pH is related to the properties of food, its safety, and its freshness.

(5) The student applies the principles of food safety and microbiology. The student is expected to:

(A) investigate the properties of microorganisms that cause food spoilage;

(B) explain the difference between food intoxication and food infection;

(C) examine the conditions under which the important pathogens are commonly destroyed, inactivated, or rendered harmless in foods;

(D) discuss the difference between microorganisms that are helpful and those that are harmful; and

(E) analyze sanitary food-handling practices.

(6) The student studies the chemical properties of food. The student is expected to:

(A) discuss elements, compounds, mixtures, and formulas;

(B) explain the Periodic Table of the Elements;

(C) compare elements and compounds;

(D) describe heterogeneous and homogeneous mixtures;

(E) explain the similarities and differences between heterogeneous and homogenous mixtures;

(F) identify chemical examples of pure substances and mixtures;

(G) identify chemical symbols, formulas, and equations and explain how they are used in food science;

(H) analyze the occurrence of specific chemical reactions; and

(I) analyze chemical and physical changes in food.

(7) The student analyzes solutions, colloids, solids, gels, foams, and emulsions. The student is expected to:

(A) identify the solvent and solute in a given solution;

(B) discuss the effect of a solute and its concentration on the boiling and freezing points of a solution;

(C) calculate the concentration of a solution using mass percent;

(D) compare and contrast unsaturated, saturated, and supersaturated solutions;

(E) describe the properties of colloidal dispersions;

(F) explain the three parts of an emulsion and their relationship to each other; and

(G) identify various food emulsions and the types of each emulsion.

(8) The student understands the functions of enzymes. The student is expected to:

(A) describe how enzymes act as catalysts in chemical reactions;

(B) explain the relationship between an enzyme and a substrate;

(C) discuss the enzymes involved in digestion;

(D) identify factors that affect enzyme activity; and

(E) explain how enzyme reactions are involved in food preparation.

(9) The student understands the role of fermentation in food sciences. The student is expected to:

(A) explain anaerobic respiration and how it is involved in metabolism and food science;

(B) list reasons food is fermented;

(C) describe how bacteria is used to ferment food, including how lactic acid bacteria creates sauerkraut from cabbage;

(D) compare fresh-pack pickling and brine pickling; and

(E) describe the process of making vinegar.

(10) The student discusses how leavening agents are used in baking. The student is expected to:

(A) describe the purpose of leavening agents in baked goods;

(B) identify and describe major leavening agents;

(C) explain why baking soda is used with an acid in baked goods;

(D) describe the types of dough and batters used in making quick breads;

(E) analyze the ingredients in baking powder;

(F) discuss how air and steam act as leavening agents; and

(G) identify the purposes of the ingredients used in making yeast breads.

(11) The student understands the purposes of additives in food. The student is expected to:

(A) discuss the use of food additives;

(B) describe properties of a desirable food preservative;

(C) explain why additives used as antioxidants are added to food;

(D) explain the difference between natural and artificial additives;

(E) identify kinds of sweeteners used in food processing;

(F) name nutrients that are used as food additives;

(G) discuss the advantages and disadvantages of using food additives; and

(H) identify agencies involved in regulating food additives.

(12) The student understands the physiology of digestion. The student is expected to:

(A) define mechanical and chemical digestive processes;

(B) explain the difference between mechanical and chemical digestive processes; and

(C) explain absorption as part of the digestive process.

(13) The student understands metabolism. The student is expected to:

(A) analyze components and byproducts of metabolism;

(B) define anabolism and catabolism;

(C) describe conditions needed for metabolism to occur;

(D) explain the process of osmosis and the role it plays in metabolism;

(E) discuss basal metabolism and the factors that affect it;

(F) identify levels of voluntary activity and how these affect the need for kilocalories;

(G) describe metabolic changes and the effect they have on the body during fasting; and

(H) explain why lactic acid builds up in the muscles during exercise and how this can be prevented or treated.

(14) The student explains how food provides energy. The student is expected to:

(A) discuss molecular motion and temperature;

(B) explain heat transfer;

(C) explain latent heat in phase changes;

(D) compare various temperatures on rates of reaction;

(E) analyze how the body uses energy and calories;

(F) describe the relationship of energy to physical and chemical reactions;

(G) analyze relationships between food intake and body weight;

(H) determine energy requirements of individuals using multiple variables such as activity level;

(I) discuss energy imbalances in relationship to weight-related disorders and diseases; and

(J) explain the transfer of energy through a food chain and its relationship to human nutrition.

(15) The student describes the basic nutrients and their specific properties as related to food science. The student is expected to:

(A) identify the recommended daily allowances of the basic nutrients;

(B) list the five main nutrients and food sources of each;

(C) explain the use of the five main nutrients in relation to the Food Guide Pyramid and/or the Dietary Guidelines; and

(D) discuss the importance of fiber in the diet.

(16) The student identifies properties of carbohydrates. The student is expected to:

(A) explain the chemical reaction that occurs when plants produce carbohydrates;

(B) define monosaccharides and disaccharides and name examples of each;

(C) describe the regulation of glucose in the blood and the conditions resulting from low and high glucose levels;

(D) explain sugar hydrolysis and list the products of the hydrolysis of sucrose and lactose;

(E) discuss the process of caramelization;

(F) compare the structures of amylose and amylopectin and how these structures affect cooking properties; and

(G) describe gelatinization, paste, retrogradation, and syneresis.

(17) The student describes the properties of fats and lipids. The student is expected to:

(A) compare the properties of saturated and unsaturated fatty acids;

(B) identify foods containing triglycerides and identify which foods contain saturated and unsaturated fat;

(C) discuss the function of fat in food preparation;

(D) describe ways lipid oxidation can be controlled in food;

(E) describe the functions of fat in the body;

(F) explain the role of fat in maintaining optimum health;

(G) explain the role of cholesterol in maintaining optimum health;

(H) contrast the properties of saturated and unsaturated fats; and

(I) describe the effects of temperature on fats in food preparation.

(18) The student describes the properties of proteins and amino acids. The student is expected to:

(A) name the groups of elements that identify an amino acid;

(B) describe the chemical structure of protein;

(C) explain what happens during the denaturation of protein and how the process occurs;

(D) describe ways in which protein is used in food preparation;

(E) discuss the composition of eggs and their storage requirements;

(F) list factors that affect the stability of an egg foam;

(G) identify the functions of protein in the body; and

(H) compare and contrast complete and incomplete proteins.

(19) The student understands the coagulation and coalescence processes associated with milk protein and cheese. The student is expected to:

(A) list the components of milk and explain how each component is dispersed in the milk;

(B) describe what happens when milk protein is coagulated;

(C) discuss the processing of milk and how it is treated when it is pasteurized, homogenized, and fortified;

(D) compare and contrast skim milk, low-fat milk, whole milk, half-and-half, and various creams;

(E) explain the differences between evaporated milk, condensed milk, and dried milk;

(F) identify factors that affect the ability of cream to form a foam;

(G) explain the changes that occur when milk is heated; and

(H) describe the process of making a fermented or cultured milk product and list examples of these products.

(20) The student analyzes the properties of vitamins and minerals. The student is expected to:

(A) discuss the functions of vitamins and minerals in the body;

(B) describe water- and fat-soluble vitamins and list the main vitamins in each category;

(C) explain why megadoses of fat-soluble vitamins can be toxic;

(D) analyze the food sources for each vitamin and mineral;

(E) analyze deficiency diseases and explain their causes;

(F) explain the difference and list examples of major and trace minerals; and

(G) explain the interrelationships among nutrients.

