

NUTRITION EDUCATION AND THE  
ELEMENTARY CLASSROOM TEACHER

by

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## DEDICATION

To our soon-to-be-born son,

## Blake Zachary Gibson

Who kept me company as I prepared for my final project,

Attended every workshop,

Spent hours kicking me along as I typed,

& was an ever-close presence at my defense.

I love you & cannot wait to meet you.

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## ABSTRACT

Inactive lifestyles and poor eating habits are the main culprits of the present increase in childhood obesity, diabetes, heart problems, and cancer. In order to counterbalance this deterioration of children's health, it is imperative that children are educated about good nutritional practices. Unfortunately, parents are not always well-informed about nutrition themselves, leaving teachers to be the necessary link between children and good nutrition.

This study investigates what teachers understand about nutrition concepts, as this knowledge would be the necessary precursor to aiding students toward better health. Due to the limited research on nutrition education in the elementary classroom, this study was preceded by three pilot studies that lent themselves to the advancement of the researcher's understanding of nutrition and its place in the elementary school setting. Initially three preservice teachers were interviewed in order to examine the preparation of elementary teachers for teaching nutrition.

In order to assess what teachers understand about nutrition it was necessary to create an instrument that would assess teachers' nutritional knowledge. Through several trials a nutrition content survey was created and modified. The final version was administered to three hundred and seventeen teachers. While creating the nutrition content survey, the researcher also compiled a proposed list for the "big ideas" in nutrition. These statements describe the nutritional concepts that elementary students should understand. The "big ideas" were used to create lesson plans that were taught to forty-four fifth graders. These students provided insight into the content of the lessons

through pre-post assessments and gave interest feedback using anonymous questionnaires.

While the nature of this study was exploratory and descriptive in nature, its quantitative and qualitative data provided insight into teachers' understanding of nutritional concepts. Along with these findings were some preliminary examinations into how preservice teachers are prepared for teaching nutrition, what elementary age students understand about nutrition and what interests them, and how teachers feel about teaching nutrition. This study provides many possible avenues for future research in the area of nutrition education.

## POSITIONALITY

A few aspects of my personal and educational backgrounds may serve as a lens through which I will view this exploration into creating a nutrition curriculum and teaching it in the classroom and at a professional development workshop. As a researcher, I will attempt to avoid biases, but I know that my own experiences may affect the way that I perceive the response and behaviors of others.

Professionally, I am currently in my sixth year of teaching in the public school system. I taught two years of high school biology in California before moving to an Arizonan elementary school. There I spent my first year in third grade and the last three years teaching fifth grade. I find fifth grade to be a compatible fit with my personality and teaching style. I do, however, miss the mentor relationships that occur when teaching high school. I have purposefully varied my teaching levels and venues, because I believe that a variety of experiences within different classrooms and schools will aid my future aspirations to become a professor and work with preservice teachers.

Academically, I received two bachelor's degrees from a small parochial school in Iowa. I majored in biology and chemistry with an emphasis in veterinarian medicine. My love for animals conflicted with the politics and harsh realities of veterinarian medicine, so I went searching for something else. Throughout my life I have been continuously involved in teaching endeavors. As a high school student I helped teach Sunday school for pre-kindergarteners. In college I worked as the French instructor's aide, tutored math and science students, and even taught line dancing. Teaching seemed to come naturally to me, because it has been a consistent part of my life for so long.

I received my master's of arts and teaching degree in science education at the University of Iowa. I double certified in secondary science and general elementary so that I could experience the spectrum of teaching activities. As a future professor I believe that being able to speak from experience at all levels will be a tremendous asset. Presently, I am attending a research-1 institution in the southwest pursuing a PhD in teaching and teacher education.

My upbringing will probably play the most prominent role in defining my outlook and perception during my research study. I was raised by a single mom who was a college professor in the fields of nutrition and human physiology. My meals always consisted of multiple vegetables, lean meats, and low-fat desserts. As a tri-sport athlete, physical fitness was a natural and consistent part of my life. I realize that this constant integration of healthy habits throughout my life has influenced my present lifestyle. I currently eat a healthy diet and maintain an exercise routine. Due to my family upbringing, I may feel that nutrition is more important than other people do. Maybe my enthusiasm for the topic will rub off on my participants. I can only hope.

## CHAPTER 1: INTRODUCTION

### *Overview*

The introduction to this study of nutrition education begins with a summary of the critical statistics of the decline in the health of children in the United States. These alarming statistics are included to emphasize the imperative nature of an intervention to educate teachers and students about nutrition. The purpose statement and research questions delineate the structure and direction of this exploratory and descriptive study. The theoretical perspective, that follows, provides background information on the theory and purpose behind the creation, delivery, and implementation of the nutrition curriculum designed and used in this study. Supporting sections of this chapter include: limitations, delimitations, and the significance of the study. These sections will explain the importance, structure, and limits of this study of nutrition education.

### *Emergence of the Study*

Standardized testing and mandated curricula focus elementary teachers toward the teaching of specific subjects such as: reading, writing, math, social studies, and science. Nutrition is *sometimes* taught as part of a science unit on the human body or touched upon amidst anti-drug, tobacco, and violence lessons in health (Comprehensive Health, 1997), but sometimes, too often, nutrition may be omitted from the elementary classroom altogether.

A recent report compiled by the Center for Disease Control and Prevention (CDCP) estimates that in the last 30 years the percent of overweight school-age children has quadrupled (CDCP, 2002). The CDCP compared 4% of school-aged children who

were overweight in 1965 with 15% percent in the year 2000 (2002). Strauss and Pollack (2001) also reported an epidemic of childhood obesity. They reported that between the years 1986-1998 the rates of obesity in children increased significantly every two years regardless of ethnicity.

Inactive lifestyles and poor eating habits are reported as the main culprits of the present increase in childhood obesity, diabetes, heart problems, and cancer (U.S. Department of Human Health Services, 1997). A drastic increase in the number of children diagnosed with Type II diabetes is of further concern. In the past, Type II diabetes occurred only in adults. Doctors can only speculate about the long term effects of people under twenty developing a disease that was previously limited to people over fifty (ADA, 2000).

Over 100 research studies have been done in schools, investigating the effectiveness of nutrition curriculum and how it relates to students' eating behaviors. Most of the studies have been supported financially by federal or private agencies but the programs studied have been unable to sustain their presence in schools, for a variety of reasons. Some studies on curriculum have reported an increase in students' understanding of nutrition but not a change in their eating behaviors. (Contento et al., 2002)

Other research studies concentrated on teacher training (Guskey & Huberman, 1995), but what remains to be explored are teachers' understandings of nutritional concepts. Without their own understanding established, teachers are unable to effectively teach nutrition to their students. This lack of understanding can inhibit their success in teaching nutrition, resulting in hindering a positive attitude toward teaching nutrition.

This negative relationship between teachers' nutrition content knowledge and attitude towards teaching nutrition only increases the chance that teachers will be ineffective in their efforts to teach nutrition in the classroom if they do not have a clear understanding of nutritional concepts.

### *Purpose Statement*

The purpose of this study is to explore nutrition education in the elementary school setting by investigating teachers' understanding of nutrition. Due to the limited research in the field of nutrition education, it was necessary for three pilot studies to be conducted to prepare the researcher to assess what teachers understand about nutrition. The exploration began with a small qualitative pilot study of current preservice teachers. The purpose was to explore the preparation of teachers for teaching nutrition starting at the university, teacher preparation level. The second pilot study's purpose was to create a nutrition content survey that would quantitatively assess teachers' understanding of nutrition content. In preparation for the final study's nutrition workshop, the third pilot study explored students' understanding of nutrition concepts (quantitative) and students' reflections and evaluations of nutrition lessons (quantitative and qualitative). These student-evaluated lessons were distributed during the nutrition workshop for elementary teachers.

The final study in this exploration of what elementary teachers' understand about nutrition consisted of a large-scale distribution of the nutrition survey created during the second pilot study as well as a nutrition professional development workshop for elementary teachers. During the nutrition professional development workshop, the nutrition content survey was used to evaluate whether this smaller group was

representative of the larger group, who had taken the survey previously. Each of the three pilot studies allowed the researcher the opportunity to ask preliminary questions that were used to prepare for the final exploration into what teachers' understand about nutrition.

### *Research Question and Preliminary Questions for Pilot Studies*

#### Research Question

What do elementary teachers understand about nutrition?

#### Questions for first pilot study

##### Preliminary Question 1-1:

What do three preservice teachers understand about nutrition?

##### Preliminary Question 1-2:

How are these preservice teachers being prepared for teaching the academic health education standards with respect to nutrition?

#### Questions for second pilot study

##### Preliminary Question 2-1:

What are the "big ideas" in nutrition?

##### Preliminary Question 2-2:

How can an effective instrument for measuring teachers' understanding of nutrition content knowledge be created, evaluated, and modified?

#### Questions for third pilot study

##### Preliminary Question 3-1:

What does a group of fifth grade students understand about nutrition before and after a nutrition unit?

##### Preliminary Question 3-2:

What do these students report about nutrition lessons with respect to learned information and interest level?

### *Theoretical Perspective*

In designing and organizing a nutrition in-service program for elementary teachers, a constructivist learning theory will serve as a useful guide. Constructivist

learning suggests that to understand concepts fully the learner must actively construct the knowledge for themselves. This idea was first presented by philosopher Giambattista Vico in the eighteenth century. Contemporaries, such as Jean Piaget, Lev Vygotsky, and John Dewey, have further developed the idea that the focus of the curriculum should be on the learner and not the teacher (Thanasoulas, 2001). To increase the potential for learners to understand and scaffold new information, the teacher must mold the teaching of the content to the background and knowledge of the student (Piaget, 1973).

The constructivist learning theory model states that each learner develops his/her own organization and scaffolds for new information based on individual previous experience and prior knowledge. (Driver et al, 1994; Piaget, 1970, Vygotsky, 1962) Piaget's theory states that when new information is presented to the learner, the learner will assimilate small perturbations to their knowledge structure but will actively have to accommodate for larger inconsistencies with his/her prior knowledge and expectations of reality. In order for teachers to support this process successfully, teachers must present new information in a holistic fashion that includes consideration of the learners' prior knowledge and experience. For Dewey, knowledge only emerges out of lessons that are structured so that the learner can have a meaningful experience (Dewey, 1938, 1966). Nutrition lessons must be tied to meaning in students' lives in order for them to fully understand nutrition concepts and the possible implications of this knowledge to their eating behaviors and lifestyle.

Vygotsky's sociocultural theory of learning emphasizes the learner's need for interpersonal and intrapersonal interaction when scaffolding new information. Forman and Cazden (1985) observed students' interactions when problem solving collaboratively.

Their findings support Vygotsky's two-phase model. In the model's initial phase of problem solving, students interact with one another, guiding and encouraging each other toward a resolution. During the second phase, each student arrives at their own conclusions and structure of the new information. They concluded that through interpersonal discourse with peers, students were able to learn new strategies for problem solving. Thus interactions with peers and the teacher are paramount in helping learners scaffold new information into their prior knowledge.

The principles of constructivist learning theory have been applied across many disciplines, such as psychology, sociology, philosophy, and education (Thanasoulas, 2001). Constructivism changes the traditional, instructive approach to a learner-centered approach that tailors the curriculum for the learner. Math students are taught problem-solving approaches that support conceptual understanding of computations instead of simply focusing on correct calculations (Jean, 2004; Davydov, 1972/1990). Science students are given hands-on, real world experiences to inquire about scientific ideas with a realistic view of the subjective, changing nature of scientific knowledge (Kuhn, 1970; Lederman & Flick, 2004).

The constructivist learning theory will be foundational to the creation and implementation of the nutrition professional development workshop included in this study. Data collected from the fifth grade students in this study will be used to guide the inclusion or removal of lessons from the curriculum as well as modifications made to individual lessons. Throughout the nutrition professional development workshop, participant feedback will guide the pace and depth with which nutrition content is addressed. Overall the researcher/teacher will tailor the implementations in the

classroom and during the workshop to the prior knowledge and personal experience of the participants. During the workshop, the participants will actively participate in nutrition lessons instead of being instructed on how they should teach nutrition in their own classrooms. In this format, teachers will be more likely to have meaningful experiences to help them scaffold the new information into their teaching schema.

In response to Vygotsky's sociocultural theory, the nutrition professional development workshop will include time for teachers to reflect on their own teaching of nutrition with their peers. After a two-hour nutrition professional development workshop, the teachers will have two weeks to teach nutrition lessons in their own classrooms and reflect upon their own teaching of nutrition. Upon their return to the second workshop, the teachers will be asked to share, with their peers, their experiences of teaching nutrition in their classrooms. They will be encouraged to discuss problems they faced or modifications they made to help them successfully teach nutrition to their students. Time to interact with the workshop teacher and their peers will help participants scaffold the new nutrition information. This process will be repeated, as there is another two-week opportunity to teach new content with new pedagogies in their individual classrooms before the third and final workshop.

## CHAPTER 2: LITERATURE REVIEW

### *Overview*

In order to guide the reader toward the significance and necessity for this study, a thorough look at the related literature will be discussed. At the outset, the history of nutrition policies will be examined. Then, previous nutrition studies involving children, teachers, and schools will be summarized. Insight into both traditional and reformed professional development programs will follow. The literature review will conclude with a collection of the health benefits of good nutrition.

### *Nutrition Policies in America's Schools*

There are several policies currently implemented that impact nutrition education. The most predominant policy in education today is the No Child Left Behind Act (NCLB, 2001). While the premises of NCLB are inarguably important, it pressures teachers to focus exclusively on the core curriculum content areas of math, reading, and writing. Peripheral subjects like science, social studies, physical education, health, technology, art, and music are sometimes left behind or minimized as the teachers prepare students for high-stakes mandated standardized testing of the core content areas. Nutrition, which is incorporated as a small subset of the health curriculum, may exist sporadically and inconsistently within the classroom. Without any accountability for the inclusion of peripheral subjects, it is not surprising that teachers will emphasize the tested curriculum at the sacrifice of other important content.

Smaller factions of influence in education promote nutrition education as a preventative remedy for the current obesity epidemic. Authors of *Generation Extra*

*Large*, write about the obesity epidemic and emphatically argue that drastic measures will need to be taken in order for schools to successfully educate and support students' change to healthier eating behaviors (Tartamella, Herscher, & Woolston, 2004). Several government and private agencies have attempted nutrition programs and consistently promote nutrition education in schools. The Center for Disease Control, U.S. Department of Agriculture, U.S. Department of Human Health Services, American Cancer Society, American Heart Association, and American Diabetes Association all lobby for the implementation of nutrition education in the classroom.

The CDC's (2003) new publication *Healthy People 2010* outlines a total of 467 national health objectives, 107 of which focus on adolescence and young children. Some objectives are considered critical because they affect health outcomes. For example, objective 19-03 states, "Reduce the proportion of children and adolescents who are overweight or obese" (CDC, 2003, 9-3).

Currently, the American Association for Health Education (AAHE, 2006) is revising the national health academic standards. The pre-publication copy of the 2006 Revision of the National Health Education Standards, PreK-12 is available for review on the AAHE's website. When compared, the Arizona health standards are practically identical to, although slightly more thorough than, the new national health standards (ADE, 1997). Despite revisions of the health standards, the mention of nutrition is still extremely minimal in both sets of standards.

Due to the scarcity of nutrition in the academic standards, teachers without strong backgrounds in nutrition may be left perplexed as to what they are supposed to teach about nutrition. Perhaps more importantly, there are currently no accountability

measures in place for nutrition education as standardized tests only cover core curriculum areas. Sometimes school districts do not have the funding or chose not to buy curriculum outside of the core content areas. When this occurs teachers are left without resources for the more extraneous subjects like nutrition, health, art, and technology. In other words, teachers who are interested in teaching nutrition are often given vague standards and little or no curriculum support (Celebuski, 2000).

Overall the present outlook on nutrition education in the classroom is very grim. Teachers are left without materials, education, and motivation to teach nutrition. The medical statistics depicting the obesity epidemic have yet to stimulate aggressive changes in the educational policies. Given the government's present priorities in education, nutrition education may only appear in the classroom if standardized testing on the nutrition standards is implemented. Robert Treviño, a physician and diabetes researcher, believes action needs to be taken or more time will only exacerbate the obesity epidemic and even more children will be lost to the tragedy of lifelong health problems. (Tartamella et al., 2004). Maybe with the growing body of research and society's focus on the obesity epidemic plaguing America's children, policies will eventually be made that force nutrition education to be implemented in every classroom in the United States.

When looking at the shifts in nutrition policy perspectives and curricular ideas within education throughout America's history, a number of related topics must be addressed. While medical professionals would promote nutrition education in schools, due to the onslaught of childhood diseases present today, other members of society are more concerned with profit. While only indirectly affecting school's nutrition programs, these competing ideas are infiltrating advertisement and cultural norms viewed by

children, and therefore are pertinent to this discussion of nutrition policies and perspectives. Both positive and negative aspects will be discussed in the following section to draw a more encompassing picture of nutrition in America throughout the last 30+ years.

Weight Watchers, Slim Fast, Jenny Craig, Atkins, and multiple other weight loss programs have surfaced through the years since 1970. Products have been packaged such that “low-fat”, “low-carb”, and “high-protein” are buzzwords to entice consumers. While these ideas have the potential to enhance healthy eating, too often people assume that they can eat more of it, because it’s already low-fat, thus minimizing its benefits.

In 1990, the Nutrition Labeling and Education Act established uniform nutrition labels for all commercially distributed foods. This act mandated that all food manufacturers and processors would have to provide truthful nutrition information on almost all foods, and barred them from making unscientifically proven claims about their products (Dorfman & Johnson, 1990). Studies have shown that people who consistently use nutrition labels to monitor their diet report a lower total fat consumption than those who do not. However, only a small portion of people reported using the labels at all (Lin & Lee, 2003).

In the last ten years, fast food restaurants started providing nutritional information for their menu items. Restaurants like McDonalds have started offering healthier choices for the more conscientious consumer. Kraft agreed to take their logo off book covers and other school advertising paraphernalia. However, many food companies continued to filter information and fatty foods through to the children. Pizza Hut and other franchises seep into the school and compete with the cafeteria at lunch. Coca-cola advertises its

goal is for “a Coke to only be an arm’s length away” (Tartamella et al., 2004). With mixed messages and so much advertisement for foods, it’s no wonder that adults and children struggle in making healthy food choices.

Television advertisements also play a role in persuading consumers to purchase unhealthy foods. One study on food advertisements, found that more commercials advertised candy, soda, and other unhealthy fattening foods than healthier choices like fruits and vegetables. The study also reported that food advertisements were more common during African-American programs than the general market programs (Henderson & Kelly, 2005). In a 1976 publication about TV commercials, it was reported that candy and sugary cereal items were more frequently advertised and more frequently requested by children while grocery shopping. Commercials for sugary cereals outnumbered non-sugary cereal commercials 3 to 1 (Galst & White, 1976).

In 1946 the National School Lunch Program was enacted to help states maintain nonprofit lunch programs in public schools. In 1966 a limited number of schools made breakfast available to their students. Seven years later, in 1973 the School Breakfast Program was available to any school who wanted to provide breakfast for its students (Congressional Digest, 1975). Throughout the last 30 years cafeteria food in schools has drastically changed. Now children are given a variety of options from which to choose, where in the past students were merely served up the chef’s concoction.

Current policies focus on lowering the fat content available to children at school. In the state of Arizona, new nutrition standards require 100% juice and low-fat milk to be served. Soda and sports drinks are prohibited at elementary schools (ADE, 2006). Throughout the history of school cafeteria food a variety of groups have influenced the

shifts in food service policies. While many groups focus on the nutritional needs of students, some focus on the productivity of food distributors, therefore skewing the school's ability to provide each student with the healthiest options (Kettlewell, 2004).

The highest concentration of nutrition policies in American history occurred within two distinct time periods. The current obesity epidemic has caused a saturation of ideas and statistics about children's nutrition in the last thirty years. But America's first nutrition crisis occurred over eighty years ago during the Great Depression. The Great Depression and war times, inflicted America with an epidemic of malnourished children. The 1920s were filled with nutrition programs and policies as adults searched for resources to feed these needy, hungry children. Statistics showed that many children suffered hunger because their family's income was not large enough to pay for food. During the 1920s milk, fruit, and vegetable consumption was widely promoted in schools and through advertisements. The internationally known character Popeye was created to promote spinach consumption in children during the 1930s. Quite opposite in need, but alike in desperation, today's overweight children and yesterday's malnourished children both need America to respond. This first crisis was met with government & state aid. Food distributors focused advertisements to help children eat healthy foods, and schools began to feed children voluntarily. The overwhelming and active efforts of the individuals and larger corporations were effective in their response to children's nutrition needs in the 1920s and 1930s (Lovett, 2005).

The necessity to feed underprivileged children persisted through the 1940s and continues today. The implementation of the National School Lunch Program was a success at feeding America's youth "without regard to race, color, creed, or means"

(Faught, 1942, 28). In May 1969, President Richard Nixon in his address to Congress said, “We must put an end to malnutrition and hunger among the poor” (Bevins, 1969, 59). Nixon also appointed renowned Harvard nutritionist, Dr. Jean Mayer, as his Special Assistant on Nutrition. Mayer’s responsibility was to plan the White House Conference, which included a panel on nutrition education and teaching. However, the final social action statement did not include nutrition education in its objectives (Bevins, 1969).

In 1977 national legislation called for the creation and implementation of the USDA’s Nutrition Education and Training Program (NET). The goal was to coordinate students’ experiences in the cafeteria with those in the classroom. Funding provided federally for the NET project was granted to states to educate teachers, students, and parents on the principles of nutrition (USDA, 1992; Scheffler & Hammond, 1992). No recent publications have been made about NET. In 1998, Congress asked the CDC to “expand its support of coordinated health education programs in schools” (CDC, 2003, 9-3). The CDC’s Project 2001 was designed to give schools the tools they would need to educate students, teachers, and parents about nutrition concepts. (Poolton, 1992). In June 2004 at the national obesity summit in Williamsburg, Virginia the health and human services secretary, Tommy Thompson discussed his small steps campaign. Critics argued that big steps, not small, would be needed to reverse the negative effects of poor nutrition on the nation’s children (Tartamella et al., 2004).

Also in 2004 the University of Baltimore reported that 18 states had failed in attempts to control the obesity epidemic in children. “Simply put, state governments are not addressing this problem effectively and the neglect is doing a lot of unnecessary damage,” stated professor Zoltan Acs (Tartamella et al., 2004). The importance of

nutrition education is clear, but little has been done to implement effective and consistent nutrition programs in schools. That said, there have been many attempts to study the success of nutrition programs in classrooms, but only a few have sustained the test of time and remained in the schools after the researchers and/or funding departed.

Over 100 research-based studies on nutrition were reviewed by Contento, Randell, & Basch (2002). Within this body of research are a number of nutrition curriculum studies that involve using assessment tools to gather information on what students knew about nutrition (pretest) and what they learned through the programs (posttest) (Contento et al., 2002). Districts and schools have implemented various nutrition programs, usually promoted and funded by government agencies. The focuses of these programs varied. Food diaries were used to emphasize portion sizes (Herbold & Dennis, 2001), computerized records tracked progress toward health goals (Horowitz et al., 2004), the effect of students' nutritional knowledge on eating behaviors was studied in middle schools (Pirouznia, 2001), and there were multiple programs that focused on promoting milk, fruit, and vegetable consumption (Baranowski et al., 2000; Blom-Hoffman & DuPaul, 2004; Connors et al., 2001; Kuczmariski & Aljadir, 2003; Nicklas, 2000).

Through the past century, especially during critical times, nutrition policy has been discussed and implemented. However, there is little evidence that nutrition education has a strong foothold in schools' curriculum. This may change in the next few years, as a fitness plan, "Getting to Wellness", is prescribed by Congress. By the 2006-07 school year, schools who have federal lunch programs must also begin a wellness policy encouraging fitness and nutrition education. This may serve as the necessary first

step in policy to implement nutrition education in the classroom. But as of right now, “Nutrition education, in many cases, is not there” (as cited in Buchanan, 2005).

### *Nutrition Education Research Studies*

Over one hundred research-based studies on nutrition at differing levels ranging from preschool to elderly participants were reviewed by Contento, Randell, and Basch (2002). Through nutrition education programs, researchers have assessed what students know about protein in-take, milk drinking, food label reading, effects of good nutrition, heart health, and the most recent trend, the importance of fruits and vegetables. Most of the studies showed an increase in students’ understanding of nutrition, but were unable to claim that their program had made a difference in students’ behavior. (Contento et al., 2002)

Contento et al. (2002) analyzed nutrition education in four categories: preschool children, school-aged children, adults, and older adults. However, only a few of the adult studies were directed toward teachers. Unfortunately, almost all of the studies on teacher education in nutrition were completed in the early 1980s. This leaves an approximate twenty-year gap in nutrition education!

In Britten and Lai’s (1998) exploration of elementary teacher self-efficacy in teaching nutrition, time spent on nutrition in the classroom was reported to be limited, and the researchers argue for the importance of nutrition education in the elementary school curriculum. In addition, Britten and Lai (1998) found that elementary self-efficacy in teaching nutrition ranked low, and teachers identified a variety of reasons for this rating. Two reasons teachers reported for this rating were their limited understanding of the content and the necessity to use the teaching time for other content.

Moreover, in a study conducted by Resnicow, Davis, Smith, Baranowski, Lin, Baranowski, Doyle, and Wang (1998), thirty-two randomly assigned elementary schools using two different curricula were studied. Half of the teachers in this study received fifty-four workshops over the course of two years teaching them about nutrition and good health. The other half of the teachers taught the GIMME 5 curriculum that promotes eating 5 or more servings of fruits and vegetables per day. The students whose teachers had attended the workshops did not show more understanding than the students in the GIMME 5 program when given identical assessments on nutritional concepts.

The GIMME 5 curriculum is one of a number of nutrition curricula that have been continuously studied within the last five years (Baranowski et al., 2000; Nicklas, 2000). Other programs include Food calendars (Kuczmarski & Aljadir, 2003), HealthNet (Herbold & Dennis, 2001), Once Upon a Time in America (Eck et al., 2005), and EatFit (Horowitz et al., 2004). Overall, the studies reported an increase in students' knowledge about nutrition through pretest-posttest assessments, but do not claim to have affected students' nutritional choices. Researchers continue to highlight the necessity for more effective nutrition curriculum in classrooms and greater attention to nutrition in teacher education curriculum (Baranowski et al., 2000; Herbold & Dennis, 2001; Nicklas, 2000).

Interestingly, two studies of nutrition curriculum insinuated blame on the teachers for the ineffectiveness of the curriculum (Birnbaum et al., 2002; Blom-Foggman et al., 2004). When comparing classrooms that taught the new curriculum with those that did not, the researchers reported that the ineffectiveness of the program was due partly to the fact that the teachers were only minimally instructed on how to use the curriculum. Without universally provided professional development, the teachers may not have

presented the material systematically. Some teachers may have covered the nutritional content with more detail and rigor than others.

### *Research on Effective Professional Development*

Within the current No Child Left Behind Act, professional development of veteran teachers is a key component. In order for teachers to have the skills, understanding, and strategies to push their students toward high academic standards, teachers must have continuous professional development opportunities (NCLB, 2001). While some professional development opportunities come from higher education institutions or textbook publishers, a majority of professional development opportunities are planned for and implemented by school districts (Little, 1989, 1993; Little, Gerritz, Stern, Guthrie, Krst, & Marsh, 1987).

The current literature on professional development focuses on new strategies to be included when developing professional development workshops. Reform movements are reducing the use of key-note, expert speakers in favor of more active participation from the attendees (Bradley, Kallick, & Regan, 1991). Lengthier interventions with follow-up support are replacing one-time conferences, which were found to be ineffective and disconnected from classroom life (Fullan, 1993).

Sparks and Loucks-Horsley (1989) stated that in the 1980s state legislators and school administrators viewed teacher professional development as a key component in improving students' performance in school. Often the content of professional development workshops was dictated by government policies and bureaucrats within the school systems (Gitlin, Kauchak, & Burbank, 2000). The traditional approach was to disseminate new ideas to teachers through the use of outside experts (Cochran-Smith and

Lytle, 1993; Loucks-Horsley, Hewson, Love, & Stiles, 1998). Such an approach limited the relevance and more importantly the applicability of the information to the classroom (Kennedy, 1997). The passive role teachers played was also problematic. Without ownership and engagement, the content was difficult to transfer effectively to the classroom, (Burbank, 2003).

In retrospect, practitioners and teachers agree that previous attempts at professional development were “fragmented, ineffectual, and inefficient” (Corcoran, 1995, 8). Shortcomings in the previous professional development strategies include: inconsistent opportunity and sporadic participation by teachers, absence of focus goals, limited span of time, and compartmentalized function and approach (Loucks-Horsley et al., 1998).

Current research has emphasized specific elements of professional development that are needed to help teachers make effective changes in their classroom. Professional development programs can be more effective if they include long-term follow-up, heterogeneous groupings, teacher collaboration, clear focus on content, and opportunities for active participation (Birman, Desimone, Baret, & Porter, 2000). When used in conjunction with one another, these tools can be even more effective (Glickman et al., 1998).

In order for collaboration to occur during professional development workshops, teachers need to be given the opportunity and time to actively participate, scaffold new information, and generate new ideas and/or perceptions. (Johnston & Kirschner, 1996; Kirschner, Dickinson, & Blosser, 1996; Clement & Vandenberghe, 2000). To help teachers transfer new content and strategies to their classroom, they should be taught new

student observation techniques like biographies, journals, peer observations, and interviews. Many of these techniques are used in action research studies. (Cochran-Smith & Lytle, 1993; Gitlin, Barlow, Burbank, Kauchak, & Stevens, 1999). Teachers must also understand how to effectively reflect on their new understandings and observations. Then they will be ready to help their students achieve higher academic standards (Bullough & Gitlin, 1995, Norman, Sprinthall, & Thies-Sprinthall, 1996).

The impact of implementing these new strategies in developing professional development workshops have researchers encouraged about their effectiveness. “Sandholtz (1999) found that experiences that provide teachers with autonomy, choice, and active participation were critical to effective professional development” (as cited in Burbank, 2003). Researchers report that the most limiting barrier to effective professional development is time (Murphy, 1997) and therefore creative measures need to be used to structure collaborative time in schools (Murphy, 1997; Richardson, 1997).

In a summary of 100 nutrition studies, Contento, Randell, & Basch (2002) found only four studies, from the early 1980s, that looked at teacher’s understanding of nutrition education through professional development. Also included in their review were student-focused nutrition education programs. Some of these studies included a teacher professional development component. However, the focus was typically to help teachers successfully use the new and highly specific curriculum (Levine, Olander, Lebevre, Cusick, Biesiackecki, & McGoldrick, 2002).

An exemplary study in nutrition education included many of the current strategies promoted above. The professional development program was attended by teachers who were then going to create effective nutrition courses for their individual counties in

Maryland. The professional development included nutrition content, interactive technology, hands-on laboratory experiences, active teacher participation, and group collaboration. The final product, a collection of lesson plans, was created by the participants and copied so that all participants received everyone's lesson plans. Unfortunately, the long-term success of this program was not tracked. A long term evaluation of the effectiveness of the program would have provided insight as to whether this approach had long term implications and was effective in encouraging and supporting the individual county's trainings. (Allen-Chabot & Bands, 2001).

Another professional development study in nutrition education focused on the use of theory in designing and conducting a workshop. The Theory of Planned Behavior was used to structure the 6-hour workshop. The focus of the professional development workshop included nutrition content and methods used to teach nutrition. One of the strategies to accomplish this was modeling actual classroom lessons. Researchers found that participants gave a positive response to using articulated theory to scaffold a professional development workshop (Townsend, Contento, Nitzke, McClelland, Keenan, & Brown, 2003).

Overall, the new strategies in professional development are clearly articulated, well-founded, and are assessable for implementation in future endeavors to create effective professional development workshops. Just as teachers are encouraged to allow opportunity for students' ownership and participation in the classroom, so should teachers be encouraged during opportunities for them to enhance their teaching skills. With the on-going push for student achievement in schools, teachers can expect more professional

development mandates as districts struggle to meet federal and state requirements (Cohen-Vogel, 2005; Desimone, Porter, Birman, Garet, & Yoon, 2002).

### *Health Benefits of Good Nutrition*

According to the World Health Organization (WHO), there are more than one billion overweight adults on Earth today. Three hundred million of them are obese. Unhealthy diets and inactive lifestyles are the primary factors causing this increase in obesity (WHO, 2003d). Chronic noncommunicable diseases like obesity, diabetes mellitus, cardiovascular disease, hypertension, stroke and cancer are becoming increasingly more common as a result of the global trend toward poor nutrition and inactivity (WHO, 2002). The rise in diagnosed cases of Type II diabetes is just one of the damaging effects that overweight/obesity can have on children and adults. Two prominent human diseases whose onset and progression are affected by obesity, a result of poor nutrition, are cardiovascular disease and cancer (WHO, 2003d).

Obesity, especially the accumulation of fat in the veins and arteries causes hypertension, myocardial infarctions, and strokes. Cardiovascular diseases (CVD), such as these, kill approximately 16.7 million people each year. Individuals who exercise regularly, eat healthy, and refrain from smoking have a drastically reduced risk of suffering a heart attack or stroke. The increased consumption of saturated fats, salt, and refined carbohydrates combined with lower consumption of fruits and vegetables are trends that have increased the prevalence of CVD (WHO, 2003b).

Studies have shown that modifications to diet can have a profound effect on an individual's risk for cardiovascular diseases. For example, flavinoids, found in berries, cherries, and plums have been shown to prevent fatty deposits in the arteries. Quercetin,

found in onions and green apples, helps prevent arteriosclerosis, the hardening of the arteries (Knekt, Jarvinen, Reunanen, & Maatela, 1996). Soy products have shown a beneficial effect on low-density lipoproteins (LDL) and triglyceride levels. Dietary fibers, especially soluble fiber has also shown improvements in LDL cholesterol level. In one study, an increase in fish consumption lowered the risk for sudden cardiac death (Olendzki, Speed, & Domino, 2006).