(21) The student explains the properties of water. The student is expected to:

(A) identify the properties of water that make it a polar molecule;

(B) describe hydrogen bonds and how they differ from covalent bonds;

(C) discuss the differences between hard and soft water;

(D) compare the heat of fusion and the heat of vaporization;

(E) explain the functions of water in food preparation; and

(F) identify the functions of water in the body.

(22) The student analyzes the food irradiation process. The student is expected to:

(A) list the steps in the food irradiation process;

(B) define the units used to measure the amount of radiation used during the irradiation process; and

(C) describe the effects of irradiation on food.

(23) The student discusses United States Department of Agriculture (USDA) packaging guidelines. The student is expected to:

(A) research food packaging guidelines established by the USDA;

(B) explain the rationale and purposes of those guidelines;

(C) describe properties of containers needed for commercial food packaging;

(D) identify factors related to the successful use of controlled-atmosphere packaging; and

(E) describe information required on a food label.

(24) The student analyzes the food dehydration process. The student is expected to:

(A) describe the principles and purposes of dehydration;

(B) describe methods of dehydration and explain their similarities and differences;

(C) explain why food is pretreated before dehydrating;

(D) compare sulfating, sulfuring, and blanching;

(E) describe types of blanching that can be used as pretreatment methods; and

(F) discuss the role of air temperature and movement in successful dehydration.

(25) The student analyzes the food canning process. The student is expected to:

(A) identify safety practices and equipment used in home and commercial canning;

(B) describe hot-pack, cold-pack, and pressure canning;

(C) identify advantages and disadvantages of each canning method;

(D) identify types of food that should be processed by each canning method; and

(E) compare heat transfer by conduction and by convection in canning.

(26) The student analyzes the food freezing process. The student is expected to:

(A) list the steps of the food freezing process;

(B) identify factors needed for successful freezing of food; and

(C) identify advantages and disadvantages of freezing food.

(27) The student understands the importance of developing lifelong skills. The student is expected to:

(A) demonstrate the use of oral and written communication skills such as writing technical reports, letters, and memos; communicating technical information to a nontechnical audience; and making formal and informal presentations;

(B) define a problem, identify potential causes and possible solutions, and make thoughtful recommendations;

(C) apply critical-thinking skills to new situations;

(D) demonstrate the highest standards of professional integrity and ethical values;

(E) work and interact with individuals from diverse cultures;

(F) explain the skills necessary for lifelong learning;

(G) work effectively with others;

(H) provide leadership in a variety of situations;

(I) deal with individual or group conflicts;

(J) research scientific and nonscientific information;

(K) competently use library resources;

(L) manage time effectively;

(M) facilitate group projects;

(N) handle multiple tasks and pressures; and

(O) prepare for a state or national food manager's sanitation certification or alternative credential within the field of food science technology.

APPENDIX B
TWU Institutional Review Board Approval Letter

TWU
TEXAS WOMAN'S UNIVERSITY
DENTON DALLAS HOUSTON

Institutional Review Board
Office of Research and Sponsored Programs
P.O. Box 425619, Denton, TX 76204-5619
940-898-3378 Fax 940-898-3416
email: IRB@twu.edu

September 16, 2011

Ms. Mary Katherine Hines

Dear Ms. Hines:

Re: *Investigating the Role of Family and Consumer Sciences Teachers in Nutrition Education in Texas Secondary Schools (Protocol #: 16746)*

The above referenced study has been reviewed by the TWU Institutional Review Board (IRB) and appears to meet our requirements for the protection of individuals' rights.

If applicable, agency approval letters must be submitted to the IRB upon receipt PRIOR to any data collection at that agency. A copy of the annual/final report is enclosed. A final report must be filed with the Institutional Review Board at the completion of the study. Because you do not utilize a signed consent form for your study, the filing of signatures of subjects with the IRB is not required.

This approval is valid one year from September 16, 2011. Any modifications to this study must be submitted for review to the IRB using the Modification Request Form. Additionally, the IRB must be notified immediately of any unanticipated incidents. If you have any questions, please contact the TWU IRB.

Sincerely,

Rhonda R Buckley

Dr. Rhonda Buckley, Co-Chair
Institutional Review Board - Denton

enc.

cc. Dr. Chandan Prasad, Department of Nutrition & Food Sciences
Dr. Carolyn Bednar, Department of Nutrition & Food Sciences
Graduate School

APPENDIX C
Online Survey and Paper survey

Copy of Investigating the Role of Family and Consumer Sciences (FCS) Teachers in Nutrition Education in Texas Secondary Schools

Your participation in the survey is voluntary. The time required for this survey is approximately 15-20 minutes. You may contact us if you have any questions. Please answer all of the questions. Please mark one answer per question unless otherwise indicated. Thank you.

The return of your completed questionnaire constitutes your informed consent to act as a participant in this research.

SECTION I: DEMOGRAPHIC DATA

This section is designed to obtain demographic information about you and your school. Please respond to each question by selecting the statement(s) that best applies/apply to you.

1) What is your gender?

- Male [Value=1]
- Female [Value=2]

2) What is your age? _____ Years

3) What is your ethnicity? Please select one.

--Select--
- African American [Value=1]
- Caucasian-Hispanic [Value=2]
- Hispanic [Value=3]
- Native American Indian [Value=4]
- Asian/Pacific Islander [Value=5]
- Black [Value=6]
- Other (please specify) [Value=7]

Other: _____

4) What certification(s) do you have to teach FCS courses in Texas secondary schools? Check all that apply.

- Composite Certificate in Family & Consumer Sciences [Checked=1]
- Specialized Certificate in Hospitality, Nutrition & Food Sciences [Checked=1]
- Specialized Certificate in Human Development and Family Studies [Checked=1]
- None [Checked=1]
- Other (please specify) [Checked=1]

_____

5) Is FCS a tested teacher certification area?

- Yes [Value=1]
- No [Value=2]

Question Logic:
If [Yes] is selected, then skip to question [#6]
If [No] is selected, then skip to question [#7]

Page Break

6) If "yes" what is your test (s) number area?

_____

7) What other professional certifications do you have that are listed in nutrition or wellness? Check all that apply.

- Family & Consumer Sciences [Checked=1]
- Registered Dietitian [Checked=1]
- ServSafe [Checked=1]
- Other (please specify) [Checked=1]

8) How many total years have you taught FCS courses in secondary schools? _____ Years

9) How many years have you taught FCS courses that included nutrition content in secondary schools? _____ Years

10) What is the highest level of education you have attained?
- Bachelor's (Checked=1)
- Bachelor's with additional courses toward Masters (Checked=1)
- Masters (Checked=1)
- Masters with additional courses toward Doctorate (Checked=1)
- Doctorate (Checked=1)
- Other (please specify) (Checked=1)

11) Please indicate the school's data/status where you teach. (check one)
- Middle school (Grades 5-8 or 7-8) (Checked=1)
- High school (Grades 9-12 or 10-12) (Checked=1)
- Other (please specify) (Checked=1)

12) Please indicate the size of the community where your school is located.
- Large metropolitan (> 1 million) (Checked=1)
- Medium Metropolitan (50[001 – 1 million) (Checked=1)
- Small Metropolitan (50 001 – 500, 000) (Checked=1)
- Suburban (2,500 – 50 000) (Checked=1)
- Rural (< 2,500) (Checked=1)

13) I am currently teaching nutrition content as
- A unit in a course (Checked=1)
- A complete stand-alone course (Checked=1)
- I am not teaching any nutrition content at this time (Checked=1)
- Other (please specify) (Checked=1)

14) I currently teach the following courses that include nutrition content. (Check all that apply.)
- Lifetime Nutrition & Wellness (Checked=1)
- Food Science (Checked=1)
- Skills for Living (Checked=1)
- Principles of Human Services (Checked=1)
- Other (please specify) (Checked=1)

15) The materials that I use to teach these courses are (Check all that apply.)
- Department-made (Checked=1)
- State mandated (Checked=1)
- Teacher-developed (Checked=1)
- Professional Association materials (Checked=1)
- Textbook (Checked=1)
- Other (please specify) (Checked=1)

16) Does your school have a local wellness policy?

Yes [Value=1] | No [Value=2] | I don't know [Value=3]

Question Logic
If [Yes] is selected, then skip to question [#17]
If [No] is selected, then skip to question [#18]
If [I don't know] is selected, then skip to question [#18]

Page Break

17) Were you involved in planning your school's local wellness policy?

Yes [Value=1] | No [Value=2]

18) My school's local wellness policy includes mandatory classroom nutrition education.

Yes [Checked=1] | No [Checked=1] | I don't know [Checked=1] | Other (please specify) [Checked=1]

Other:

19) If Q.18 is "yes", on an average, how many classes of nutrition education are taught per week? .....

SECTION II: ATTITUDES TOWARD NUTRITION EDUCATION

Please indicate the level of agreement with the following statements using the scale provided below. Select one choice for each question.

20) Students enrolled in FCS courses with a nutrition component develop healthy eating behaviors.

Strongly Disagree — Strongly Agree

Strongly Disagree [Value=1] | Disagree [Value=2] | Neutral/Undecided [Value=3] | Agree [Value=4] | Strongly Agree [Value=5]

21) At my school the amount of school-based nutrition education currently offered is enough to change student eating behaviors.

Strongly Disagree — Strongly Agree

Strongly Disagree [Value=1] | Disagree [Value=2] | Neutral/Undecided [Value=3] | Agree [Value=4] | Strongly Agree [Value=5]

22) Classroom nutrition education can play a significant role in reversing the prevalence of childhood overweight and obesity.

Strongly Disagree — Strongly Agree

Strongly Disagree [Value=1] | Disagree [Value=2] | Neutral/Undecided [Value=3] | Agree [Value=4] | Strongly Agree [Value=5]

23) FCS teachers can be role models for nutrition and fitness.

Strongly Disagree — Strongly Agree

Strongly Disagree [Value=1] | Disagree [Value=2] | Neutral/Undecided [Value=3] | Agree [Value=4] | Strongly Agree [Value=5]

24) My school supports school-based nutrition education.

Strongly Disagree — Strongly Agree

Strongly Disagree [Value=1] | Disagree [Value=2] | Neutral/Undecided [Value=3] | Agree [Value=4] | Strongly Agree [Value=5]

25) Parents in my community support school-based nutrition education.

Strongly Disagree — Strongly Agree

Strongly Disagree [Value=1] | Disagree [Value=2] | Neutral/Undecided [Value=3] | Agree [Value=4] | Strongly Agree [Value=5]

26) School-based nutrition education can influence family habits at home.

Strongly Disagree — Strongly Agree

Strongly Disagree [Value=1] | Disagree [Value=2] | Neutral/Undecided [Value=3] | Agree [Value=4] | Strongly Agree [Value=5]

27) The student is responsible for his/her eating behaviors.

Strongly Disagree — Strongly Agree

Strongly Disagree [Value=1]	Disagree [Value=2]	Neutral/Undecided [Value=3]	Agree [Value=4]	Strongly Agree [Value=5]

SECTION III: TEACHING SELF-EFFICACY

If classroom nutrition education became a state or federal mandate, do you feel qualified to teach the subject to all the students and not just to those enrolled in the FCS courses?
Please indicate your level of agreement with the following statements using the scale provided below. Select one choice for each question.

29) I am confident that I have enough nutrition knowledge.

Strongly Disagree — Strongly Agree

Strongly Disagree [Value=1]	Disagree [Value=2]	Neutral/Undecided [Value=3]	Agree [Value=4]	Strongly Agree [Value=5]

30) I am confident that I have enough experience.

Strongly Disagree — Strongly Agree

Strongly Disagree [Value=1]	Disagree [Value=2]	Neutral/Undecided [Value=3]	Agree [Value=4]	Strongly Agree [Value=5]

31) I feel qualified to teach the entire student body.

Strongly Disagree — Strongly Agree

Strongly Disagree [Value=1]	Disagree [Value=2]	Neutral/Undecided [Value=3]	Agree [Value=4]	Strongly Agree [Value=5]

32) I can teach any student regardless of their ethnic or religion.

Strongly Disagree — Strongly Agree

Strongly Disagree [Value=1]	Disagree [Value=2]	Neutral/Undecided [Value=3]	Agree [Value=4]	Strongly Agree [Value=5]

33) I feel confident in presenting nutrition education content to other teachers in my school and district.

Strongly Disagree — Strongly Agree

Strongly Disagree [Value=1]	Disagree [Value=2]	Neutral/Undecided [Value=3]	Agree [Value=4]	Strongly Agree [Value=5]

SECTION IV: COMFORT IN TEACHING NUTRITION EDUCATION TOPICS

The following questions are designed to evaluate how comfortable you feel teaching nutrition education topics excluded in family and consumer sciences courses. Please choose one answer for each question.

33) Reading and interpreting food labels

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

34) Food serving sizes

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

35) Recommended Dietary Allowances (RDA) of main nutrients

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

36) The Food Guide Pyramid

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

37) MyPlate

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

38) The Dietary Guidelines

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

SECTION V: COMFORT IN TEACHING GENERAL NUTRITION TOPICS

The following questions are designed to evaluate how comfortable you feel teaching *general* nutrition topics included in family and consumer sciences courses. Please choose one answer for each question.

39) Relationship of activity level and caloric intake to health and weight management

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

40) Long-term effects of food choices on health

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

41) Effects of food allergies on individual and family health

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

42) Fad diets and advertising claims

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

43) Current lifestyle habits that increase health risks

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

44) Nutritional value of fast foods and convenience foods

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

SECTION VI: COMFORT IN TEACHING DISEASE PREVENTION NUTRITION TOPICS

The following questions are designed to evaluate how comfortable you feel teaching *disease prevention* nutrition topics included in family and consumer sciences courses. Please choose one answer for each question.

45) Prevention, treatment and management of diabetes

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

46) Prevention, treatment and management of hypertension (High blood pressure)

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

47) Prevention, treatment and management of overweight and obesity

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

48) Prevention, treatment and management of eating disorders (i.e. anorexia and bulimia)

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

SECTION VII: COMFORT IN TEACHING NUTRIENT METABOLISM TOPICS

The following questions are designed to evaluate how comfortable you feel teaching nutrient *metabolism* topics included in family and consumer sciences courses. Please choose one answer for each question.

49) Basal energy metabolism

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

50) Physiology of digestion

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

51) Metabolism of nutrients

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

52) The human body's use of energy and calories

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

53) Relationship between food intake and body weight

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

54) Energy imbalances in weight-related disorders and diseases

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

55) Regulation of glucose in the body

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

56) Saturated and unsaturated fatty acids

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

SECTION VIII: COMFORT IN TEACHING FUNCTIONS OF NUTRIENTS TOPICS

The following questions are designed to evaluate how comfortable you feel teaching *functions of nutrients* topics included in family and consumer sciences courses. Please choose one answer for each question.