Consistently research confirms the positive impact the consumption of a variety of fruits and vegetables can have on the human body. While the mechanisms through which fruits and vegetables work to benefit the body may vary, there is enough evidence to promote the benefits of their daily consumption (Joshiyura, Hu, Manson, Stampfer, Rimm, Speizer, Colditz, Ascherio, Rosner, Spiegelman, & Willet, 2001). Studies continue to further research the effects/benefits of nutrition and diet on the risk of cardiovascular disease. However there are ethical limitations to medical research. Studies cannot be conducted where the experimental group would be deprived of certain vitamins or foods known to benefit their health. For example, when researchers were testing the effect of B-12 vitamins on stroke prevention, they could not ethically make one group B-12 deficient (Liebman, 2006).

Much like cardiovascular disease, several cancers have been linked to obesity, Substantial evidence points to obesity as a factor in cancers of the esophagus, colon, breast, prostate, and endometrium. While tobacco remains the number one preventable cause of cancer, poor nutrition and inactivity are also serious risk factors that are preventable. Diet related cancers account for approximately 30% of the cancers in western countries. Cancer cases are estimated to rise over the next 20 years from 20

million to 30 million worldwide. By 2020, it is estimated that the number of new cases will rise from 10 million to 15 million annually (WHO, 2003a).

There is substantial evidence of the correlations between nutrition and cancer. For example, the consumption of fruits and vegetables has been shown to significantly reduce the risk for cancer, while consumption of meats and preservatives increase an individual's risk for cancer (WHO, 2003a). Intake of folate has been shown to protect against colon cancer. One hundred percent of the recommended daily value for folate is found in several cereals: Kashi heart to heart, Life, Product 19, Quaker Take Heart Oatmeal, and Total (Liebman, 2006). However, it must be noted that there is weak evidence that folic acid might contribute to cancer. Folic acid might help cancerous cells grow more quickly if they are already present when the individual consumes more folic acid (Liebman, 2006). Lutein found in fruits and vegetables, like broccoli, green peas, spinach, and sweet yellow corn, have also shown to help in the prevention of cancer (Calvo, 2005).

Good nutrition practices can have an effect on a number of other illnesses besides cardiovascular disease, diabetes, and cancer. Green tea has polyphenols which help prevent cancer, heart disease, gum disease, and even tooth decay. A deficiency in folic acid leads to neuro tube birth defects (Liebman, 2006). Lutein can help prevent macular degenerations and cataracts, the two leading causes of blindness (Calvo, 2005). Vitamin K, found in spinach, kale, and parsley is necessary for optimal bone growth (Kohlmeier, Salomon, Saupe, & Shearer, 1996). Daily consumption of tart cherries has been shown to reduce arthritis, gout, and headaches (Wang, Nair, Strasburg, Chang, Booren, Gray, &

DeWitt, 1999). All berries, including cranberries, help prevent urinary tract-bladder infections (Kontiokari, Laitinen, Jarvi, Pokka, Sundqvist, & Uhari, 2003).

Studies on the link between diet and symptoms often rely on self-report by the participants. (Olendzki et al., 2006). Longitudinal studies are performed to track individuals and monitor what they are eating. Individuals who report a greater consumption of fruits and vegetables and maintain active lifestyles have a reduced risk of cancer, cardiovascular diseases, and other diseases effected by nutrition (Liebman, 2006). Genetic predisposition often plays a significant part in the development of certain conditions, but nutrition can play a role in reducing these individuals' already elevated risk level (WHO, 2003c).

In the medical literature the increase in noncommunicable diseases like diabetes are well-documented. Cancer and cardiovascular disease seem predominant in the research, as they cause millions of deaths every year. Perhaps the rise in concern about obesity is being more widely advertised due to the active nature of this diseases' care. Children are now starting insulin injections at school and home. Children are being taught, by necessity, how to manage their blood sugar levels. Parents are being educated on how to test blood sugar levels and administer insulin shots. The overt nature of diabetes may be what brings it to the fore front even though cancer and cardiovascular diseases are as serious and also need to be addressed in today's youth.

### *Summary*

The current literature on nutrition, nutrition related diseases, and nutrition education guide the design and implementation of this study. The literature on nutrition underlines the importance of nutrition for children. The government agencies' warnings

about health related diseases like childhood obesity, cancer, cardiovascular disease and diabetes all warrant a response by the educators and parents of these children. The limited resources and studies on nutrition education for elementary teachers highlight the void that this study attempts to begin to fill. How do we prepare elementary teachers to teach nutrition to their students, in hopes that these lessons will ultimately affect the students' choices and behaviors with regard to nutrition?

## CHAPTER 3: METHODS

### *Overview*

The design of this study on nutrition in the elementary classroom was both exploratory and cumulative in nature. Three small pilot studies were used to guide the design, construction, and content of the final study. In this chapter, the participants, procedures, data collection and analysis are outlined individually for each of the four studies. The overall context for the studies is the same and is described briefly before the description of the first pilot study's methods.

Upon deciding to focus on nutrition education at the elementary level, the researcher first designed a pilot study to explore what preservice teachers were being taught about nutrition and how to teach nutrition in their future classrooms. In order to investigate the preservice teachers' preparedness to teach nutrition a three-phase interview model was implemented. Participants were preservice teachers in their last semester of coursework before their student teaching semester. The preservice teachers were interviewed about their nutrition content knowledge, general pedagogical knowledge, and finally asked to combine these two elements to design a lesson based on a nutrition state academic standard. The outcome of this study led the researcher to believe that preservice teachers are not being formally taught to teach nutrition as part of their teacher preparation program and set forth on a journey to create an opportunity for elementary teachers to learn how to teach nutrition.

Before teaching nutrition to elementary teachers it was important to understand what they already knew about nutrition. The second pilot study involved the creation of a nutrition content survey that would assess what elementary teachers understand about

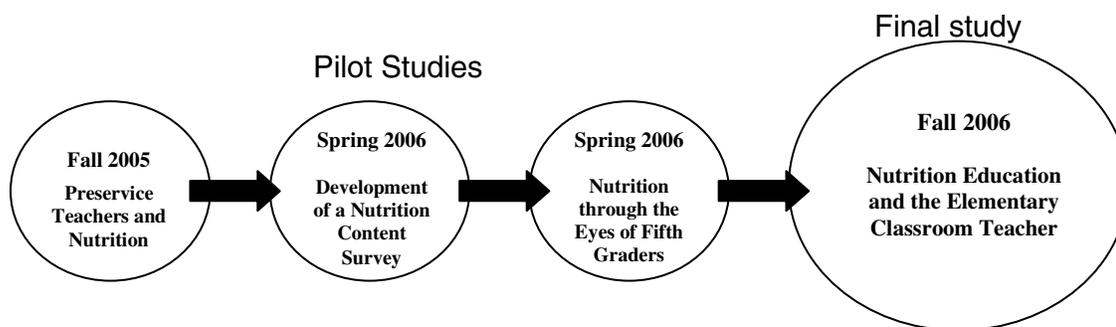
nutrition. To do this, the “big ideas” of nutrition needed to be identified. After researching multiple sources, the researcher wrote five “big ideas” about nutrition and then designed a survey that assessed elementary teachers’ understanding about these ideas. In order to create a clear and content-rich survey, participants of the second pilot study were asked to take the survey and to give feedback on the content and clarity of the questions. The participants included preservice teachers, general elementary education teachers, and one nutrition expert from the Cooper Clinic in Dallas, Texas. The researcher then used the feedback from the participants to modify the survey twice until the third and final version was ready for use during the final study.

In preparation for the final study’s nutrition workshop, the researcher taught nutrition lessons to fifth graders in her classroom. This was the third pilot study. Each lesson was assessed for students’ understanding through a pre-post test. Students were also asked to fill out a questionnaire about the interest and clarity of each lesson. They were given the opportunity to give feedback and offer ideas for modifications for each lesson. Students were charged with the opportunity to make the lessons better for future fifth graders.

The final study consisted of two parts. The first part of the study was the administration of the final nutrition survey to the district’s elementary and middle school teachers. This portion of the study focused on understanding what teachers’ know about nutrition. The second part of the study consisted of a six-hour workshop that focused on giving elementary teachers an opportunity to learn nutrition content and increase their confidence and familiarity with teaching nutrition to their students. The lessons, honed by fifth graders during the third study, were distributed to the teachers as part of the

nutrition workshop. The nutrition survey was used in this portion of the final study as a tool for determining the relationship between the small group of workshop participants and the larger group of elementary teachers in that district that had previously taken the survey.

The flowchart in Figure 1 was designed as an overview of the pilot studies that were conducted in preparation for the final study's workshop. A full account of the methods of each of these studies precedes that of the final study.



*Figure 1.* Overview Flowchart of Pilot Studies and Final Study.

### *Context of the Study*

These studies on nutrition education took place at Stuart Elementary School (pseudonym) during the 2005-2006 and 2006-2007 school years. The school is located in a suburb of a large city in the Southwest United States. Stuart Elementary is predominately a middle-class school whose population for the 2005-2006 school year was 840 students grades K-6. The school population was 64.8% Caucasian, 26.7% percent Hispanic, and 8.5% other ethnic backgrounds. Fifteen percent of the school's

students were on the free-and-reduced lunch program, and less than 5% of the population received English Learner Language support. Stuart Elementary School is part of the Ramana School District. It currently consists of eleven elementary schools, two junior high schools, and two high schools.

Located on the Stuart Elementary School campus was a satellite campus for the nearby research-1 state university, where approximately 20-30 preservice teachers attended methods and application classes on the Stuart Elementary School campus each semester. During their methods courses, professors taught the preservice teachers about instructional methodologies for reading, writing, math, science, and social studies. The rest of their day was spent in classes on campus observing and assisting regular classroom teachers. This semester of coursework immediately preceded their student teaching experience.

#### *Pilot Study #1--Preservice Teachers and Nutrition*

The purpose of the first pilot study was to investigate preservice teachers' nutritional content knowledge, pedagogical knowledge, and their ability to create a standard-based nutrition lesson. Through interviews with three preservice teachers, the researcher used this study to understand the current preparation of preservice teachers for teaching nutrition in their future elementary classrooms. As a five-year veteran teacher, the researcher had not experienced any preservice training in nutrition. However, with the rising concern about childhood obesity, perhaps preservice programs were starting to include nutrition education within their teacher preparation programs. If nutrition was being taught to these preservice teachers, the researcher would be able to use some of the

same resources and curriculum for the final study which included a nutrition workshop for practicing elementary teachers. This initial investigation was a necessary first step toward understanding if teachers are prepared to teach nutrition and if so, how are they being prepared. Preservice teachers in the midst of their teacher preparation program provided an excellent opportunity for the researcher to explore how preservice teachers are being prepared to teach nutrition in their future classrooms.

### *Participants*

The participants in this part of the study were three preservice teachers, accessed through the satellite program. Purposeful selection of the three preservice teachers was made to represent the typical elementary teacher: white, middle-class, female, and English speaking. The selected preservice teachers met the desired criteria by being currently enrolled in the methods classes at the aforementioned satellite campus. In recruiting the participants, the researcher asked two cooperating teachers if they would be willing to allow their preservice teachers to leave early three times during the semester so that they could participate in the study without interfering with their other time commitments outside of the school day. The two preservice teachers agreed to participate in the study and when asked if one of them knew another preservice teacher that might be interested, one of the preservice teachers recruited another white, middle-class, English speaking, female from her methods classes. Please note that pseudonyms will be used for all participants and schools throughout the remaining chapters.

### *Procedures*

The aim of the first pilot study was to inquire into the presence and depth of nutrition education at the college and university level during teacher education

coursework. The following preliminary questions guided the first pilot study: What do three preservice teachers understand about nutrition? How are these preservice teachers being prepared for teaching the academic health education standards with respect to nutrition?

To answer these questions, the researcher used Irving Seidman's (1998) three-phase phenomenological interview model. The model was modified to include two formal interviews and the facilitation of one focus group. All interviews took place in the researcher's classroom at Stuart Elementary. The interviews were conducted individually and lasted approximately 30 minutes each. The first set of interviews took place on the 13<sup>th</sup>, 15<sup>th</sup>, and 20<sup>th</sup> of September 2006 from 3:15-3:45 p.m. The second interview with each participant occurred approximately 6 weeks later, the 25<sup>th</sup> and 27<sup>th</sup> of October and the 1<sup>st</sup> of November 2006 from 3:15-3:45. The focus group included all three participants and took place on December 1, 2006 from 3:15-4:30.

The purpose of the initial 30-minute interview was to explore preservice teachers' understanding of nutritional concepts, as well as identify their educational experiences in nutrition. Each participant was asked the following background questions:

- Tell me why you are going to school to be a teacher.
- Tell me about your teacher education program. (Coursework, present and past)
- Where did you learn about nutrition? What classes have you taken that included nutrition and when? Were nutrition concepts covered in any of your teacher preparation classes?

Participants were also asked to complete a nutrition survey that explored their understanding of nutritional concepts. On the survey participants were asked:

- Draw then describe aloud what you know about the food pyramid.
- List at least three behaviors that can help an individual stay healthy and explain why these behaviors are helpful.
- If you were to help students plan a healthy lunch to bring to school, please write what you would choose and why.
- What other concepts do you think or know that are covered by the Arizona Health Standards?

The second 30-minute interview, conducted approximately a month after the initial interview, focused on the methods courses in which the preservice teachers were concurrently enrolled. The participants were asked to reflect on the pedagogical knowledge they were learning in their methods classes and observing in their applications classrooms. The purpose of the second interview was to identify preservice teachers' understanding of pedagogical knowledge and its appropriate use within the elementary classroom. Due to the absence of nutrition education within the teacher preparation program, as reported during the first interview, it was necessary to explore the preservice teachers' understanding of general pedagogies that could potentially be incorporated into the teaching of nutrition. The interview questions focused on science and health pedagogies, but reading, writing, and mathematical pedagogies are also incorporated in the teaching of nutrition and therefore were included in the second interview. The second interview questions included:

- Tell me at least three pedagogies that you have learned in your class this semester.
- What else do you know you will be learning about this semester?  
Anything you are particularly looking forward to?
- Are there any pedagogies that you have seen your mentor teacher use that you particularly liked or disliked?
- What content topic would you like to know more about teaching and why?

The third session on December 1, 2006 was conducted as a focus group involving all three participants. Given an Arizona health academic standard, the participants were challenged to collaboratively construct a nutrition lesson plan for a fourth or fifth grade class. The purpose of this focus group was to investigate these preservice teachers' ability to incorporate what they understood about nutrition and educational pedagogies into a standards-based nutrition lesson plan (APPENDIX A). This final phase investigated whether preservice teachers are ready to teach nutritional concepts even if they have not been directly taught how to teach nutrition. After the focus group, the participants were asked to complete an individual survey about their experience during the collaborative creation of the nutrition lesson. The survey included the following questions:

- How easy was it to make this lesson on nutrition?
- Elaborate on your answer for question #1. What made it easy or hard?
- What, if anything, did you learn from this experience?
- What was the most positive part of this experience?
- What was the least positive part of this experience?

### *Data Collection and Analysis*

After transcribing interviews verbatim, a simple coding system was used to analyze each participant's nutritional background. Transcripts of the interviews were first read in their entirety for overall content. During the second read of the transcripts, the researcher found and coded for all instances in which references were made to past nutrition experiences. This included coursework in nutrition, personal influences, and individual backgrounds. Any opportunities for exposure to nutrition content were organized by category (e.g. college courses, high school courses, family influences, personal experiences, etc.). Charmaz's constant comparative method was used in the analysis of the interviews. Each subsequent interview was compared with the information collected from the other participants (Charmaz, 2003).

The nutrition survey and interview transcription were collaboratively analyzed for the depth of the participants' understanding of the nutritional concepts included on the survey. Initially, each question's answer was evaluated individually for accuracy. It was necessary to assess the participants' written and oral responses to each question, as they were asked to talk through their completion of the survey and often gave more information verbally than what they wrote down. After the initial evaluation of each question, each survey was scrutinized for the participant's overall understanding of nutritional concepts. For example, individuals who did not answer the first question on the food pyramid thoroughly, may have been able to successfully choose a variety of foods when responding to the third question which asks them to help a child plan a healthy lunch. This would show an ability to apply their knowledge of the food pyramid

even if they had been unsuccessful in drawing the food pyramid and naming the different food groups in response to the first question.

As each interview was read the overall nutrition survey and nutrition background information for each participant was constantly compared to the previously read interviews. The researcher compared the nutritional background experiences of the participant who gave the most in-depth answers on the survey to the nutritional background experiences of the other participants. The nutritional backgrounds were reorganized by frequency and longevity. Which of the participants had the most experiences with nutrition over the longest period of time? The background information was coded for approximate time periods and influence. For example, a high school course would last no longer than an hour a day for a semester or year, whereas having a mother who was a nutritionist would be eighteen plus years of daily nutritional experiences. After the reviewing the sorting of the nutrition experiences by depth and longevity, participants' survey scores and nutrition background were reassessed. This time the researcher was looking for possible associations between type and length of nutritional experience and an individual's understanding of nutritional concepts. Were the participants with rich nutrition backgrounds more successful on the nutrition survey?

In order to identify the participants' awareness of a variety of teaching pedagogies the second interview focused on the pedagogies they had been taught in their methods classes as well as those they had experienced in their application classes. To analyze the transcripts from the second interview, a coding process was used to identify recurring themes. As each transcript was read, important ideas related to pedagogy were found and coded. These ideas were sorted into major categories for each individual. For instance,

reading pedagogies, classroom management techniques, and increasing student participation were among the created categories.