57) Functions of fats in the body

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

58) Functions of protein in the body

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

59) Functions of carbohydrate in the body

Very Uncomfortable — Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

60) Functions of vitamins in the body

Very Uncomfortable

Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

61) Functions of minerals in the body

Very Uncomfortable

Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

62) Functions of water in the body

Very Uncomfortable

Very Comfortable

Very Uncomfortable [Value=1]	Somewhat Uncomfortable [Value=2]	Neutral/Undecided [Value=3]	Somewhat Comfortable [Value=4]	Very Comfortable [Value=5]

63) Based on your experience, what are the best ways to influence students to adopt habits for a healthy lifestyle over a lifetime?

(5000 characters remaining)

Page Break

464) Would you like to participate at a drawing for one of thirty $75 gift cards to Barnes & Noble and Academy currently at the Katy Factory?

Yes [Value=1]	No [Value=2]

Question Logic
If [Yes] is selected, then skip to survey [#144514], question [#1]
If [No] is selected, then skip to question [No logic applied]

Page Break

Thank you for your participation and interest in this project.

Automatic Page Break

Copy of Investigating the Role of Family and Consumer Sciences (FCS) Teachers in Nutrition Education in Texas Secondary Schools

Your Unique Response ID is: 2

Thank you!

Investigating the Role of Family and Consumer Sciences (FCS) Teachers in Nutrition Education in Texas Secondary Schools

Department of Nutrition and Food Sciences, Texas Woman's University November 2011

Your participation in the survey is voluntary. The time required for this survey is approximately 15-20 minutes. You may contact us if you have any questions. Please answer all of the questions. Please mark one answer per question unless otherwise indicated. Thank you.

The return of your completed questionnaire constitutes your informed consent to act as a participant in this research.

SECTION I. DEMOGRAPHIC DATA

This section is designed to obtain demographic information about you and your school. Please respond to each question by selecting the statement(s) that best applies/apply to you.

1. What is your gender? ☐ Male ☐ Female
2. What is your age? _____ Years
3. What is your ethnicity? Please select one.
   - ☐ White/Non-Hispanic ☐ Black/Non-Hispanic ☐ Hispanic
   - ☐ Native American Indian ☐ Asian/Pacific Islander
   - ☐ Other (Please specify.) _____
4. What certification(s) do you have to teach FCS courses in Texas secondary schools? Check all that apply.
   - ☐ Composite Certificate in Family & Consumer Sciences
   - ☐ Specialized Certificate in Hospitality, Nutrition & Food Sciences
   - ☐ Specialized Certificate in Human Development and Family Studies
   - ☐ None
   - ☐ Other (Please list) _____
5. Is FCS a second teacher certification area? ☐ Yes ☐ No
6. If yes, what is your first certification area? _____
7. What other professional certifications do you have that are related to nutrition or wellness? Check all that apply.
   - ☐ Family & Consumer Sciences
   - ☐ Registered Dietitian
   - ☐ ServSafe
   - ☐ Other (Please specify.) _____
8. How many total years have you taught FCS courses in secondary schools? _____ Years
9. How many years have you taught FCS courses that included nutrition content in secondary schools? _____ Years
10. What is the highest level of education you have attained?
    - ☐ Bachelor's ☐ Bachelor's with additional courses toward Masters
    - ☐ Masters ☐ Masters with additional courses toward Doctorate
    - ☐ Doctorate ☐ Other (Please specify.) _____
11. Please indicate the school's classification where you teach. Select one.
    - ☐ Middle school (Grades 6-8 or 7-9)
    - ☐ High school (Grades 9-12 or 10-12)
    - ☐ Other (Please specify.) _____
12. Please indicate the size of the community where your school is located.
    - ☐ Large metropolitan (> 1 million)
    - ☐ Medium Metropolitan (500, 001 – 1 million)
    - ☐ Small Metropolitan (50,001 – 500, 000)
    - ☐ Suburban (2,500 – 50,000)
    - ☐ Rural (< 2,500)
13. I am currently teaching nutrition content as
    - ☐ A unit in a course
    - ☐ A complete stand-alone course
    - ☐ I am not teaching any nutrition content at this time.
    - ☐ Other (Please specify.) _____

14. I currently teach the following courses that include nutrition content (check all that apply):
    - ☐ Lifetime Nutrition & Wellness
    - ☐ Food Science
    - ☐ Skills for Living
    - ☐ Principles of Human Services
    - ☐ Other (Please list.) _____
15. The materials that I use to teach these courses are (check all that apply):
    - ☐ District-mandated ☐ State-mandated ☐ Teacher developed
    - ☐ Professional Association materials ☐ Textbooks
    - ☐ Other (Please specify.) _____
16. Does your school have a local wellness policy? ☐ Yes ☐ No ☐ I don't know
17. If Q. 16 is "yes", were you involved in planning your school's local wellness policy?
    - ☐ Yes ☐ No
18. My school's local wellness policy includes mandatory classroom nutrition education.
    - ☐ Yes ☐ No ☐ I don't know.
    - ☐ Other (Please specify.) _____
19. If Q. 18 is "yes", on an average, how many minutes of nutrition education are taught per week?_____

SECTION II: ATTITUDES TOWARD NUTRITION EDUCATION

Please indicate the level of agreement with the following statements using the scale provided below. Circle one number for each question.

1 = Strongly Disagree; 2 = Disagree; 3 = Neutral/Undecided; 4 = Agree; 5 = Strongly Agree

20. Students enrolled in FCS courses with a nutrition component develop healthy eating behaviors.	1	2	3	4	5
21. At my school the amount of school-based nutrition education currently offered is enough to change student eating behaviors.	1	2	3	4	5
22. Classroom nutrition education can play a significant role in reversing the prevalence of childhood overweight and obesity.	1	2	3	4	5
23. FCS teachers can be role models for nutrition and fitness.	1	2	3	4	5
24. My school supports school-based nutrition education.	1	2	3	4	5
25. Parents in my community support school-based nutrition education.	1	2	3	4	5
26. School-based nutrition education can influence eating habits at home.	1	2	3	4	5
27. The student is responsible for his/her eating behaviors.	1	2	3	4	5

SECTION III: TEACHING SELF-EFFICACY

If classroom nutrition education became a state or federal mandate, do you feel qualified to teach the subject to all the students and not just to those enrolled in the FCS courses? Circle one number for each question.

1 = Strongly Disagree; 2 = Disagree; 3 = Neutral/Undecided; 4 = Agree; 5 = Strongly Agree

28. I am confident that I have enough nutrition knowledge.	1	2	3	4	5
29. I am confident that I have enough experience.	1	2	3	4	5
30. I feel qualified to teach the entire student body.	1	2	3	4	5
31. I can teach any student regardless of their interest in nutrition.	1	2	3	4	5
32. I feel confident in presenting nutrition education content to other teachers in my school and district.	1	2	3	4	5

SECTION IV: COMFORT IN TEACHING NUTRITION EDUCATION TOPICS

The following questions are designed to evaluate how comfortable you feel teaching nutrition *education* topics included in family and consumer sciences courses. Circle one number for each question.

1 = Very Uncomfortable; 2 = Somewhat Uncomfortable; 3 = Neutral/Undecided; 4 = Somewhat Comfortable; 5 = Very Comfortable

33. Reading and interpreting food labels	1	2	3	4	5
34. Food serving sizes	1	2	3	4	5
35. Recommended Dietary Allowances (RDA) of basic nutrients	1	2	3	4	5
36. The Food Guide Pyramid	1	2	3	4	5

37. MyPlate	1	2	3	4	5
38. The Dietary Guidelines	1	2	3	4	5

SECTION V: COMFORT IN TEACHING GENERAL NUTRITION TOPICS

The following questions are designed to evaluate how comfortable you feel teaching *general* nutrition topics included in family and consumer sciences courses. Circle one number for each question.