The collaboratively written lesson plan (APPENDIX A), focus group videotape, and researcher's notes collected during the final focus group were analyzed for participants' understanding of nutrition and pedagogical knowledge. The lesson plan was read in its entirety and any references to nutrition content and/or pedagogies were organized into categories. The researcher used her background as a five-year veteran teacher, to evaluate the nutritional and pedagogical content of the lesson plan. Did the nutritional content meet one of the Arizona Health Standards? Were the pedagogies age and topic appropriate? In the opinion of the researcher, was the nutritional content and pedagogical knowledge of the participants rich enough to create a nutrition lesson that could be successful in helping students learn about nutrition?

The video tape was watched four times and analyzed for individual and group responses. During the first three viewings, only one participant was watched at a time. When the individual mentioned an idea about nutrition or pedagogy, the tape was stopped and the idea written down. After the video, the ideas were separated into two categories: nutrition and pedagogy. This process was repeated for each individual. As the video was watched repetitively, the method of constant comparison was used to organize the ideas mentioned during the collaborative creation of the nutrition lesson plan. Had each participant contributed something to the lesson or had one or more participants dominated? The fourth viewing focused on the interactions between the three participants. Were they equally involved in designing and writing the lesson? Perhaps only the participants with stronger backgrounds were capable of creating a successful

lesson. Or maybe the nutritional and pedagogical knowledge were less relevant in a collaborative setting than individual personalities.

In order to better understand the collaborative dynamics of the focus group, the final survey was coded for negative and positive feedback about the collaboration experience. Instances of positive feedback were listed together as were the instances of negative feedback. Then each participant's responses were analyzed for overall experience and potential reasons for their attitude toward the experience. This survey was used in conjunction with the video tape in order to explore any possible discrepancies between what was observed on the video tape and the self-reflections written by each participant. Perhaps one participant appeared to be less involved in the creation of the lesson on the videotape, but reported in their self-reflection that they were not as involved because of a personality conflict with another member of the group.

#### *Pilot Study #2—Development of a Nutrition Content Survey*

The goal of this study was to create, evaluate, and modify a survey that assessed teachers' nutritional content knowledge. The survey was created for use during the final study where the nutrition survey was administered to a group of elementary teachers and other elementary school personnel. In creating this survey, two preliminary questions were asked: What are the "big ideas" in nutrition? How can an effective instrument for measuring teacher understanding of nutrition content knowledge be created, evaluated, and modified?

### *Participants*

The participants in this study included thirty-five practicing elementary teachers, eighteen preservice teachers, and one nutritionist. All of the teachers on the Stuart Elementary faculty were asked to participate, and thirty-five of the thirty-six teachers volunteered. All preservice teachers attending methods classes at the satellite program were recruited, and all eighteen volunteered to participate. All volunteers were allowed to participate in the study. The survey was also sent to the secretary at Cooper Clinic requesting that several of the nutritionists evaluate it. Only one nutritionist responded.

### *Procedures*

Initially the focus of the survey's content had to be decided and the questions written. For the first draft (APPENDIX B), the survey's questions were based on information from the USDA's food pyramid, food groups, caloric-intake recommendations, statistics from the CDC about the effects of poor nutrition on diseases like diabetes, cardiovascular disease, and cancer, and several other nutrition resources and curriculum guides (BHG, 2006; CDC, 2002; Cheung, Gotmaker, & Dart, 2004; Cooper, 1999; Tillman & Toner, 1990; USDA, 2005). The survey was designed such that participants not only answered the nutrition questions, but they also evaluated the survey on its clarity. When administering the survey, the researcher asked the participants for feedback on the survey's clarity and invited them to write suggestions or comments in the space provided.

The Stuart Elementary staff was the first group to participate in the second study. The principal allowed the researcher time at the end of the weekly staff meeting for volunteers to complete the survey. Consent forms and surveys were passed out, and the

researcher explained the purpose and necessity of the role that the participants would play as they gave their feedback. Thirty-five of the school's thirty-six teachers participated in the study, and some of them gave thorough, handwritten evaluations of questions that were unclear or ambiguous.

After compiling and analyzing the teachers' data and continuing to search for literature relating to the research on nutrition education, appropriate modifications to the survey were made. The teachers' feedback pinpointed a few changes that were needed to clarify questions. Teachers also suggested the addition of questions about the relationship between exercise and nutrition as well as more in-depth questions about individual caloric needs. These changes to the original survey were made prior to its distribution and administration to the preservice teachers and nutrition expert.

The modified survey was simultaneously administered to twenty preservice teachers and sent to nutritionists at Cooper Clinic for expert review. Similar to the first administration with the Stuart Elementary teachers, the preservice teachers were asked to respond by answering the questions as well as give feedback on the clarity of each question. The nutritionists were asked to gauge whether the survey's questions adequately covered the "big ideas" in nutrition. Figure 2 illustrates the multiple stages involved in the creation and modification of the nutrition content survey designed during the second pilot study.

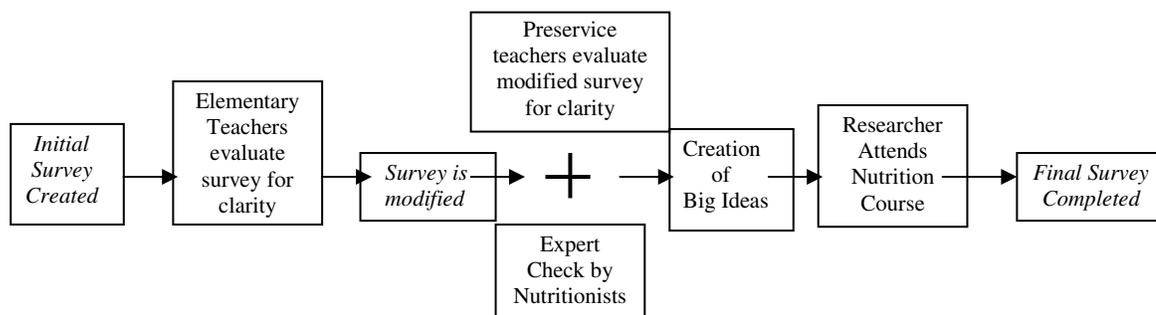


Figure 2. Flowchart of the Design and Creation of a Nutrition Survey.

Concurrently a continued effort was being made to explore the literature on nutrition and nutrition education. The researcher gathered the major ideas of nutrition included in curriculum guides and other books on children’s nutrition. A variety of nutrition-related websites were consulted, including those sponsored by government departments, hospitals/physicians, scientists, educators, and food producers/distributors (BHG, 2006; CDC, 2002; Cheung, Gotmaker, & Dart, 2004; Cooper, 1999; Tillman & Toner, 1990; USDA, 2005). From the review, the researcher created five “big ideas” elementary students should know about nutrition. These “big ideas” were used to further modify and organize the content of the nutrition survey. Each of the five “big ideas” was assessed by six questions on the survey so that teachers’ understanding of individual ideas, as well as general nutrition knowledge, could be examined. The five “big ideas” in nutrition are listed and then described in-depth below.

### *Big Ideas in Nutrition*

- The food pyramid is a graphic representation that provides two major sources of information: food groups and recommended dietary allowances.
- The daily consumption of a variety of fruits, vegetables, and milk plays an integral part in providing bodies with the vitamins and minerals they need to stay healthy.
- Nutrition labels are found on all packaged foods and give standardized information about the contents.
- Eating properly is essential to sustaining a healthy life.
- Calories, a unit of energy, are attained through food consumption and used to carry out all of the functions necessary to sustain life.

The food pyramid is a graphic representation created by the United States Department of Agriculture to convey food guidance criteria to the American public. The food pyramid provides two major sources of information: food groups and recommended dietary allowances. The food groups include: grains, vegetables, fruits, milk, and meats and beans. Oils are also included on the food pyramid, but are not considered a food group. All foods can be classified as belonging to one or more of these food groups. The width of each section on the pyramid is a visual reminder of the proportions that should be consumed of each food group. The USDA recommends a daily consumption of each group based on age, sex, and gender. Approximate values for children are: 6 ounces of grains, 2 ½ cups of vegetables, 1 ½ cups of fruit, 3 cups of milk, and 5 ounces of meats and beans.

The daily consumption of fruits, vegetables, and milk plays an integral part in providing bodies with the vitamins and minerals they need to stay healthy. Without these vitamins and minerals the human body cannot grow or function normally. Prevention of many diseases, like scurvy and Vitamin A deficiency, can be accomplished through consistent intake of items from these food groups. In order to consume adequate amounts of vitamins and minerals it is important to eat a variety of fruits and vegetables as well as maintain a consistent intake of milk-based products.

Nutrition labels are found on all packaged foods and give standardized information about the contents. The following information can be found on all nutrition labels: serving size, calories, fat, cholesterol, sodium, carbohydrates, sugars, proteins and some vitamins. Other categories and subcategories may also be present. Reference Daily Intake refers to the recommended values for the dietary intake of nutrients considered sufficient for most of the population regardless of age or gender. Nutrition labels provide consumers with the percent of daily values that one serving of the product provides. The information provided by nutrition labels can be instrumental in helping people make healthier food choices.

Eating is essential to sustaining life. Without proper intake of nutrients individuals may suffer from deficiencies, i.e. scurvy. Or if vitamins are consumed in excess they can also have an adverse effect, i.e. hypervitaminosis A. In order to keep the body functioning properly, it is important to maintain a consistent, healthy, and daily consumption of a variety of foods. Sufferers of eating disorders like bulimia and anorexia can cause harm to internal organs which may eventually lead to death. On the opposite end, overweight and/or obese individuals may increase their risk for cardiovascular

disease, diabetes, and cancer. For optimal performance, the body needs daily nourishment.

Calories, a unit of energy, are attained through food consumption. The body uses these calories to carry out all of the functions necessary to sustain life. The body uses energy gained through the intake of calories to breathe, pump blood, move, think, and a plethora of other voluntary and involuntary activities. Without food consumption the body would eventually starve to death. Individuals can lose excess calories by exercising. Exercise provides many health benefits including, but not limited to, weight loss, decreased blood pressure, and improved cholesterol levels. When caloric intake and expenditure are equal, the individual should maintain their current weight. If caloric intake is greater than expenditure, the individual will gain weight, and when the expenditure is greater he/she will lose weight.

The final influencing factor in the creation of the nutrition survey was a summer nutrition course that the researcher attended at a research-1 university. The textbook for the course was *Nutrition: Concepts and Controversies* (Sizer & Whitney, 2006). The information taught during the course, through the textbook, and the textbook's accompanying software was used to diversify the questions asked in the survey as well as align appropriate questions with the "big ideas" in nutrition. This final edition of the survey was administered to elementary teachers and other school personnel during the final study.

#### *Data Collection and Analysis*

After the first administration of the nutrition survey to the Stuart Elementary teachers, survey answers were analyzed for clarity and content. In order to access the

clarity of the survey, each survey was read over and any clarity ratings of three or less were tallied on a separate sheet of paper. Handwritten suggestions were copied and categorized. Surveys in which participants had made handwritten notes or comments on clarity were divided from the surveys where no comments were written for future reference. Any questions that received clarity ratings of three or less were then reviewed and changed before the second administration of the nutrition survey.

When analyzing the content of the survey, the researcher used statistical methods for the quantitative data and open coding for the qualitative data. The teacher's responses to the survey were inputted into an Excel document. After which they were transferred to SPSS. Using SPSS the mean, range, and median of the data was calculated. Individual questions were then analyzed, as well as individual respondents. This data was used to guide changes to the content of the nutrition survey.

The qualitative data on the content of the survey came from the teacher's answers to the third post-survey question. The teachers were asked to list any topics they thought should be included in the survey, but were not. These responses were read and proposed topics were listed and categorized. Those ideas that were repeated by multiple teachers prompted the addition of a five questions to the second version of the nutrition survey (APPENDIX C & D).

The analysis of the second survey administration was conducted in the same manner as the first. The surveys were analyzed for clarity feedback and content. The clarity feedback was tallied, with special attention made to the changed and new questions. The ratings on these questions were analyzed to see if the participants identified the same trouble with understanding the questions' content or if the problems

with clarity had been remedied. Any handwritten feedback was categorized for future reference when completing the final version of the nutrition content survey. The preservice teachers' responses were inputted into Excel and then transferred to SPSS. Group, individual, and question data was calculated as during the analysis of the first administration of the survey.

The expert review by a nutritionist at Cooper Clinic was read over and clarity reviewed. The expert did not answer the survey questions or give overall feedback on the content as requested. There a few suggestions about individual questions that were taken into consideration when creating the final version of the nutrition content survey (APPENDIX E).

### *Pilot Study #3—Nutrition through the Eyes of Fifth Graders*

The ultimate goal of this study was to design nutrition lessons that would help increase elementary students' understanding of nutritional concepts. The lessons and all data collecting instruments were designed and created by the researcher. The lessons focused on the "big ideas" of nutrition created in the previous study. After the lessons were taught, the fifth grade students were asked for feedback through pre-posttests, unit assessments, and student questionnaires, all of which were created by the researcher. This information was used to modify the nutrition lessons before they were used as part of the nutrition workshop for elementary teachers taught during the final study. Short descriptions of the nutrition lessons included in this study are available in APPENDIX F.

### *Participants*

The participants in this study included forty-four fifth grade students at Stuart Elementary. The students were enrolled in the researcher's class or that of her co-teacher. All of the students in both classes were invited to participate in the study. Letters of recruitment (APPENDIX G), consent forms, and assent forms were sent home with all fifty-six students. Forty-four of the students returned the paperwork signed by their parents and themselves. All fifty-six students participated in the nutrition unit as part of their normal health and science curricula. The data from the twelve non-participants was not retained nor were they included in the analysis. Of the participant population, 16 were girls and 28 were boys. Three girls and nine boys chose not to participate. The demographics for the participants were as follows: 52% Caucasian, 27% Hispanic, and 21% other nationalities.

### *Procedures*

To begin the nutrition unit, each student was asked to take a pre-unit assessment. The questions asked the students about eating healthy, the food pyramid, calories, and nutrition labels. The final question asks them to list things they would like to learn about nutrition (APPENDIX G). The pretest was intended to help guide the structure and content of the lessons, as well as identify weaknesses or unfamiliarity with individual nutritional concepts.

Each lesson began with a short, three or four question pretest. The teacher/researcher established a routine with her students for their nutrition lessons. Students completed the pretest and then immediately returned the paper to their teacher. The lesson would then take place, using overheads, worksheets, and other materials.

After the lesson, the students' pre-test papers were returned, and they took the posttest, which was located on the lower half of the pretest paper (APPENDIX J). They could see their pretest but were instructed that only the posttest was used for a grade. The pretest/posttest comparison helped the students, and the teacher, see what they had learned from the lesson.

On the back of the pre/post assessment was a student questionnaire. The questionnaire focused on the students' attitude toward the lesson and was completed immediately after the posttest. The students reported information about how much they enjoyed the lesson and how much they felt they had learned. The students were also asked to make recommendations on how to improve the lesson. While the pre/post tests always changed to include the lesson's content, the student questionnaire remained the same for each lesson (APPENDIX K).

A cumulative exam for nutrition was given at the end of the unit (APPENDIX L). The exam covered the food pyramid, healthy vs. unhealthy food choices, nutrition labels, calories, and exercise. The test was short answer, requiring the students to give thoughtful and complete sentence answers. Students were given a study guide in order to prepare for the test.

#### *Data Collection & Analysis*

The data analysis for this study was done primarily in three sections. The first section was the pre and post-unit assessments. The pre-unit assessment was used to learn more about what students already knew about nutrition before the unit started. The post-unit assessment was used to evaluate the students' understanding of nutrition after the unit was over. The second section and third sections of data analysis were divided into

five separate lessons. In the second section the students pre-post tests for the individual nutrition lessons were scored and the results summarized. The third section focused on the student questionnaires from each of the lessons. These questionnaires were used to help the researcher refine and modify the lessons for the nutrition workshop in the final dissertation study, as well as teaching nutrition to future fifth graders.

Data analysis began with a detailed review of each of the students' responses to the ten questions on the pre-unit assessment (APPENDIX I). Initially lists were made of each student's response to the first question. These responses were then divided into categories. The categories were put in order from most common response to individual responses. A percentage was calculated for the most common response. This process was repeated for all ten of the pre-unit assessment's questions. The purpose of this process was to find strengths and weaknesses in the students' nutritional knowledge. This information helped to structure the content of the lessons to fit the nutritional educational needs of these students.

The post-unit assessments were subjectively graded by the researcher/teacher. Due to the open-ended nature of most of the questions, multiple points were awarded on a given question for accuracy and depth of knowledge reflected in the student's response (APPENDIX L). Each of the ten questions was worth five points for a total of fifty points. The questions on the post-unit test assessed the same content as the pre-unit test, but the questions had been rewritten to require the students to give more in-depth answers and explanations (APPENDIX M). The post-unit assessment was not directly compared to the pretest because of these significant changes to the wording of the questions.

Instead the post-unit assessment was used as a post-test only analysis of what the students understood about nutrition after the unit was over.

The second source for data analysis was the individual pre-posttests. These short pre-posttests were used to evaluate the students' learning within each of the seven nutrition lessons. Pre-posttests were scored for accuracy. Raw scores were inputted into an Excel document where percentages for each pre and posttest were calculated. Then the pretest's mean score was calculated and compared to the posttest's mean score for each of the individual nutrition lessons.

Student questionnaires provided the third opportunity for data analysis and evaluation of the nutrition lessons. Students were asked six questions about each lesson. They were asked to respond with Likert-scale ratings on two questions and the other four were open-ended questions. The Likert-scale results from each nutrition lesson were inputted into Excel and the mean scores for both questions were calculated. This process gave a mean score for how much the students reported that they learned during the lesson and how much they enjoyed the lesson. The mean scores from all of the lessons were inputted into a table for comparison.

The open-ended questions were analyzed separately. The purpose of this portion of the analysis was to gather feedback to adjust and modify the nutrition lessons. Comments that were too general, like "It was fun," were read over and discarded. Only specific suggestions and/or constructive criticisms were listed and categorized. Categories were listed in order of frequency of responses. This process was repeated separately for each nutrition lesson.

*Final Study—Nutrition Education and the Elementary Classroom Teacher*

The goal of this exploratory study was to gather information about the nutritional knowledge of elementary teachers. At the onset of this study, a large group of elementary teachers took the nutrition survey. A smaller group of elementary teachers participated in the nutrition workshop. The following preliminary question was the focus of this study: What do elementary teachers understand about nutrition? A description of the individual nutrition workshops and their content is included as APPENDIX N.

*Participants*

There were two sets of participants in this study. The first group of participants consisted of 317 Ramana School District K-8 employees. One hundred and sixty-seven of the participants were K-6 teachers in the district, the target population. The Ramana School District has a total of 307 K-6 teachers, thus 54% of them took the survey. Of the other 150 employees who completed the survey, 59 of them were middle school teachers. The 85 individuals that indicated “other” on their survey were: librarians, music teachers, P.E. teachers, reading specialists, special education teachers, administrators, etc.

The participants in this workshop portion of this study included eleven practicing elementary teachers from the Ramana School District. The teachers represented five of the eleven elementary schools in the district. Participants were self-selected. They independently signed up for the nutrition course on the district’s professional development website. Participation in the workshop was completely voluntary. In order to earn their six professional development/salary credit hours, it was necessary for each teacher to be present for all six hours. However, the extent of their involvement in the class was not graded. For example, the participants were encouraged to teach a nutrition

lesson to their own students, but did not have to participate in this activity if they chose not to. When asked if they would be willing to participate in the researcher's study, all of the workshop attendees agreed.

### *Procedures*

In preparation for the nutrition workshop, access to the district and some of its resources was needed. After applying and meeting with the Director of Research and Evaluation, the researcher was granted permission to conduct her study within the district. She then had to apply to the district to teach a nutrition workshop to elementary teachers. The two-page application described the goals and outline of the class, as well as petitioned for six salary and certification credits for the participants (APPENDIX O).

After the researcher was granted permission to teach the class, she had to contact the district's professional development office for advertisement and enrollment procedures for the nutrition workshop. The district uses an on-line system for scheduling professional development courses. This served as a disadvantage for the researcher, as potential participants must have been actively looking for a course to know that the workshop was available. To counteract this disadvantage, the professional development office offered to send out a district-wide e-mail. The researcher also faxed a flyer for the workshop to all of the district's elementary school secretaries asking them to post the flyer in the teachers' lounge, so that more teachers would know that the workshop was occurring and available for their attendance. Some teachers at her own school casually reported to the researcher that they would like to take the workshop, but the time or days did not work for them.

On the advertising flyers, the course was described as, “This six-hour workshop is designed to help you integrate nutrition concepts and lessons into your classroom. With the increasing rates of childhood obesity and diet-related illnesses, it is imperative that children learn how to make smart food choices. This workshop will be full of nutrition content knowledge as well as easy-to-replicate lessons that you can take right to the classroom or modify to fit your content and/or teaching style. The workshop will be led by PhD student/5th grade teacher Flavia Gibson, who is currently writing her dissertation on nutrition education in the elementary classroom. This workshop has been created as a product of her research and as an instrument for future study.” The workshop was designed to occur over the course of five weeks, allowing two weeks between sessions for implementation of the nutrition lessons taught and exploration and adaptation of other nutrition lessons. The dates and times of the nutrition workshop were October 19<sup>th</sup>, November 2<sup>nd</sup>, and November 16<sup>th</sup>, 2006 from 4:00-6:00 p.m. in C-101 on the Stuart Elementary campus.

Prior to the first workshop, the district office administered the nutrition survey through a web-based software program called Zoomerang. Three hundred and twenty elementary school employees took the survey and all but three of them allowed their data to be used by the researcher for her analysis. Each school was asked, by the district, to administer the survey at their school site. After the administration of the survey, the researcher was given the raw data and results overview. The purpose of this collection of data was two-fold. The first purpose was to assess what elementary teachers know about nutrition. The second purpose was to use the results of the larger group to decide whether the participants who attended the nutrition workshop were representative of the

district's elementary teacher population. The survey was again administered at the beginning of the first workshop in order for the researcher to determine whether these participants were representative of the larger group of teachers in the district who had taken the survey previously.

### *Data Collection*

In order to explore the nutritional understanding of elementary classroom teachers several data sources were analyzed. The initial nutrition survey administered to the district's elementary teacher population was compared with the same survey given at the nutrition workshop. Participants completed three open-ended surveys at the close of each nutrition workshop. The first workshop ended with an exit card, the second a feedback form, and the third survey was the district's professional development evaluation protocol. At the end of the first and second workshop, participants were asked to teach a nutrition lesson in their elementary classroom during the two-week interim before the next workshop. They were asked to bring a nutrition lesson plan with reflection. These lesson plans/reflections were analyzed with the researcher's notes that were taken when the participants were explaining their nutrition lessons to the other people in the workshop.

After the district-wide distribution of the nutrition survey, the raw data was transferred from an Excel document to SPSS. Using SPSS the mean, range, and median scores were calculated. The raw data of the workshop participants' data was similarly analyzed and then compared with the larger population's results.

The first nutrition workshop ended with an exit card that participants were asked to complete before their departure. The exit card had three questions:

1. During the “Nutrition Statistics & Calculations” section of the workshop, what did you learn? Were you surprised by the statistics?
2. What did you think of the “Just Try It” lessons? Would you do them in your classroom? Why or why not?
3. What is the topic of the nutrition lesson(s) you will teach before our next meeting?

Each participant’s responses were read individually. A list of each participant’s responses was made and then the responses for each question were collapsed into categories. The purpose of this analysis was to assess participant’s familiarity with the nutrition lessons taught during the workshop and to promote positive attitudes toward trying nutrition lessons in their own classrooms.

At the end of the second workshop, participants were asked to answer four questions on a feedback form. The questions asked them to predict what type of lesson they would teach before the third workshop, to list what parts of the nutrition workshops were most helpful to them, to give suggestions of ways the workshop could be different, and they were asked to list three items that they would like to have included in the last workshop. Again each individual’s form was read, lists created, and the items categorized. The data collected from the fourth question was used to guide some of the content for the third and final workshop.

The Ramana School District mandates that all participants complete a professional development evaluation form at the end of any class taken within the district. The evaluation has two parts: 15 Likert-scale questions and four short answer questions. These surveys must be returned to the district professional development office after the completion of the professional development course. The Likert-scale questions have four

categories, although only two are labeled, four is “very” and one is “not at all”.

Participant responses to the Likert-scale questions were inputted into an Excel document.

The mean score for each question was calculated.

On the back of the district survey were four open-ended questions. Teachers had to list three things that they learned, two things they would use in their classrooms, and list one thing they still had a question about. The last question allowed for other comments. Each question was read separately, ideas listed, and categories created.

The two-week interims between the three workshops were scheduled to provide participants enough time to plan, teach, and reflect upon a nutrition lesson conducted with their own elementary students. The participants were asked to bring their lesson plan and reflection with them to the following workshop. After discussing the lessons, the researcher collected the lesson plans. At the following workshop, each participant received a copy of everyone’s lesson plans. This process was repeated for the second two-week interim. During the first interim, nine of the eleven participants taught nutrition lessons and turned in lesson plans. Seven of the eleven participants taught nutrition lessons during the second interim. A total of fifteen lesson plans were created, taught, and reflected upon by the participants of the nutrition workshop.

The lesson plans were analyzed for topic choice and as a byproduct to this analysis the researcher found some evidence of positive attitudes toward teaching nutrition. Initially each lesson plan was read in its entirety. The second time the lesson was read the topic of the lesson was listed on a separate sheet of paper. During the second read, evidence of student and/or teacher enthusiasm, students’ application of lessons to their lives, and teachers’ future plans to teach nutrition were categorized and

listed in a chart (APPENDIX T). For example, one of the participants wrote in their reflection, “Once I finished this introductory lesson, I couldn’t stop thinking about where I’ll go next!” (Participant #3) While the research question did not focus on teachers’ attitudes toward teaching nutrition, the researcher opted to look at this information to gain a richer understanding of nutrition education in the elementary school.

### *Summary*

The exploratory and culminating nature of this series of studies allowed for a plethora of different perspectives and approaches to nutrition education. The participants included preservice teachers, practicing teachers, and fifth graders. Multiple methods were employed to investigate teachers’ understandings of nutrition. Interviews, quantitative and qualitative surveys, research with fifth grade students, and researcher as facilitator during the nutrition workshop are some of the diverse approaches utilized to answer the individual preliminary questions as well as the overall research question.

## CHAPTER 4: RESULTS

### *Overview*

This exploration of nutrition education in the elementary classroom was driven by the research question: What do elementary teachers understand about nutrition? In preparation for answering this question, three pilot studies were conducted prior to the final study, each having their own more specific preliminary questions. This chapter provides the results for each of the studies as they pertain to each preliminary question. The research question is discussed as the focus of the final study which is a culmination of the results and findings for this series of studies.

### *Pilot Study #1 -- Preservice Teachers and Nutrition*

In order to investigate what teachers' understand about nutrition, the first pilot study focused on the preparation of preservice teachers in the area of nutrition. The preliminary questions that drove this study were: What do three preservice teachers understand about nutrition? How are these preservice teachers being prepared for teaching the academic health education standards with respect to nutrition? In this study a three-phase interview model was implemented with three preservice teachers. The first interview was conducted individually and focused on what the preservice teachers understood about nutrition and where they had learned about nutrition. The second interview was also conducted individually and focused on what teaching pedagogies the preservice teachers had learned in their methods and applications classrooms. The final focus group included a collaborative effort from the three participants and focused on the preservice teachers' ability to make a nutrition lesson plan based on the Arizona health

academic standards. Each phase of the interview model allowed for a deeper understanding of the nutrition background of this sample of preservice teachers as well as an insight into their ability to use their knowledge of nutrition concepts to create an effective nutrition lesson for their future elementary students.

*Preliminary question 1-1: What do three preservice teachers understand about nutrition?*

During the first interview, each participant was given a small nutrition survey and asked to complete and discuss her answers. As the participant wrote responses, she was asked to think aloud about her answers. All three of the participants drew and labeled the old food pyramid. Only one participant mentioned the currently modified version of the food pyramid but was more familiar with the old pyramid and drew it instead. Only Sarah included serving sizes in her drawing. She mentioned that she had just, over the summer, taken a class where she had to learn the food pyramid. Only Sarah successfully drew all four levels of the pyramid. Suzy omitted meats and dairy, while Helen left out vegetables and fruits.

When listing behaviors that can help an individual stay healthy, all three participants included exercise and a healthy or low fat diet. Other behaviors that were included in the participants' responses were: keeping stress to a minimum, getting enough sleep, and smoking and drinking in moderation. Notably, exercise and a healthy diet were the first two items mentioned on everyone's list.

The third question on the nutrition survey asked the participants to help students plan a healthy lunch to bring to school. All three participants chose for the students to bring sandwiches for their main course. Two mentioned a peanut butter and jelly

sandwich, and two mentioned a meat sandwich: turkey, chicken, or ham. (One participant mentioned peanut butter and jelly as well as meat.) Each participant's meal plan also included a fruit, vegetable, and dairy product. Only Helen included a "sweet treat" justified by "they like it" and that if they have a little bit, they might not over indulge when they do get to eat sweets. Interestingly, the participants who had drawn incomplete food pyramids included the missing categories in their meal plans. For example, Suzy omitted meats from her food pyramid in the first question, but included a ham sandwich for protein in her meal plan.

In order to have a richer understanding of what this sample of preservice teachers' understood about nutrition, the nutritional background of each participant was investigated. Suzy claimed that she had always been underweight regardless of the fact that she was not raised eating healthy foods. She claims to have changed her eating choices after watching her college roommates' healthier eating habits. Regardless of what she eats, she remains thin. Helen was raised in a healthy family, and her mom is a nutritionist. She was raised in New York and felt that the community in general was focused on eating healthy. Sarah struggled with eating behaviors in high school and at the age of fifteen consulted a nutritionist. The nutritionist helped her learn how to modify her eating behaviors by making healthier choices. Sarah is a vegetarian.

All three participants were knowledgeable about nutritional concepts including the food pyramid, healthy foods, and healthy behaviors. However, the depth of their nutritional knowledge was a concern as their re-creations of the basic food pyramid were limited. Their backgrounds in nutrition education were also limited. All three participants remembered taking a health class in junior high and/or high school that had a

nutrition component, but they could not recall details about the nutrition content that they were taught. Sarah and Helen had both taken an elective college nutrition course. None of the participants had taken a nutrition-related course within their teacher education program or mandatory general education classes.

*Preliminary question 1-2: How are these preservice teachers being prepared for teaching the academic health education standards with respect to nutrition?*

The last question on the nutrition survey administered during the first interview focused on the participants' familiarity with the state health standards by asking them what concepts they thought were covered. None of the participants had been exposed to the health standards except with respect to physical education (P.E.). All of the participants took the P.E. methods class offered by their university, but they had only used the physical education portion of the health standards. Sarah was the only participant who identified basic nutrition and hygiene as other possible concepts in the state health standards, although she admitted to only guessing as she had not actually read the standards.

The second interview focused on the pedagogies the preservice teachers were being taught in their methods and application courses. When asked to list pedagogies they were learning to use in their methods courses each participant gave different answers. Suzy responded with "read-aloud, monitoring of behaviors, tapping on the shoulder for redirection, and monitoring independent practice." Helen's main focus was language arts, and she responded with "choral reading, echo reading, fluency, and

problem solving with manipulatives”. Sarah identified “KWL charts, think-pair-share, and journaling”.

The preservice teachers were then asked to talk about the pedagogies that they were observing during their time in their application classrooms. Overall, direct instruction was seen to be a negative and the use of manipulatives or other hands-on materials a positive. However, one participant did mention that sometimes the students were distracted by the manipulatives and less apt to listen to the lesson. In most cases a blend of instruction and activities was considered to be appropriate by the participants. Slates were mentioned by two of the participants. Slates are small white boards that are given to each student. Often used in math, the slates can be written on and held up so the teacher can easily monitor students’ understanding.

The second set of interview’s revealed that the participants’ teacher preparation program was affording them opportunities to learn and experience different teaching pedagogies. While none of the participants reported any direct link between pedagogy and nutrition, each of the preservice teachers’ were able to list and discuss multiple teaching strategies that they could implement to help students learn content. The final focus group required them to adapt these instructional strategies to nutrition content.

In the final stage of this research study the three participants collaborated to create a lesson on nutrition. The participants decided to use the Arizona Health Academic standard that states, “Contrast healthy and unhealthy lifestyles” (ADE, 1997). Some of the ideas that emerged from the participants’ brainstorming discussion were graphic organizers used to compare and contrast, community and family influences, how to personalize the lesson for students without making them have a negative self-image,

scaling lessons down to fit within the time allotted for that subject during the school day, think-pair-share (cooperative discussion strategy, Lyman, 1981), T-chart (graphic organizer), anticipatory set (beginning of the lesson included to gain students' interest in topic), usage of post-its, modeling, collaborative work, whole group learning, and journaling. Ultimately the lesson consisted of teacher modeling, think-pair-share, whole group discussion, and an individually written reflection. The lesson plan included allowing some students to share their reflections with the class. Students would then be asked to answer the questions "Why is it important to understand and compare healthy and unhealthy lifestyles?"

After the lesson plan was completed, the participants were asked to reflect upon their experience on a short survey. When asked how easy or difficult it was for them to make this lesson on nutrition, two participants found it easy, while the other indicated that it was hard for her. The two participants who found the lesson easy indicated that interest and knowledge in the subject and simplicity of the introductory lesson they had created aided in their productivity. The participant who found the activity hard identified unfamiliarity with the topic and clashing of ideas, opinions, and style during the collaboration as obstacles.

The survey also asked the participants what, if anything, they had learned from this experience of collaboratively creating a lesson on nutrition. They all stated they had learned more about the importance of teaching nutrition in their future classrooms. Two participants expressed frustrations of unfamiliarity with the standards and the prior nutritional knowledge of the students at this age. The most positive part of this experience for two of the teachers was the collaborative efforts of a group. One

mentioned that she felt better prepared for future lesson planning in the area of health and nutrition. The least positive part for two of the participants was working with others to incorporate and narrow ideas down, but both expressed that this would be a realistic part of teaching and was a good thing to experience. One participant felt that she needed to know more about the topic to be more successful in planning a lesson.