1 = Very Uncomfortable; 2 = Somewhat Uncomfortable; 3 = Neutral/Undecided; 4 = Somewhat Comfortable; 5 = Very Comfortable

39. Relationship of activity level and caloric intake to health and weight management	1	2	3	4	5
40. Long-term effects of food choices on health	1	2	3	4	5
41. Effects of food allergies on individual and family health	1	2	3	4	5
42. Fad diets and advertising claims	1	2	3	4	5
43. Current lifestyle habits that increase health risks	1	2	3	4	5
44. Nutritional value of fast foods and convenience foods	1	2	3	4	5

SECTION VI: COMFORT IN TEACHING DISEASE PREVENTION NUTRITION TOPICS

The following questions are designed to evaluate how comfortable you feel teaching *disease prevention* nutrition topics included in family and consumer sciences courses. Circle one number for each question.

1 = Very Uncomfortable; 2 = Somewhat Uncomfortable; 3 = Neutral/Undecided; 4 = Somewhat Comfortable; 5 = Very Comfortable

45. Prevention, treatment and management of diabetes	1	2	3	4	5
46. Prevention, treatment and management of hypertension (high blood pressure)	1	2	3	4	5
47. Prevention, treatment and management of childhood obesity	1	2	3	4	5
48. Prevention, treatment and management of eating disorders (i.e. anorexia and bulimia)	1	2	3	4	5

SECTION VII: COMFORT IN TEACHING NUTRIENT METABOLISM TOPICS

The following questions are designed to evaluate how comfortable you feel teaching nutrient *metabolism* topics included in family and consumer sciences courses. Circle one number for each question.

1 = Very Uncomfortable; 2 = Somewhat Uncomfortable; 3 = Neutral/Undecided; 4 = Somewhat Comfortable; 5 = Very Comfortable

49. Basal activity metabolism	1	2	3	4	5
50. Physiology of digestion	1	2	3	4	5
51. Metabolism of nutrients	1	2	3	4	5
52. The human body's use of energy and calories	1	2	3	4	5
53. Relationship between food intake and body weight	1	2	3	4	5
54. Energy imbalances in weight-related disorders and diseases	1	2	3	4	5
55. Regulation of glucose in the body	1	2	3	4	5
56. Saturated and unsaturated fatty acids	1	2	3	4	5

SECTION VIII: COMFORT IN TEACHING FUNCTIONS OF NUTRIENTS TOPICS

The following questions are designed to evaluate how comfortable you feel teaching *functions of nutrients* topics included in family and consumer sciences courses. Circle one number for each question.

1 = Very Uncomfortable; 2 = Somewhat Uncomfortable; 3 = Neutral/Undecided; 4 = Somewhat Comfortable; 5 = Very Comfortable

57. Functions of fat in the body	1	2	3	4	5
58. Functions of protein in the body	1	2	3	4	5
59. Functions of carbohydrate in the body	1	2	3	4	5
60. Functions of vitamins in the body	1	2	3	4	5
61. Functions of minerals in the body	1	2	3	4	5
62. Functions of water in the body	1	2	3	4	5

63. Based on your experience, what are the best ways to influence students to adopt habits for a healthy lifestyle over a lifetime? Please attach a separate sheet if necessary.

_____

_____

_____

****

If you would like to participate in the drawing for one of thirty $20 gift cards to Barnes & Noble and receive a summary of the study findings, please enter contact information below.

Name of Recipient _____
Email _____
Address _____
City_____ State _____ Zip _____

Thank you very much for completing this survey.

****

APPENDIX D
Pilot Study Cover Letter

Investigating the Role of Family and Consumer Sciences (FCS) Teachers in Nutrition Education in Texas Secondary Schools

Department of Nutrition and Food Sciences, Texas Woman's University
P.O. Box 425888 Denton, Texas 76204-5888

October 2011

Dear Family and Consumer Sciences Teacher:

Do you have an opinion regarding how nutrition courses are being offered in Texas secondary schools? We are conducting a study to determine secondary level Family and Consumer Sciences (FCS) educators' attitudes concerning school-based nutrition education and their self-efficacy and comfort levels regarding teaching nutrition topics. Survey results will be used to develop training materials to assist any programs that will allow FCS educators to more widely teach nutrition topics in school curriculums across the country.

My name is Kathy Hines and I am a doctoral student in nutrition at TWU. We may have met at one of the Family and Consumer Sciences meetings in August or September, or your name has been given to me by one of my professors. We are now conducting the **pilot study** for the on-line survey. It is very important that we receive your completed survey so that we may continue with this research. Your personal information will be held confidential. It will only be used for the purposes of this research study and will be destroyed after the publication of the study results.

To participate in this study, proceed to https://www.psychdata.com and **Go to Survey # 144448**. Please answer all of the questions. Unless a question indicates that more than one answer may be given, please mark only one answer for each question. Please complete your survey by **Thursday, October 20 by 8 AM.** The questionnaire should take **about 15 to 20 minutes** to complete. In appreciation of your time in completing the survey, we are having a drawing for thirty $20.00 gift cards to Barnes & Noble booksellers. If you would like your name entered in the drawing, then please follow the instructions at the end of the survey.

Participation in this survey is completely voluntary, and you may withdraw your participation from the study at any time without penalty. The return of your completed questionnaire constitutes your informed consent to act as a participant in this research. A summary of the study will be provided to participants who request a copy and indicate so at the end of the survey. This will be provided within six months of completion of the research project.

Thank you in advance for your time, participation and interest in this topic. If you have any questions, please do not hesitate to contact us. If you have any questions about your rights as a participant in this research or the way this study has been conducted, you may contact Texas Woman's University Office of Research and Sponsored Programs at 940-898-3378 or via email at IRB@twu.edu.

Sincerely,

Kathy Hines, MS
Graduate Student
kathin@twu.edu

Carolyn M. Bednar, Ph.D., RD, Professor
Phone: 940-898-2658 Fax: 940-898-2634
CBednar@mail.twu.edu

APPENDIX E
E-Mail Cover Letter and Reminder Letter

Investigating the Role of Family and Consumer Sciences (FCS) Teachers in Nutrition Education in Texas Secondary Schools

Department of Nutrition and Food Sciences, Texas Woman's University
P.O. Box 425888 Denton, Texas 76204-5888

November 7, 2011

Dear Family and Consumer Sciences Teacher:

Do you have an opinion regarding how nutrition courses are being offered in Texas secondary schools? We are conducting a study to determine secondary level Family and Consumer Sciences (FCS) educators' attitudes concerning school-based nutrition education and their self-efficacy and comfort levels regarding teaching nutrition topics. Survey results will be used to develop training materials to assist any programs that will allow FCS educators to more widely teach nutrition topics in school curriculums across the country.

Your name and address were provided to us by the Texas Education Agency. Your personal information will be held confidential. It will only be used for the purposes of this research study and will be destroyed after the publication of the study results.

If you would like to participate in this study, then proceed to https://www.psychdata.com and enter **145269** in the **Go to survey #** box, or Google **PsychData** and continue. Please answer all of the questions. Unless a question indicates that more than one answer may be given, please mark only one answer for each question. Please complete your survey by **November 18**. The questionnaire should take **about 15 to 20 minutes** to complete. In appreciation of your time in completing the survey, we are having a drawing for thirty $20.00 gift cards to Barnes & Noble booksellers. If you would like your name entered in the drawing, then please follow the instructions at the end of the survey.

Participation in this survey is completely voluntary, and you may withdraw your participation from the study at any time without penalty. The return of your completed questionnaire constitutes your informed consent to act as a participant in this research. A summary of the study will be provided to participants who request a copy and indicate so at the end of the survey. This will be provided within six months of completion of the research project.