When asked how each participant felt about teaching nutrition in the future, Suzy said that she did not feel prepared at all for teaching nutrition to her future students. Helen, who had chosen to take nutrition as an elective, still felt that she could learn more about teaching nutrition. Sarah, most confident about teaching nutrition, admitted to being unsure about what nutrition content was included in the health standards. She also mentioned that if she had taken more science, or the science had been more directed to teaching elementary age children, she might be more aware of what she would be expected to teach to meet the health standards.

The participants ranged in their confidence to teach nutrition in their future classrooms. When asked whether they would attend a teacher in-service focused on teaching nutrition, Sarah was the only one who hesitated. She said she might attend but was pretty confident she knew enough to successfully teach her students. Both Suzy and Helen eagerly agreed that they would like to learn more about nutrition themselves as well as effective ways to teach nutrition to their students.

Overall there was no evidence, in this study, that these preservice teachers were required to take any nutrition courses in college, nor were they given any instruction on effective methods of teaching nutrition. The focus group designed a lesson plan based on their basic knowledge of nutritional concepts from elective nutrition courses and their

own personal experiences. The pedagogies incorporated, as well as the layout of the lesson plan, were adapted from their core subject methods courses. The created lesson plan seemed feasible, but the superficial content did not give evidence that preservice teachers are being prepared to teach in-depth nutrition content successfully in their future elementary classrooms.

### *Implications from Pilot Study #1*

The findings from this study informed the focus and exploration of two of the studies that followed. The short nutrition survey that the participants completed as part of their first interview indicated that teachers have experience with nutrition and some nutrition knowledge. The second study focused on the development of a longer, more in-depth study of what teachers understand about nutritional concepts through the creation of a multiple-choice nutrition content survey. This survey was used to assess teachers' understanding of nutritional concepts. Secondly, the omission of nutrition education in the teacher education programs, as uncovered in this study, was instrumental in promoting the creation of the nutrition professional development workshop conducted during the final study.

### *Pilot Study #2—Development of a Nutrition Content Survey*

This pilot study focused on the development and modification of a nutrition content survey designed to assess what teachers' understand about nutrition. Two preliminary questions guided the content and exploration conducted during this study. What are the “big ideas” in nutrition? How can an effective instrument for measuring

teacher understanding of nutrition content knowledge be created, evaluated, and modified? Elementary teachers, preservice teachers, and a nutrition expert participated in guiding the content and clarity of the nutrition content survey.

*Preliminary question 2-1: What are the “big ideas” in nutrition?*

Prior to the construction of the first version of the nutrition content survey, several professional resources were consulted to find the “big ideas” in nutrition. No such list existed, but certain ideas were repeated in multiple sources. Thus, the survey’s questions were based on information from the USDA’s food pyramid, food groups, caloric-intake recommendations, statistics from the CDC about the effects of poor nutrition on diseases like diabetes, cardiovascular disease, and cancer, and several other nutrition resources and curriculum guides (BHG, 2006; CDC, 2002; Cheung, Gotmaker, & Dart, 2004; Cooper, 1999; Tillman & Toner, 1990; USDA, 2005).

The original version of the nutrition content survey was administered to thirty-five elementary teachers at Stuart Elementary. The teachers were asked to rate each question on its clarity using a Likert scale and were invited to give written suggestions in the spaces provided. When asked if there were any nutrition topics they felt were important that had not been addressed in the survey, teachers suggested the inclusion of caloric and nutrition needs based on age groups, food values and good snack choices, nutrition’s link to exercise, nutrition at home, nutrition at school, food additives and dyes, and the importance of whole grains. The preservice teachers and nutrition expert were also asked for missing nutrition content, but no suggestions were made.

After continued research in the fields of nutrition and nutrition education and attending a college nutrition course, the “big ideas” of nutrition were written. The survey was then modified so that there were six questions assessing teachers’ understanding of each “big idea”. The final nutrition content survey includes a total of 30 multiple-choice questions, six questions for each of the five “big ideas” in nutrition. This survey was administered during the final study.

### *Big Ideas in Nutrition*

- The food pyramid is a graphic representation that provides two major sources of information: food groups and recommended dietary allowances.
- The daily consumption of a variety of fruits, vegetables, and milk plays an integral part in providing bodies with the vitamins and minerals they need to stay healthy.
- Nutrition labels are found on all packaged foods and give standardized information about the contents.
- Eating properly is essential to sustaining a healthy life.
- Calories, a unit of energy, are attained through food consumption and used to carry out all of the functions necessary to sustain life.

*Preliminary question 2-2: How can an effective instrument for measuring teachers’ understanding of nutrition content knowledge be created, evaluated, and modified?*

After the first draft of the nutrition content survey was created, feedback was requested from thirty-five elementary teachers at Stuart Elementary (APPENDIX B). The teachers were asked to answer the nutrition content questions, give a Likert-scale

rating of each question's clarity, and write suggestions or comments in the space provided. Prior to completing the nutrition survey participants were asked for background information. The thirty-five K-6 teachers who participated in this portion of the study reported that they had taught an average of 15.7 years with a range from one year to twenty-eight years. Five of the participants had earned their bachelor's degree, eleven reported an educational level of BA +18, five had received their master's degree, and ten reported having at least eighteen credits beyond their master's degree. When asked what nutrition classes they had taken in the past, seventeen reported that they had not taken any classes in nutrition, five had learned about nutrition in junior high or high school, twelve in college, and four through professional development opportunities.

The nutrition survey answers and clarity responses provided feedback on the participants' understanding of nutrition as well as the clarity of the questions. When assessing teachers' understanding of nutritional concepts, the first question asked teachers about the new food pyramid. Only 37% of the teachers surveyed knew that the USDA had proposed a new food pyramid. Overall, the teachers' mean score on the survey was 66% with a standard deviation of 11 (APPENDIX C).

There were two questions that received very low clarity scores and were confusing to many of the participants. Question #7 asked, "Which of the following foods has the highest fat content?" The possible answers were: A--hamburger, B--taco salad with ground beef, no cheese, C--chicken nuggets (10 piece), and D--fried fish filet. Teachers requested more information about the way the items were cooked and what condiments were being served. The second question that gave some participants difficulty asked "What is the recommended caloric intake for a moderately active 10-

year-old?” Most of the participants split their votes between 1800 and 2000 calories. The correct answer is 1800 calories. When these two questions were omitted the teachers’ mean survey score rose to 75% with a standard deviation of 13.

Post-survey responses indicated that 97% of the participants found the overall survey “easy to understand” or “understandable”. When asked whether they felt the content of the survey adequately assessed the “nutrition content pertinent to the elementary teacher” less than 10% responded with “pretty well”, 20% responded with “very well”, while 70% of the respondents replied that the survey’s content was “excellent”. Suggestions from the teachers were; the inclusion of caloric and nutrition needs based on age groups, food values and good snack choices, nutrition’s link to exercise, nutrition at home, nutrition at school, food additives and dyes, and the importance of whole grains. These suggestions led to the addition of five more questions to the nutrition survey before the second administration.

The modified survey was then administered to a class of eighteen preservice teachers (APPENDIX D). Again the participants were asked to answer the nutrition concept questions and rank the clarity of each question. The teacher information portion of the survey revealed that all but four of the preservice teachers had taken nutrition classes in high school and/or college. All of the respondents said they would be interested in taking a nutrition professional development workshop.

The modified version included twenty-two questions, five more than the original survey. The preservice teachers scored lower than the teachers but had a greater standard deviation. The preservice teachers’ mean score was 67% with a standard deviation of 20. Even though they had been revised, questions #7 and #8 received no dominant answer

and low clarity scores again. Omission of these two questions raised the mean survey score to 72% with a standard deviation of 21. The mean and standard deviation were also calculated from the preservice teachers' data after omitting the five added questions in order to evaluate whether these questions had drastically affected the participants' scores. Without the five questions the mean score lowered to a 69% with a standard deviation of 21. While the scores between the two groups of participants were not very different, the standard deviation of the preservice teachers was almost double that of the teachers (APPENDIX C).

The nutrition expert provided very limited feedback. The survey had obviously been read but very little helpful feedback was given. The survey itself was not taken, only the clarity ratings filled out. There were a few minor suggestions on individual questions, like "give more examples of foods in the meat & beans category" for question #3, but no overall feedback on the content or the "big ideas" as requested (APPENDIX H).

The simultaneous efforts of continuous research in the fields of nutrition and nutrition education as well as multiple administrations of the nutrition content survey were both instrumental in the creation, evaluation, and modification of the final nutrition content survey (APPENDIX E). The "big ideas" focused the survey's content, while the participants' feedback helped to clarify the wording of the questions. These were essential elements in creating a survey that effectively evaluated what teachers understand about nutrition.

### *Implications from Pilot Study #2*

The most important contribution of this study to answering the research question was the creation of the final nutrition content survey to be used in the final study. This survey provided baseline data of teachers' understanding of nutritional concepts as well as an indicator as to whether the workshop participants were representative of the greater district population. The "big ideas" identified in this study were used to guide the nutrition lessons for fifth graders in the next study and the curriculum for the nutrition professional development workshop in the final study.

### *Pilot Study #3—Nutrition through the Eyes of Fifth Graders*

Using the "big ideas" in nutrition identified in the previous study, the researcher created nutrition lesson plans and taught them in her fifth grade classroom during the third pilot study. Students were asked to give feedback on their understanding of nutritional concepts as well as their interest in the lessons taught. These lessons were later used as part of the curriculum for the nutrition professional development workshop. The preliminary questions that guided this study were: What does a group of fifth grade students understand about nutrition before and after a nutrition unit? What do these students report about nutrition lessons with respect to learned information and interest level? A pre-unit test was used to assess what the fifth grade participants understood about nutrition before the unit began. Then a post-unit assessment was given afterwards to further evaluate their understanding of nutritional concepts after taking part in a unit on nutrition. Feedback on individual nutrition lessons was gathered through short pre/posttests and student questionnaires. All of these instruments were created by the

researcher and used to gather information from the fifth grade participants about what they had learned and how much they liked or disliked each nutrition lesson.

*Preliminary question 3-1: What does a group of fifth grade students understand about nutrition before and after a nutrition unit?*

The first preliminary question was answered through the administration of pre-unit and post-unit tests. The participants completed a ten question, open-ended assessment at the beginning of the unit and a similar test at the end of the nutrition unit (APPENDIX I & L). The qualitative responses to the pre-unit assessment were categorized and charted by frequency (APPENDIX P). Overall the students showed some knowledge and/or familiarity with most of the concepts on the pre-unit assessment. Gaps in the students' understanding of nutrition were identified and lessons were created to address these concepts. Students struggled with defining nutrition and calories, as well as explaining the significance of nutrition labels.

When asked "What is nutrition?" 63% of the students identified nutrition as healthy food or food that was good for you. Only three responses alluded to nutrition being a broader subject and including more than just food. When asked why it is important to eat, slightly over one-fourth of the students said to prevent starvation and/or death. The second most popular categories were: "eating gives you energy" and "to be healthy or fit".

The third and fourth questions focused on "good" and "bad" foods. Students were asked to identify the foods in each category and then explain why these foods were considered good or bad. Fruits and vegetables were the most prevalent answers when the

students were identifying foods that are good for you. All of the students' responses would have been correct with the exception of perhaps "all food in the food pyramid" and cheese. When asked why these foods were considered good choices, students responded with benefits for the body. Most popular was the response that these foods were nutritious and had vitamins the body needed. A more generic response of "healthy/the body needs it" accounted for the second largest response category. Overall the students seemed to know that these foods would help the body. Some even named specifics like teeth, muscles, bones, and eyes.

Sixty-two percent of the students' responses identified sweets, sugar, chocolate, candy, and soda as bad foods. Fatty foods were the second greatest category, 29% of the responses, and included hamburgers, chips, junk food, and French fries. When asked why these foods were bad, students identified their fat and sugar contents. Most popular were their effects at making people gain weight, slowing you down or weakness, and tooth decay. All of the students' responses were appropriate for explaining why some foods are considered bad for you.

The food pyramid and food groups were the focus of questions five and six. Almost all of the students showed evidence of previous knowledge about the food pyramid, except for one. That particular student drew a three-dimensional pyramid, where each brick had the word "food" written in it. Other than that individual, all students gave some information about the food pyramid, whether they could draw it or not. Thirty-nine percent of the students drew and labeled the old food pyramid with a 75% or better accuracy. The students were successful, overall, in naming the food groups on the food pyramid. About three-fourths of the students identified fruits, vegetables,

meats, and breads. Most of those also remembered that there was an unhealthy component. Many of them referred to it as “candy” or “sugar”. Dairy was mentioned but with less frequency, in about half of the students’ responses.

Almost all of the students, over 95%, correctly identified strong bones and/or teeth as reasons to drink milk. Over half of the students identified calcium as the component of milk that aided with these attributes. One student elaborated on their response by explaining the necessity for calcium so that bones would not bend and break easily, especially in old age.

The eighth question on the pre-unit assessment proved to be more difficult to answer for the students than most of the previous questions. Students seemed unsure of why people use nutrition labels. Only three students mentioned that nutrition labels were helpful to people who were dieting. Twelve students referred to the label as telling you the nutrition and stuff you need for eating. Only four students gave more in-depth responses that showed more familiarity with the subject than other students. These students knew that the nutrition label tells you how much is in one serving and/or that there was a percent of daily value for different nutrients that you were supposed to have each day. The second half of the question asked students to tell as much as they could about nutrition labels. Over half of the students were able to list some of the items on a nutrition label. The most popular answers being: fat, calories, ingredients, and protein.

Question nine, “What is a calorie?” proved to be the most challenging question. Overall students did not know how to define a calorie. Most of them knew that it was associated with food and many of them thought that it was fat or like fat. Only two students related calories with energy. Interestingly, even though they did not know what

calorie meant, almost all of the students knew that you could gain calories by eating and lose them by exercising.

The last question asked the students what they would like to learn about nutrition. The majority of students drew different terms or ideas from the test. The most common responses related to calories, food groups, and a general understanding of nutrition. Some of the responses seemed more personal for the students, “How do people get fat?” and “How come things, like candy, aren’t good for you at all?” One student even wrote a plea for his or her answer, “Body Health and EVERYTHING else! Please!”

The post-unit assessment was subjectively graded by the researcher/teacher. Each question was given a score from one to five. The researcher evaluated each answer based on accuracy and depth of information given. A five meant that the answer was correct and the written explanation accurate. The mean grade among the participants was a 94%, with grades ranging from 72% to 100%. The post-unit assessment asked for more specific information than its pre-unit counterpart. For example instead of asking the students to identify healthy foods and why they are good for you, the post-unit question had three parts: Name one food group that is healthy for you, give three examples of foods in that food group, and tell why it is important for you to eat foods from that food group. The rephrasing of the posttest questions required more thorough answers from the students. The level of detail that was expected was greater in the posttest than the pretest, plus the specificity of the questions made a pre-posttest comparison invalid.

Two important ideas were learned about what fifth graders understand about nutrition through the administration of the pre and post-unit assessments. First, in order to create an effective nutrition curriculum it is important to first identify gaps and

misconceptions in students' nutritional knowledge. In this study the pre-unit assessment identified gaps in the students' knowledge and lessons were created to teach specific nutrition concepts. Secondly, the post-unit assessment supported the inclusion of nutrition education in the elementary classroom. The rich responses to the open-ended questions were evidence that fifth graders can learn about nutrition in school and evaluate nutritional information, like nutrition labels, to assess foods and guide their own eating behaviors.

*Preliminary question 3-2: What do these students report about nutrition lessons with respect to learned information and interest level?*

Student questionnaires were completed after each nutrition lesson, and students were asked to evaluate the lesson based on the information learned and their interest in the material covered (APPENDIX K). The questionnaire had two Likert-scale questions, four open-ended questions and an empty space for comments about the lesson. The questionnaire was the same for all of the lessons. The first two questions were: "How much did you enjoy the nutrition lesson today?" and "How much did you learn about nutrition today?" The choices students were given to circle were "6—tons, 5—a whole lot, 4—some, 3—not much, 2—very little, and 1—not at all/nothing." The results of the Likert-scale questions for the individual lessons are found in Table 1.

Table 1

*Responses from Fifth Graders on Interest Level and Learned Information from Nutrition Lessons*

Lesson Title	Mean interest level	Mean amount of information learned
Nutrition Statistics, Childhood Obesity, & Diseases	4.8	4.4
Food Groups & the Food Pyramid	5.1	5.5
The Food Pyramid & Food Portions	5.0	5.4
Food Groups & Food Logs	4.5	4.6
Blast-Off Game	5.3	5.6

The open ended questions on the student questionnaire asked for something the student learned during the lesson, what they liked most and least, and finally if they had any suggestions. Most of the responses were not very helpful. The most helpful critiques were reported after the first lesson. Fifteen students reported that the first lesson was too long. Twenty-five students said that they did not like having to do the math calculations for body mass index (BMI). In response to these suggestions, the lesson on nutrition statistics was divided into two lessons. The math calculations were not eliminated, but a BMI chart was included so that teachers could choose whether to do the calculations or just look at the chart.

In order to better understand what students were learning from the nutrition lessons a short pre-posttest was administered each day. This half-page assessment focused on the objectives of the lesson. A summary of the results from the pre-posttest for the individual nutrition lessons are located in Table 2.