Thank you in advance for your participation. If you have any questions about the survey, please contact the researchers (see contact information below). If you have any questions about your rights as a participant in this research or the way this study has been conducted, you may contact Texas Woman's University Office of Research and Sponsored Programs at 940-898-3378 or via email at IRB@twu.edu.

Sincerely,

Kathy Hines, MS, Graduate Student
kathin@twu.edu

Carolyn M. Bednar, Ph.D., RD, Professor
940-898-2658 CBednar@mail.twu.edu

Investigating the Role of Family and Consumer Sciences (FCS) Teachers in Nutrition Education in Texas Secondary Schools

Department of Nutrition and Food Sciences, Texas Woman's University
P.O. Box 425888 Denton, Texas 76204-5888

November 30, 2011

Dear Family and Consumer Sciences Teacher:

Do you have an opinion regarding how nutrition courses are being offered in Texas secondary schools? We are conducting a study to determine secondary level Family and Consumer Sciences (FCS) educators' attitudes concerning school-based nutrition education and their self-efficacy and comfort levels regarding teaching nutrition topics. Survey results will be used to develop training materials to assist any programs that will allow FCS educators to more widely teach nutrition topics in school curriculums across the country.

Your name and address were provided to us by the Texas Education Agency. Your personal information will be held confidential. It will only be used for the purposes of this research study and will be destroyed after the publication of the study results.

If you would like to participate in this study, then proceed to https://www.psychdata.com and enter **145269** in the **Go to survey #** box, or Google **PsychData** and continue. Please answer all of the questions. Unless a question indicates that more than one answer may be given, please mark only one answer for each question. Please complete your survey by **December 15, 2011**. The questionnaire should take **about 15 to 20 minutes** to complete. In appreciation of your time in completing the survey, we are having a drawing for thirty $20.00 gift cards to Barnes & Noble booksellers. If you would like your name entered in the drawing, then please follow the instructions at the end of the survey.

Participation in this survey is completely voluntary, and you may withdraw your participation from the study at any time without penalty. The return of your completed questionnaire constitutes your informed consent to act as a participant in this research. A summary of the study will be provided to participants who request a copy and indicate so at the end of the survey. This will be provided within six months of completion of the research project.

Thank you in advance for your participation. If you have any questions about the survey, please contact the researchers (see contact information below). If you have any questions about your rights as a participant in this research or the way this study has been conducted, you may contact Texas Woman's University Office of Research and Sponsored Programs at 940-898-3378 or via email at IRB@twu.edu.

Sincerely,

Kathy Hines, MS, Graduate Student
kathin@twu.edu

Carolyn M. Bednar, Ph.D., RD, Professor
940-898-2658 CBednar@mail.twu.edu

APPENDIX F
Direct Mail Cover Letter and Postcard Reminder

TWU
TEXAS WOMAN'S UNIVERSITY
DENTON DALLAS HOUSTON

Department of Nutrition and Food Sciences
P.O. Box 425888, Denton, TX 76204-5888
940-898-2636 FAX 940-898-2634

November 14, 2011

Dear Family and Consumer Sciences Teacher:

Do you have an opinion regarding how nutrition courses are being offered in Texas secondary schools? We are conducting a study to determine secondary level Family and Consumer Sciences (FCS) educators' attitudes concerning school-based nutrition education and their self-efficacy and comfort levels regarding teaching nutrition topics. Survey results will be used to develop training materials to assist any programs that will allow FCS educators to more widely teach nutrition topics in school curriculums across the country.

Your name and address were provided to us by the Texas Education Agency. Your personal information will be held confidential. It will only be used for the purposes of this research study and will be destroyed after the publication of the study results.

If you would like to participate in this study, please answer all of the questions. Unless a question indicates that more than one answer may be given, please mark only one answer for each question. Please complete your survey by (**December 1, 2011**). The questionnaire should take **about 15 to 20 minutes** to complete. You will need to fold the survey as indicated by the dotted lines on the back page and then staple at the lengthwise edges. The address should appear and no envelope is needed for mailing. In appreciation of your time in completing the survey, we are having a **drawing for thirty $20.00 gift cards** to Barnes & Noble booksellers. If you would like your name entered in the drawing, then please follow the instructions at the end of the survey. An electronic version of this survey is also available at **https://www.psychdata.com.** Enter **145269** in the **Go to survey #** box, or Google **PsychData** and continue. Please complete only **one** form of this survey.

Participation in this survey is completely voluntary, and you may withdraw your participation from the study at any time without penalty. The return of your completed questionnaire constitutes your informed consent to act as a participant in this research. A summary of the study will be provided to participants who request a copy and indicate so at the end of the survey. This will be provided within six months of completion of the research project.

Thank you in advance for your participation. If you have any questions about the survey, please contact the researchers (see contact information below). If you have any questions about your rights as a participant in this research or the way this study has been conducted, you may contact Texas Woman's University Office of Research and Sponsored Programs at 940-898-3378 or via email at IRB@twu.edu.

Sincerely,

Kathy Hines, MS, Graduate Student
kathin@twu.edu

Carolyn M. Bednar, Ph.D., RD, Professor
940-898-2658 CBednar@mail.twu.edu

Dear Family and Consumer Sciences Teacher:

Reminder! We need your help!

You have been invited to participate in a 15-20 minute survey to determine secondary level FCS educators' attitudes concerning school-based nutrition education. Direct benefits of completing the survey include a chance to win one of **thirty $20.00 gift cards** to Barnes & Noble booksellers and the opportunity to receive a summary of the results. If you would like to participate, please go to **https://www.psychdata.com** and enter **145269** in the **Go to survey #** box. Please return your completed survey by **December 15, 2011**. Participation in the survey is completely voluntary, and you may withdraw at any time without penalty. **Thank you in advance for your help especially if you have already returned the completed survey.**

Sincerely,

Kathy Hines, MS
Graduate Student
Phone:
Email: kathin@twu.edu

Carolyn M. Bednar, Ph.D., RD
Professor
Phone: 940-898-2658
Email: CBednar@twu.edu

APPENDIX G
Tables

Table 17

Series of one-way MANOVA for FCS teacher perceptions of comfort levels teaching nutrition topics based on ethnicity

Statement			W/NH (n=145)	Other (n=30)
Nutrition Education (N = 175)	F	p	Mean ± SD	Mean ± SD
Food serving sizes	0.34	.563	4.79 ± 0.51	4.73 ± 0.52
Reading and interpreting food labels	1.15	.286	4.78 ± 0.52	4.67 ± 0.55
The Food Guide Pyramid	0.21	.647	4.74 ± 0.62	4.80 ± 0.48
The Dietary Guidelines	0.87	.352	4.59 ± 0.63	4.47 ± 0.68
Recommended Dietary Allowances (RDA) of basic nutrients	0.63	.429	4.51 ± 0.69	4.40 ± 0.72
MyPlate	0.08	.774	4.45 ± 0.83	4.40 ± 0.86

Note. Multivariate F (6.00, 168.00) = 0.58, p = .745 partial η^2 = .020.

			W/NH (n=143)	Other (n=31)
General Nutrition (N = 174)	F	p	Mean ± SD	Mean ± SD
Long-term effects of food choices on health	0.79	.376	4.72 ± 0.57	4.61 ± 0.76
Current lifestyle habits that increase health risks	1.83	.178	4.69 ± 0.63	4.52 ± 0.78
Nutritional value of fast foods and convenience foods	3.40	.067	4.66 ± 0.60	4.42 ± 0.92
Fad diets and advertising claims	2.92	.089	4.65 ± 0.63	4.42 ± 0.89
Relationship of activity level and caloric intake to health and weight management	5.86	.016	4.64 ± 0.67	4.29 ± 0.97
Effects of food allergies on individual and family health	0.00	.997	4.26 ± 0.90	4.26 ± 0.97

Note. Multivariate F (6.00, 167.00) = 1.95, p = .075 partial η^2 = .066. Means with different superscripts differed significantly. $p < .05$ (2-tailed)

			W/NH (n=146)	Other (n=32)
Functions of Nutrients (N = 178)	F	p	Mean ± SD	Mean ± SD
Functions of water in the body	5.61	.019	4.62 ± 0.71	4.25 ± 1.11
Functions of protein in the body	4.93	.028	4.58 ± 0.75	4.22 ± 1.10
Functions of carbohydrate in the body	4.34	.039	4.58 ± 0.74	4.25 ± 1.11
Functions of vitamins in the body	5.95	.016	4.57 ± 0.72	4.19 ± 1.09
Functions of minerals in the body	9.48	.002	4.53 ± 0.75	4.03 ± 1.15
Functions of fat in the body	3.51	.063	4.52 ± 0.75	4.22 ± 1.10

Note. Multivariate F (6.00, 171.00) = 2.53, p = .023 partial η^2 = .081. Means with different superscripts differed significantly. $p < .05$ (2-tailed)

(Continued)

Statement			W/NH (n=151)	Other (n=33)
Disease Prevention (N = 184)	F	p	Mean ± SD	Mean ± SD
Prevention, treatment and management of childhood obesity	0.34	.560	4.34 ± 0.85	4.24 ± 1.15
Prevention, treatment and management of eating disorders (i.e. anorexia and bulimia)	0.23	.633	4.26 ± 0.87	4.18 ± 1.04
Prevention, treatment and management of hypertension (high blood Pressure)	1.17	.281	4.17 ± 0.92	3.97 ± 1.19
Prevention, treatment and management of diabetes	0.11	.744	4.09 ± 0.96	4.03 ± 1.13
Note. Multivariate F (4.00, 179.00) = 0.64, p = .636 partial η^2 = .014.				
			W/NH (n=144)	Other (n=30)
Nutrient Metabolism (N = 174)	F	p	Mean ± SD	Mean ± SD
Relationship between food intake and body weight	9.16	.003	4.56 ± 0.74	4.07 ± 1.08
The human body's use of energy and calories	9.68	.002	4.35 ± 0.86	3.77 ± 1.28
Physiology of digestion	4.43	.037	4.20 ± 1.04	3.73 ± 1.41
Saturated and unsaturated fatty acids	2.86	.093	4.17 ± 0.93	3.83 ± 1.21
Basal activity metabolism	6.29	.013	4.04 ± 1.04	3.50 ± 1.25
Metabolism of nutrients	6.29	.013	4.04 ± 0.95	3.53 ± 1.25
Energy imbalances in weight-related disorders and diseases	2.10	.149	4.03 ± 0.99	3.73 ± 1.20
Regulation of glucose in the body	0.03	.869	3.80 ± 1.01	3.83 ± 1.21
Note. Multivariate F (8.00, 165.00) = 2.67, p = .009 partial η^2 = .114. Means with different superscripts differed significantly. $p < .05$ (2-tailed)				

Note. Likert Scale: 1 = Very Uncomfortable to 5 = Very Comfortable
W/N-H: White/Non-Hispanic
Other: Asian/Pacific Islander, Black/Non-Hispanic, Hispanic, and Native-American Indian.

Table 18

Series of one-way MANOVA for FCS teacher perceptions of comfort levels teaching nutrition topics based on level of education

Statement			B (n = 93)	B + (n = 41)	M/+ (n= 40)
Nutrition Education (N = 174)	F	p	Mean ± SD	Mean ± SD	Mean ± SD
Food serving sizes	4.35	.014	[a] 4.68 ± 0.63	4.88 ± 0.33	[b] 4.93 ± 0.23
Reading and interpreting food labels	2.50	.085	4.68 ± 0.61	4.83 ± 0.38	4.88 ± 0.40
The Food Guide Pyramid	2.15	.120	4.67 ± 0.67	4.83 ± 0.44	4.88 ± 0.56
The Dietary Guidelines	1.18	.310	4.49 ± 0.72	4.66 ± 0.48	4.63 ± 0.59
Recommended Dietary Allowances (RDA) of basic nutrients	2.58	.079	4.39 ± 0.78	4.54 ± 0.60	4.68 ± 0.53
MyPlate	0.63	.535	4.38 ± 0.87	4.46 ± 0.84	4.55 ± 0.75

Note. Multivariate F (12.00, 332.00) = 1.08, p = .378 partial η^2 = .037. Means with different superscripts differed significantly. $p < .05$ (2-tailed)

			B (n = 91)	B + (n = 39)	M/+ (n= 42)
General Nutrition (N = 172)	F	p	Mean ± SD	Mean ± SD	Mean ± SD
Long-term effects of food choices on health	1.07	.346	4.67 ± 0.56	4.82 ± 0.39	4.74 ± 0.63
Current lifestyle habits that increase health risks	1.88	.155	4.60 ± 0.65	4.82 ± 0.39	4.71 ± 0.64
Nutritional value of fast foods and convenience foods	1.25	.291	4.58 ± 0.62	4.77 ± 0.43	4.64 ± 0.76
Relationship of activity level and caloric intake to health and weight management	0.24	.791	4.56 ± 0.70	4.62 ± 0.54	4.64 ± 0.76
Fad diets and advertising claims	1.26	.287	4.56 ± 0.69	4.74 ± 0.44	4.67 ± 0.65
Effects of food allergies on individual and family health	1.01	.368	4.20 ± 0.90	4.44 ± 0.82	4.29 ± 0.89

Note. Multivariate F (12.00, 328.00) = 0.48, p = .925 partial η^2 = .017.

			B (n = 90)	B + (n = 43)	M/+ (n= 43)
Functions of Nutrients (N = 176)	F	p	Mean ± SD	Mean ± SD	Mean ± SD
Functions of water in the body	0.19	.826	4.53 ± 0.78	4.60 ± 0.54	4.60 ± 0.90
Functions of carbohydrate in the body	0.62	.539	4.49 ± 0.82	4.65 ± 0.53	4.53 ± 0.91
Functions of protein in the body	0.52	.595	4.48 ± 0.82	4.63 ± 0.58	4.53 ± 0.91
Functions of vitamins in the body	0.74	.478	4.46 ± 0.81	4.63 ± 0.49	4.53 ± 0.91
Functions of fat in the body	0.30	.742	4.44 ± 0.81	4.56 ± 0.63	4.49 ± 0.91
Functions of minerals in the body	0.73	.484	4.39 ± 0.87	4.56 ± 0.59	4.51 ± 0.91

Note. Multivariate F (12.00, 336.00) = 0.58, p = .858 partial η^2 = .020.