Table 2

*Fifth Graders' Mean Scores for Individual Lesson's Pre-Posttests*

Lesson Title	Mean Pretest Score (%)	Mean Posttest Score (%)	Change (%)
Nutrition Statistics, Childhood Obesity, & Diseases	58.6	77.6	+19.0
Food Groups & the Food Pyramid	55.1	83.4	+28.3
The Food Pyramid & Food Portions	66.7	75.2	+8.5
Blast-Off Game	80.0	80.9	+0.9
Food Labels	88.6	91.7	+3.1
Mean Total Score	69.8	81.8	+12.0

The first lesson, “Nutrition Statistics, Childhood Obesity, & Diseases” showed a growth rate of 19% between the average pretest and posttest scores. The largest improvement for the students was question #2. They were asked to list three childhood diseases that are caused by obesity. Most students improved their scores by accurately listing the three diseases that had been shown on the disease flow chart. Another repetitive void in students’ nutritional knowledge was found when students were asked to state the difference between overweight and obese. Almost all of the students correctly

defined overweight, but many students erroneously predicted that obese was the opposite of overweight. They defined obese as underweight or too skinny.

“Food Groups & the Food Pyramid” pre-posttest scores showed the greatest growth, 28%. The first question asked for students to name all of the food groups. The pretest answers reflected some knowledge, but incomplete memorization from prior nutrition lessons or exposure. Students were much more successful in the posttest after they had learned about the different food groups and had had the opportunity to look at their own copy of the food pyramid. Students remained confused about the food group from which you should eat the least. The old food pyramid placed sweets and other fatty foods in one category. The new pyramid uses only oil. The students were confused and frustrated that sweets, sugar, and candy were not included in the food pyramid at all.

The third lesson, “The Food Pyramid & Food Portions” reviewed the previous lesson’s introduction to the food pyramid and added how much of each food group was recommended. Examples of how much of each food group should be eaten in a day were brought in for the students to see during the lesson. Three cups of carrots, six ounces of cereal, and other examples of each food group were measured and shown to the class so that they could visualize how much they should be eating from each food group. The difference between pretest and posttest scores for this lesson was 8.5%.

The Blast-Off Game’s pre-posttest was the least successful. Students were asked to list three healthy things to eat for breakfast, lunch, dinner, and snack. They were also asked to list three unhealthy things to eat for the same four meals. Students did not show much improvement after the lesson, 0.9%. The scores for both the pretest and posttest

were about 80%, which meant that students gave good answers but not necessarily more or better answers after they had completed the lesson.

The lesson on “Food Labels” produced high scores on both the pre and posttests. The average for the pretest scores was 88.60%. The 3.1% increase, placed the average score for the posttest at 91.7%. These were the highest pre and posttest scores of any of the lessons. On the pretest students were asked, to explain what a nutrition label is, where the nutrition labels are usually located, to list at least five items found on a nutrition label.

Overall the fifth graders reported that they enjoyed the lessons on nutrition. They reported on the survey that they felt that they were also learning about nutrition at a high rate. The pre-posttest scores for the individual nutrition lessons supported their report that they were learning nutrition content. The students’ interest level was important to this study because it indicated that students are interested in learning about nutrition and perhaps other students would also enjoy learning about nutrition. The effectiveness of the lessons was evaluated through the pre-posttests as well as the student feedback on the questionnaires.

### *Implications for Pilot Study #3*

The information learned during this study was used in the creation and implementation of a nutrition professional development workshop during the final study. The students’ feedback was used to guide the modification of the nutrition lessons before they were shared with other elementary teachers at the nutrition workshop. The students gave the researcher insight on the interest level of the lessons for students as well as the

effectiveness of each lesson in teaching nutrition content to fifth graders. During the nutrition workshop, the researcher was able to share from her experiences of teaching the lessons and could more adequately answer questions and concerns that arose from the teachers at the workshop.

*Final Study—Nutrition Education and the Elementary Classroom Teacher*

The final study included two separate but related entities. Together they were used to answer the research question: What do elementary teachers understand about nutrition? The first portion of the study included a large-scale administration of the nutrition content survey created during the second pilot study to 317 elementary and junior high employees. The results from the survey were used to answer the first part of the research question, what do elementary teachers understand about nutrition? Data collected from eleven teacher participants during the nutrition workshop was used to explore the teachers' attitudes toward teaching nutrition in their elementary classrooms, but only as a preview for future studies on nutrition education in the elementary classroom.

*Research Question—What do elementary teachers understand about nutrition?*

The nutrition content survey designed in the second pilot study was administered district-wide using a web-based software program called Zoomerang. Three hundred and twenty elementary school employees, teachers and other staff members, took the survey and all but three of them allowed their data to be used by the researcher for her analysis. As shown in Table 3, the overall nutrition survey scores as well as individual “big ideas”

were analyzed. The table also includes the analysis of the nutrition content survey when it was administered to the nine participants of the nutrition professional development workshop.

Table 3

*Nutrition Survey Scores for District-wide Employees and Teachers in the Workshop*

	District-wide Scores		Workshop Participants' Scores	
	n	% correct	n	% correct
Big Idea #1 Food Pyramid	317	44.4	9	46.3
Big Idea #2 Vitamins & Minerals	317	52.7	9	46.3
Big Idea #3 Nutrition Labels	317	82.6	9	75.9
Big Idea #4 Importance of Eating	317	56.8	9	44.4
Big Idea #5 Calories	317	51.4	9	51.8
Total Mean Score	317	57.6	9	53.3

According to the results from the nutrition content survey, elementary teachers' understanding of nutritional concepts is limited. The total score and individual "big ideas" scores are all low with the exception of the "big idea" about nutrition labels. Teachers appeared to have an understanding of the purpose of nutrition labels, how to gather information from nutrition labels, and what items are included on nutrition labels.

Neither the district-wide population nor the workshop participants scored well on the nutrition survey. Both groups answered the questions about nutrition labels with the most accuracy.

Within the survey, there were six questions for each of the five “big ideas”. To further analyze the results from the nutrition survey individual questions within each “big idea” were compared as seen in Table 4. For example, for the first “big idea” about food pyramids both the district participants and the workshop participants scored higher on the questions that asked about food groups (questions #2 & #4), but lower on the questions that dealt with portion sizes (questions 1, 3, 5, and 6).

Table 4

*District-wide and Workshop Participants’ Scores for Individual Survey Questions*

<b>Big Idea #1—Food Pyramid</b>	District-wide Scores		Workshop Participants’ Scores	
	n	% correct	n	% correct
1. According to the new food pyramid, from which food group should you eat the largest quantity?	317	0	9	11.1
2. Which of the following includes all of the food groups?	317	72.9	9	88.9
3. How many cups of vegetables does the USDA recommend eating everyday?	317	52.1	9	77.8
4. Which of the following combinations do NOT include complementary protein sources?	317	87.1	9	66.7
5. Which of the following estimates the portion of protein an individual needs each day?	317	44.5	9	33.3
6. 1 large apple would equal _____	317	9.8	9	0

<b>Big Idea #2—Vitamins &amp; Minerals</b>	District-wide Scores		Workshop Participants' Scores	
	n	% correct	n	% correct
7. Which of the following is NOT a vitamin found in milk?	317	58.7	9	55.6
8. How many ounces of milk and/or dairy products should a person intake daily?	317	34.7	9	44.4
9. Which of the following are good examples of sources for Vitamin C?	317	59.6	9	44.4
10. How much of the human body's weight comes from water?	317	47	9	22.2
11. Which of the following is NOT a vitamin found in spinach?	317	42.9	9	33.3
12. Which of the following is NOT a disease caused by nutrition deficiency?	317	73.5	9	77.8

<b>Big Idea #3—Nutrition Labels</b>	District-wide Scores		Workshop Participants' Scores	
	n	% correct	n	% correct
13. Which of the following foods would be healthiest for a student to bring for snack?	317	87.4	9	66.7
14. Where are nutrition labels usually located?	317	97.8	9	100
15. What does “% Daily Value” mean?	317	93.4	9	77.8
16. In order to find the percentage of sugar weight in a product what should you do?	317	36	9	33
17. Which of the following categories is NOT included on a nutrition label?	317	85.8	9	77.8
18. Which of the following meals is most healthy and includes a variety of food groups?	317	95.3	9	100

<b>Big Idea #4—Importance of eating</b>	District-wide Scores		Workshop Participants' Scores	
	n	% correct	n	% correct
19. Which is NOT a function of fat in the body?	317	36.3	9	44.4
20. Which of the following has the most energy?	317	11.7	9	11.1
21. Which of the following nutrients provide energy?	317	70.7	9	55.6
23. Which of the following is NOT a reason why it is important to eat breakfast?	317	55.5	9	66.7
24. Some of the health benefits of fiber include	317	83.3	9	44.4
30. Which of the following trends has been seen in the last five to ten years?	317	83.3	Accidentally deleted from workshop surveys	

<b>Big Idea #5—Calories</b>	District-wide Scores		Workshop Participants' Scores	
	n	% correct	n	% correct
22. A food that contains 2 grams of fat, 11 grams of carbohydrates, and 6 grams of protein. How many calories does that food provide?	317	12.9	9	11.1
25. What is a calorie?	317	83.6	9	77.8
26. What is the recommended daily caloric intake for a moderately active 10-year old?	317	34.4	9	66.7
27. Which of the following individuals need the most calories?	317	64.7	9	66.7
28. How many calories would a 154-pound man use walking for 30 minutes?	317	57.1	9	44.4
29. How many calories are in one slice of multigrain bread?	317	55.8	9	44.4

The nutrition survey provided information on what elementary teachers understand about nutrition, but some discussion will follow about extraneous data that was collected and enriched the researcher's understanding of nutrition education in the elementary classroom. As a byproduct of the professional development workshop the researcher recorded preliminary evidence of teachers' attitudes toward teaching nutrition. This information may lead to a future study into elementary teachers' attitudes toward teaching nutrition.

The eleven teachers who attended the nutrition workshop participated in three two-hour workshops. The data collected from the workshop participants consisted of three short surveys, one given at the end of each workshop, and the participants' nutrition lesson plans with reflections. This data was used to gather feedback on the participants' experiences during the nutrition workshop. For a more detailed account of the contents of the nutrition workshop, please see APPENDIX N.

At the end of the first workshop, participants were asked to complete an exit card. When asked what they learned in the section on "Nutrition Statistics & Calculations" only two of the eleven participants reported that they were surprised by the obesity and related childhood diseases statistics. All of the participants gave examples of information that they had learned about nutrition that evening (APPENDIX Q). On the second question eight of the eleven participants reported that they would use the "Just Try It" tasting lessons in their own classrooms. The teachers who said they would not use the "Just Try It" lessons reported that it would not be appropriate for their students due the age of their students or in one case that the teacher was a specialist instead of a general elementary classroom teacher. Lastly, the teachers were asked to predict what topic in

nutrition they would teach before the next workshop. Four teachers chose nutrition labels, two making healthy eating choices, and the other individuals chose topics like getting energy from food, serving sizes, healthy substitutes, etc. (APPENDIX Q)

At the end of the second workshop, participants were asked to answer four questions on a feedback form. The first question asked them to predict what type of lesson they would teach before the third workshop. While there were a variety of answers, there were six who said that they would teach food groups and/or the new food pyramid (APPENDIX R). The participants were also asked to choose what parts of the nutrition workshops were most helpful. While lesson plans and hand-out for kids were mentioned five times, eleven other categories were also named. Only one suggestion was given when the participants were asked for suggestions to improve the workshop. That individual reported wanting to know more about planning healthy meals. Fourteen different topics arose when participants were asked what they would like to have included in the last workshop. Most popular were the suggestions for more website resources and more nutrition resources in general including lesson plans. (APPENDIX R).

The Ramana School District's evaluation was used for feedback after the third and final workshop. The evaluation has two parts: 15 Likert-scale questions and four short answer questions. The Likert-scale questions have four categories, although only two are labeled, four is "very" and one is "not at all". Overall the nutrition workshop received mostly threes and fours. The lowest scores fell in relevance and applicability to practice, while the high scores were in the organization and respectfulness of the workshop facilitator (APPENDIX S).

On the back of the district survey were several open-ended questions. Much of the information gathered was similar to the exit card and feedback form. Teachers had to list things that they learned and would use in their classrooms. While 13 topics were mentioned, about half of the teachers mentioned the new food pyramid, websites, and lesson plans among the three things that they learned during the nutrition workshop. A variety of ideas were presented when teachers were asked what they would use in their own classrooms, such as new lessons, eating healthy, Blast-Off game, food groups and exercise. Over half of the participants gave no response when asked what could be improved for the workshop. The last question allowed for open comments. One constructive criticism that was written was that the participant would have liked to see where nutrition fit into the state standards (APPENDIX S).

The two-week interim between workshops allowed the participants enough time to plan, teach, and reflect upon a nutrition lesson in their own elementary classroom. During the first interim, nine of the eleven participants taught nutrition lessons and brought lesson plans and/or reflections to share. Seven of the eleven participants taught nutrition lessons during the second interim. Therefore, a total of fifteen lesson plans were created, taught, and reflected upon by the participants of the nutrition workshop.

The lessons ranged in topics with the most popular being healthy food choices. Some of the participants chose to use the district's Unitedstreaming videos and Smartboard technologies to teach their lessons. The music teacher innovatively conducted lessons combining music with apples and vegetables. Other participants made cross-curricular connections incorporating nutrition within their language arts and social studies curriculum (Table 5).

Table 5

*Topics of Participants' Nutrition Lesson Plans*

Lesson Plan Topics	Frequency
Healthy Food Choices	7
Seeds—sunflower, pine, and pumpkin	1
Health benefits of apples	1
Obesity—Dateline video	1
Nutrition and Idioms	1
Nutrition Labels	1
Vegetables	1
Fat/Calorie Content of Fast Foods	1
Comparing food from different eras	1

Participants were asked to write a reflection about the nutrition lessons they had taught in their classrooms. Overall the reflections that were written were positive. Some of the reflections only focused on the presentation or content of the lesson itself. However, there were a number of teachers who specifically mentioned the students' interest in the lesson and the teacher's perspective on teaching nutrition in their classroom. There were two instances where the teacher reported that the students actively applied the new nutritional knowledge to their own lives/behavior. Seven reflections included plans to teach nutrition in the future. Table 6 charts the frequency of

each type of reflection. Please see APPENDIX T for a complete list of the comments from the participants' lesson plans and reflections.

Table 6

*Participants' Reflections on Teaching Nutrition*

	Frequency
Students enjoyed the lesson	7
Students applied information to their personal lives	2
Teacher enjoyed teaching lesson	3
Teacher exhibits enthusiasm toward teaching nutrition now and in the future	7
Reflection limited to content only	3
Reflection missing from lesson plan	4

Nine out of the eleven participants created a lesson plan during the first interim. The second round was less productive with six of the eleven participating. The lesson plans ranged from very skeletal to multiple pages with detailed descriptions. Unfortunately, several of the teachers did not write reflections, which allowed for only a limited glimpse into participant's attitudes toward teaching nutrition. The most interesting information found in the participants' reflections were based on the teachers' attitudes and the students' reactions to the nutrition lessons. For example, after teaching her first grade students about making healthy food choices, the teacher wrote,

“It is exciting to empower kids to make healthy choices. It also has a ripple effect onto their families. When they are soaking up the information, and talking about it to their parents, they can truly make changes that will affect them for life. Once I finished this introductory lesson, I couldn’t stop thinking about where I’ll go next!” (Participant #3)

A sixth grade teacher designed a lesson based on the Dateline video about obesity and fast food restaurants. In his reflection he wondered whether some of the topics were over the kids’ heads. Upon discussion he found that the students were very interested, and that the constant reference to eating at McDonalds had kept the information pertinent to them. After following up with his kids on the video’s impact, he wrote:

“Two weeks after the lesson I had another discussion with my students on this topic. I asked how many had changed their eating habits as a result of the lesson. 85% said they had definitely made a change. I was very surprised to hear the details of their changes. Some students had switched to diet soda. Others were making healthy choices from the McDonalds menu. Another said he was eating McDonalds every day before the video and had not eaten there since. In the past I have taught nutrition at the end of the school year, but this taught me I will always need to teach this in the beginning of the year.” (Participant #5)

Two of the participants, who were reading specialists, collaborated to create a series of nutrition lesson plans. Even with only the 20 minutes they are allotted with students they hope to continue nutrition through the incorporation of books on nutrition into their reading curriculum. One of the reading specialists reflected, “I can see where

teaching students about nutrition can lead to a change in eating habits. This could be life changing for some students.” (Participant #9)

The counselor was enthusiastic about having a positive approach for helping young people who are overweight. She works with students with low self-esteem and imagined that the “Just Try It!” lessons would serve as positive approaches to teaching students to make healthier food choices. She mentioned that the teachers and school nurse had asked about teaching students with weight problems, and now the counselor felt better prepared to help educate and empower these young people.

The conversations within the workshops included the bringing and sharing of resources as well as an open forum for ideas. The cooking teacher brought healthy cookbooks and others brought website addresses to share. A thievery, as only acceptable in teaching, occurred where the description of one lesson led another participant to create a similar revision of the same lesson by another. By the second workshop, several participants had ordered a class set of food pyramids from [www.mypyramid.gov](http://www.mypyramid.gov) as advised by the researcher during the first workshop. During the third workshop, the facilitator gave a list of children’s books about nutrition; the participants began adding many of their own suggestions for books about nutrition for others to add to the list.