(Continued)

Statement			B (n = 93)	B + (n = 43)	M/+ (n= 46)
Disease Prevention (N = 182)	F	p	Mean ± SD	Mean ± SD	Mean ± SD
Prevention, treatment and management of childhood obesity	2.46	.088	4.23 ± 0.89	4.58 ± 0.63	4.35 ± 0.99
Prevention, treatment and management of eating disorders (i.e. anorexia and bulimia)	2.32	.102	4.18 ± 0.89	4.51 ± 0.67	4.20 ± 0.96
Prevention, treatment and management of hypertension (high blood Pressure)	2.34	.099	4.02 ± 0.99	4.40 ± 0.73	4.17 ± 1.02
Prevention, treatment and management of diabetes	2.11	.124	3.96 ± 1.02	4.30 ± 0.77	4.17 ± 0.99
Note. Multivariate F (8.00, 352.00) = 0.96, p = .467 partial η^2 = .021.					
			B (n = 88)	B + (n = 38)	M/+ (n= 46)
Nutrient Metabolism (N = 172)	F	p	Mean ± SD	Mean ± SD	Mean ± SD
Relationship between food intake and body weight	0.08	.919	4.47 ± 0.80	4.53 ± 0.56	4.50 ± 0.91
The human body's use of energy and calories	0.71	.493	4.20 ± 0.92	4.42 ± 0.64	4.26 ± 1.14
Physiology of digestion	0.51	.603	4.05 ± 1.18	4.24 ± 1.05	4.20 ± 1.03
Saturated and unsaturated fatty acids	0.85	.428	4.05 ± 1.01	4.29 ± 0.73	4.13 ± 1.05
Metabolism of nutrients	0.37	.693	3.91 ± 1.00	4.08 ± 0.94	3.96 ± 1.12
Energy imbalances in weight-related disorders and diseases	0.92	.399	3.89 ± 1.03	4.13 ± 0.88	4.07 ± 1.14
Basal activity metabolism	1.41	.246	3.82 ± 1.15	4.08 ± 1.02	4.11 ± 0.99
Regulation of glucose in the body	1.68	.190	3.67 ± 1.11	4.03 ± 1.00	3.87 ± 0.93
Note. Multivariate F (16.00, 324.00) = 0.59, p = .891 partial η^2 = .028.					

Note. Likert Scale: 1 = Very Uncomfortable to 5 = Very Comfortable
Bachelor's: B; Bachelor's plus additional coursework: B+; Master's or higher: M/+

Table 19

Series of one-way MANOVA for FCS teacher perceptions of comfort levels teaching nutrition topics based on community size

Statement			M (n = 60)	S (n = 55)	R (n= 60)
Nutrition Education (N = 175)	F	p	Mean ± SD	Mean ± SD	Mean ± SD
Food serving sizes	1.86	.158	4.88 ± 0.32	4.71 ± 0.53	4.75 ± 0.63
Reading and interpreting food labels	2.67	.072	4.88 ± 0.32	4.67 ± 0.55	4.72 ± 0.64
The Food Guide Pyramid	0.52	.598	4.82 ± 0.57	4.71 ± 0.57	4.73 ± 0.66
The Dietary Guidelines	0.59	.557	4.58 ± 0.62	4.49 ± 0.64	4.62 ± 0.67
MyPlate	1.34	.265	4.53 ± 0.77	4.29 ± 0.98	4.48 ± 0.75
Recommended Dietary Allowances (RDA) of basic nutrients	0.60	.942	4.50 ± 0.65	4.51 ± 0.69	4.47 ± 0.75
Note. Multivariate F (12.00, 334.00) = 1.18, p = .298 partial η^2 = .041					
Statement			M (n = 60)	S (n = 54)	R (n= 64)
Functions of Nutrients (N = 178)	F	p	Mean ± SD	Mean ± SD	Mean ± SD
Functions of carbohydrate in the body	0.76	.468	4.58 ± 0.91	4.41 ± 0.84	4.56 ± 0.73
Functions of fat in the body	1.79	.170	4.58 ± 0.89	4.30 ± 0.86	4.50 ± 0.74
Functions of water in the body	0.50	.606	4.57 ± 0.91	4.46 ± 0.79	4.61 ± 0.70
Functions of protein in the body	0.84	.435	4.57 ± 0.91	4.39 ± 0.83	4.56 ± 0.75
Functions of vitamins in the body	0.73	.486	4.55 ± 0.91	4.39 ± 0.81	4.55 ± 0.71
Functions of minerals in the body	0.65	.525	4.50 ± 0.97	4.33 ± 0.85	4.48 ± 0.76
Note. Multivariate F (12.00, 340.00) = 0.71, p = .740 partial η^2 = .024					
Statement			M (n = 57)	S (n = 53)	R (n= 64)
General Nutrition (N = 174)	F	p	Mean ± SD	Mean ± SD	Mean ± SD
Long-term effects of food choices on health	3.65	.028	[a] 4.88 ± 0.38	[b] 4.60 ± 0.66	4.62 ± 0.70
Current lifestyle habits that increase health risks	2.55	.081	4.81 ± 0.44	4.53 ± 0.72	4.64 ± 0.74
Nutritional value of fast foods and convenience foods	1.69	.189	4.75 ± 0.43	4.57 ± 0.77	4.55± 0.75
Fad diets and advertising claims	1.51	.223	4.74 ± 0.48	4.53 ± 0.78	4.56 ± 0.75
Relationship of activity level and caloric intake to health and weight management	0.44	.643	4.65 ± 0.67	4.55 ± 0.67	4.53 ± 0.84
Effects of food allergies on individual and family health	0.44	.643	4.33 ± 0.89	4.17 ± 0.94	4.27 ± 0.91
Note. Multivariate F (12.00, 332.00) = 1.089, p = .369 partial η^2 = .038. Means with different superscripts differed significantly. $p < .05$ (2-tailed)					

(Continued)

Statement			M (n = 63)	S (n = 55)	R (n= 66)
Disease Prevention (N = 184)	F	p	Mean ± SD	Mean ± SD	Mean ± SD
Prevention, treatment and management of childhood obesity	0.29	.749	4.40 ± 0.93	4.29 ± 0.94	4.29 ± 0.88
Prevention, treatment and management of eating disorders (i.e. anorexia and bulimia)	0.89	.411	4.35 ± 0.85	4.13 ± 0.94	4.26 ± 0.92
Prevention, treatment and management of hypertension (high blood Pressure)	1.25	.288	4.19 ± 0.97	3.96 ± 1.04	4.23 ± 0.93
Prevention, treatment and management of diabetes	0.95	.388	4.14 ± 0.97	3.93 ± 1.09	4.15 ± 0.93
Note. Multivariate F (8.00, 356.00) = 1.07, p = .386 partial η^2 = .023.					
Statement			M (n = 58)	S (n = 54)	R (n= 62)
Nutrient Metabolism (N = 174)	F	p	Mean ± SD	Mean ± SD	Mean ± SD
Relationship between food intake and body weight	0.15	.861	4.52 ± 0.88	4.46 ± 0.72	4.44 ± 0.86
Physiology of digestion	0.67	.514	4.26 ± 1.18	4.04 ± 1.09	4.06 ± 0.98
The human body's use of energy and calories	0.16	.852	4.22 ± 1.09	4.31 ± 0.79	4.23 ± 1.14
Saturated and unsaturated fatty acids	0.14	.874	4.09 ± 1.20	4.07 ± 0.84	4.16 ± 0.89
Basal activity metabolism	1.42	.244	4.03 ± 1.14	3.74 ± 1.07	4.05 ± 1.06
Energy imbalances in weight-related disorders and diseases	0.01	.986	4.00 ± 1.14	3.98 ± 0.94	3.97 ± 1.04
Metabolism of nutrients	0.09	.914	3.95 ± 1.13	4.00 ± 0.93	3.92 ± 101
Regulation of glucose in the body	0.21	.810	3.74 ± 1.21	3.87 ± 0. 91	3.81 ± 1.01
Note. Multivariate F (16.00, 328.00) = 1.31, p = .191 partial η^2 = .060.					

Note. Likert Scale: 1 = Very Uncomfortable to 5 = Very Comfortable
Metropolitan: M; Suburban: S; Rural: R