The feedback and engagement of the participants was overwhelmingly positive. Teachers were inspired and practicing nutrition education in their classroom. They were individually and collaboratively seeking information and lessons on nutrition. The final nutrition notebook included a total of thirty nutrition lesson plans. Fifteen were shared and created by the facilitator and the other fifteen were created, taught, and shared by the

participants. According to the final survey, the nutrition workshop was deemed a success by all who attended.

*Implications for the Final Study*

The information and data collected through the first three studies was used to create the final study which focused on understanding nutrition education in the elementary classroom. The background information from the preservice teachers (pilot study #1), creation of the “big ideas” in nutrition and corresponding nutrition survey (pilot study #2), and the application of nutrition lesson in a fifth grade classroom (pilot study #3) culminated in the final study to investigate elementary teachers’ understanding of nutrition.

## CHAPTER 5: DISCUSSION

### *Overview*

As in the previous chapter, the preliminary questions are discussed individually with the research question reserved for last. Conclusions are discussed as they relate to each question. The limitations of this study are then discussed in greater detail after the conclusions for the final study. Finally, recommendations for further research are proposed.

### *Conclusions*

#### *Preliminary question 1-1: What do three preservice teachers know about nutrition?*

The first interview with the three preservice teachers included a short nutrition survey. All of the preservice teachers successfully listed healthy behaviors and planned healthy meals for students to bring for lunch. Only one of the participants was aware of the new food pyramid, but was more familiar with the old pyramid and drew it instead. The short nutrition survey was limited and could not be used to conclusively determine the overall nutritional knowledge of the preservice teachers. The conclusion of the first pilot study was that these three preservice teachers knew enough nutritional content to create a nutrition lesson plan comparing healthy and unhealthy lifestyles. However, this may be partially due to the personal backgrounds of the participants, one suffered from an eating disorder in high school and consulted a nutritionist and the another participant's mother is a nutritionist. Due to these circumstances, these three preservice teachers are probably not representative of the larger preservice teacher population.

In the second pilot study, a longer nutrition survey was given to eighteen preservice teachers to evaluate their understanding of nutritional concepts. Their scores (mean = 69%) were lower than those of the elementary teachers who took that same survey (mean = 75%). The preservice teachers who took the survey reported that they had taken nutrition courses in junior high and high school, but no one reported personal connections, as the two preservice teachers in the first pilot study did. Overall, preservice teachers seemed to have an awareness of general nutrition content but did not have a thorough understanding of nutritional concepts nor a comprehensive background in nutrition education.

*Preliminary question 1-2: How are these preservice teachers being prepared for teaching the academic health education standards with respect to nutrition?*

All of the preservice teachers who participated in the first and second pilot studies were from the same teacher preparation program. Their teacher preparation curriculum did not include a nutrition education class. Almost all of the participants reported taking a nutrition or health course in junior high or high school. Any college-level nutrition courses were taken as electives. The participants also reported that they had taken a P.E./health methods course, but nutrition was not part of the course's curriculum.

During the second interview with the three preservice teachers, teaching pedagogies were discussed. Their teacher preparation program included methods courses in social studies, math, science, and language arts. It could be argued that by teaching preservice teachers different strategies for teaching content to their students, they are being prepared to adapt these strategies to other content like nutrition. When the focus

group designed their lesson plan, they were successful in applying different pedagogies to the Arizona nutrition content standard they chose to use.

In conclusion, the data showed that these preservice teachers are not being formally taught how to teach nutrition in their future elementary classrooms. However, depending on their background in nutrition, they may be able to teach nutrition effectively by merging their nutritional content knowledge and general pedagogical knowledge. For example, the two preservice teachers with personal connections to nutritionists may have a richer understanding of nutrition and therefore be more capable of teaching nutrition to their future students. Others, without backgrounds in nutrition, may have a difficult time because their teacher preparation programs are not directly preparing them for teaching nutrition in their future elementary classrooms.

*Preliminary question 2-1: What are the “big ideas” in nutrition?*

The “big ideas” in nutrition emerged during the second study. Multiple resources were consulted including the United States Department of Agriculture (USDA), Center of Disease Control (CDC) and several nutrition sources and curriculum guides (BHG, 2006; CDC, 2002; Cheung, Gotmaker, & Dart, 2004; Cooper, 1999; Tillman & Toner, 1990; USDA, 2005). After completing the nutrition content survey, teachers and preservice teachers were asked to respond with suggestions for nutritional content that should be added to the survey. The compilation of these sources resulted in the following “big ideas” in nutrition:

- The food pyramid is a graphic representation that provides two major sources of information: food groups and recommended dietary allowances.

- The daily consumption of a variety of fruits, vegetables, and milk plays an integral part in providing bodies with the vitamins and minerals they need to stay healthy.
- Nutrition labels are found on all packaged foods and give standardized information about the contents.
- Eating properly is essential to sustaining a healthy life.
- Calories, a unit of energy, are attained through food consumption and used to carry out all of the functions necessary to sustain life.

In order for these concepts to be accepted by the nutrition and nutrition education community as the “big ideas” in nutrition, it will be necessary to get feedback from nutrition experts. While this was attempted during the second study, the nutrition expert from Cooper’s Clinic gave limited feedback on the survey and no feedback on the proposed “big ideas” in nutrition. The “big ideas” include a variety of nutritional concepts, but may not be fully comprehensive of the important nutritional concepts that elementary students should know.

*Preliminary question 2-2: How can an effective instrument for measuring teachers’ understanding of nutrition content knowledge be created, evaluated, and modified?*

In order to create an effective instrument for assessing teachers’ understanding of nutrition, two drafts of a nutrition survey were created and administered with two different populations of participants. The first survey was administered to thirty-five elementary classroom teachers. They were asked for feedback on the clarity and content of the survey. Afterwards, the survey was modified to clarify two questions that had

received low clarity scores, and five questions were added to increase the survey's content. The second draft was administered to eighteen preservice teachers. They also reported on the content and clarity of the second draft of the nutrition survey. These two trial administrations were part of the process to create and modify an effective instrument for measuring what teachers understand about nutrition.

In conjunction with the participants' feedback, the researcher continued to research nutrition concepts in the educational, medical, and popular media. The researcher also attended an elective, college-level nutrition class to update and increase her own nutritional knowledge. Due to the vastness of the field of nutrition, as well as its tie to the scientific/biomedical community, the understanding and availability of nutritional knowledge is constantly changing. For example, blueberries have become promoted in the popular media recently for their high levels of antioxidants. The researcher felt it was necessary to update her nutritional knowledge as it had been twelve years since she had taken a nutrition class.

In attempting to create an effective instrument for measuring teachers' understanding of nutrition, much thought, effort, and time were put into the modification of the nutrition survey before it was administered district-wide during the final study. However, in order for this nutrition survey to be considered effective, it will need to be reviewed by multiple nutrition and education experts. Again, the limited feedback from the nutrition expert was a limiting factor in the researcher's ability to conclude that the final survey was an effective instrument.

*Preliminary question 3-1: What does a group of fifth grade students understand about nutrition before and after a nutrition unit?*

The fifth graders' responses on the pre-unit assessment reflected a general awareness of nutritional concepts. Some concepts were more familiar, especially the idea of drinking milk for stronger bones. Other concepts were more challenging for the students and responses were vague or completely incorrect. Students were not familiar with calories or the contents of nutrition labels. Students were aware of healthy and unhealthy foods, but could not classify them into the different food groups.

The post-unit assessment was written to require more specific answers from the students than the pre-unit assessment. Students successfully used the information that they had been taught during the nutrition unit to answer the questions with the mean overall test score being a 94%. Students were able to define a calorie as well as use a nutrition label to evaluate the nutritional value of foods.

The individual nutrition lessons were evaluated by small pre-posttests. The mean growth showed on these assessments was a 12% increase between pre and posttest scores. As expected, the students' nutrition concept knowledge increased after they had been exposed to a unit of nutrition lessons. It can be concluded, then that students who participate in a unit on nutrition will increase their understanding of nutritional concepts. However, this sample of fifth graders may have a different baseline of nutritional knowledge, as seen on the pre-unit assessment, than other fifth graders. For example, this group of students is predominately white and middle class. According to research, minority populations are seeing a greater increase in childhood obesity than whites

(Kumanyika, 2006). Therefore, in order to understand what fifth grade students know about nutrition, it would be necessary to sample a greater, more diverse population.

*Preliminary question 3-2: What do these students report about nutrition lessons with respect to learned information and interest level?*

For each nutrition lesson students were asked to complete a pretest, posttest, and questionnaire. On the questionnaire they were asked to report how much they felt they learned and how much they liked the lesson. When asked how much they enjoyed the lesson, students' mean responses ranged from 4.5-5.3 on a scale of one to six. A four indicating that they liked the lesson "some" and a five meant "a whole lot". The mean interest level for the series of nutrition lessons was 4.9. The self-report of how much the students felt that they learned during each lesson ranged from 4.4-5.6 on the same six-point scale. The mean score for how much students felt they learned during the series of nutrition lessons was a 5.1.

From this data, it can be concluded that these students were interested in the nutrition unit and grew in their understanding of nutritional concepts. They accurately self-reported that they had learned new information as reflected in their posttest scores. The high interest level may serve as an indicator that nutrition lessons would be of interest to other fifth grade students. More studies would need to be conducted to see if other populations of fifth graders gave the same feedback.

*Research Question: What do elementary teachers understand about nutrition?*

The final version of the nutrition content survey was administered district-wide during the final study. Three hundred and seventeen elementary teachers and other elementary school personnel completed the survey on-line. The mean score on the nutrition survey was 58%. When the test items were sorted into categories by the “big ideas” in nutrition, only one category had a substantially higher mean than the others. The participants’ responses to the questions pertaining to nutrition labels resulted in a mean score of 83%. All of the other scores fell in the 50-60% range, except questions pertaining to the food pyramid resulted in a mean score of 44%.

The workshop participants also completed the nutrition survey. Their overall mean score was similar, but lower, than that of the larger population. The mean for the workshop participants was 53%. As with the larger population, the questions pertaining to nutrition labels received the highest mean score, 76%. The other “big ideas” mean scores predominately fell between 40-50%, lower than that of the larger population.

In order to gain a more in-depth perspective on teachers’ nutritional knowledge, the results for the survey were divided by “big idea” in Table 3 and broken down for further analysis by individual question in Table 4. This organization of the teachers’ responses allowed for a more insightful discussion of what teachers’ understand about nutrition and what gaps exist in teachers’ understanding of nutritional concepts.

The first “big idea” focuses on the food pyramid. Two major sources of information available on the food pyramid are the food groups and recommended dietary allowances. One of the survey’s questions asked about food groups, one question asked about food items in a particular food group, and four questions focused on portion sizes

of different food groups or items. Both groups of participants were able to successfully identify the food groups and sources of protein with a 65% mean score or above.

The questions on portion sizes proved to be more difficult for both the district-wide and workshop participants. Two questions in particular were especially challenging. The first question asks which food group has the largest recommended daily allowance. None of the district-wide participants and only one of the workshop participants answered correctly. This may be due to the fact that the survey was based on the new food pyramid and participants may have been unfamiliar with the changes from the old pyramid.

The second question that received very few correct responses asked how much one large apple would be of the recommended daily allowance for fruit. The correct answer is two-thirds. Over 80% of the participants answered that a large apple would be one-fourth or one-half of their daily allowance of fruit. This may be a misconception promoted by the large portions of food served in American society or an indicator of the misperceptions of actual serving sizes.

The second “big idea” in nutrition focused on the intake of vitamins and minerals, especially through the consumption of vegetables, fruits, and milk. Two questions focused on the consumption of milk, and one question focused on each of the following topics: food items that contain Vitamin C, water in the body, vitamins in spinach, and diseases caused by nutrition deficiency. Overall the two participant groups were not very successful on these questions with the exception of the last question on nutrition deficiency. More than seventy percent of the participants from each group correctly

identified rickets, scurvy, and osteomalacia as diseases associated with nutrition deficiency.

Nutrition labels and the information that they contain are the subject of the third “big idea” in nutrition. This was the most successful category for both groups of participants. A high majority of participants could identify healthy snacks, knew where to locate nutrition labels on packaging, could define “% of daily value”, identify categories found on a nutrition label, and choose a healthy meal with a variety of food groups. One question received low scores as it focused on how to find the percentage of sugar weight in a food product. In order to calculate this percentage the sugar grams must be divided by the total grams in a serving size and then the quotient must be multiplied by one hundred. Most participants responded that this information could be found if they “simply read the nutrition label”.

The importance of eating, the fourth “big idea” in nutrition, focused on fat, energy, the importance of eating breakfast, the benefits of fiber, and diseases related to overeating. Seventy percent or more of the participants in the district-wide survey responded correctly about the health benefits of fiber, current trends in nutrition related diseases, and nutrients that provide energy. Both participant groups had difficulty with the questions that related to fat. Roughly a third of all of the participants correctly identified the functions of fat in the human body and only a tenth of the participants were able to identify fat as the molecule that provides the most energy per gram.

The fifth “big idea” focused on the currency of energy called calories. Calories can be gained through consumption of food and used to perform all life-sustaining functions as well as to exercise. While participants were able to define a calorie

successfully, other questions proved to be more difficult. Participants were only moderately successful in applying their understanding of calories to specific situations like how many calories a 10-year old boy should consume or how many calories are burned by a 30 minute walk. Only a few participants were able to correctly calculate the number of calories when given the protein, carbohydrate, and fat grams of a food item.

Using the “big ideas” and nutrition survey wrote and created during these research studies, it can be concluded that teachers have limited nutritional knowledge. The topic of nutrition labels being the one category that would be an exception to this conclusion. However, as concluded previously, until the “big ideas” and nutrition survey have been scrutinized by nutrition experts, it cannot be concluded that the nutrition survey can effectively assess what teachers understand about nutrition.

Preliminary evidence about teachers’ attitudes toward teaching nutrition in their classrooms was summarized in four categories created from the workshop participants’ reflections of the nutrition lessons they taught in their elementary classrooms. Instances where teachers reported students’ enjoyment of the lessons, students’ application of the nutrition concepts to their personal lives, reports of teachers enjoying teaching nutrition lessons, and instances where teachers wrote about teaching nutrition in the future were recorded. Of the eleven workshop participants, six wrote about teaching nutrition in the future. In another study, nutrition lesson reflections such as these could serve as evidence of teachers’ attitudes toward teaching nutrition. While none of the participants wrote negatively about teaching nutrition, there were several teachers who wrote a limited reflection of their lesson or no reflection at all.

While many areas of this exploration into nutrition education have culminated in inconclusive, non-generalizable data, the potential implications for future research are numerous. After the upcoming discussion of the limitations of this study, the possibilities for future exploration into the field of nutrition education will be explored.

### *Limitations*

The limitations, as listed in the introduction, hindered the generalizability of the conclusions drawn for this study of nutrition in the elementary classroom. The selection of participants was not random. For the most part convenience sampling was used as the researcher chose participants to whom she had access. The preservice teachers and teachers worked at the same school as the researcher. The fifth grade students were in the researcher's fifth grade class. The district administrators allowed the district-wide distribution of the researcher's survey because the researcher was a teacher in the district. The participants in this study were from one district or research-1 institute, both located in the southwestern part of the United States.

The participants who attended the nutrition workshop were limited in number with a total of eleven participants, only nine of whom completed all three workshops. Additionally, the motivation of the workshop participants may have influenced the data. The participants self-selected to participate in the workshop and so likely are more motivated to teach nutrition and thus not representative of the attitudes of the general elementary teacher population. On the other hand, teachers may have attended the nutrition workshop for the sole purpose of acquiring salary credit and/or certification hours.

As mentioned previously, without expert review the “big ideas” in nutrition and the nutrition content survey may not be accurate. The “big ideas” may not be a comprehensive list of the nutritional content knowledge that elementary students should know. There may have been important concepts that have been omitted that should have been included. The nutrition survey may also be a limiting factor as it may not be an accurate assessment of what teachers understand about nutrition. Without expert review and critique, the effectiveness of the nutrition survey is questionable. Also, there may be some error in the alignment of the test items with the “big ideas” in nutrition, making the categorized mean scores inaccurate.

The qualitative data collected during each study could be subject to different interpretations. The other roles of the researcher as teacher, colleague, friend, workshop facilitator, and employee may have effected the collection and analysis of data. In every study, the researcher played at least two roles. She was the colleague of the preservice teachers and teachers, a friend to many of the teachers who participated in the survey administration as well as the nutrition workshop, and the classroom teacher of the fifth grade students. These multiple roles probably complicated the participants’ ability to be completely unbiased in their feedback. While the researcher discussed with the participants the importance of their honest feedback, it is impossible to tell where these relationships created irregularities in the data.

### *Implications*

The implications of this study of nutrition education fall within three categories: policy, practice, and research. It is the researcher’s opinion that until policy changes

nutrition education will not become prevalent in elementary classrooms. Nutrition's ambiguous placement in the health standards allows confusion among teachers as to whose responsibility it is to teach nutrition. In the elementary school, the health requirements could be fulfilled by the elementary classroom teacher, the physical education teacher, the nurse or nurse's aids, and/or the DARE officer. Moving the nutrition standards to the science standards may increase its prevalence in the classroom and the curriculum. Nutrition would easily tie into the already present human body standards in science. The addition of nutrition to the science standards would also require standardized testing in nutrition at the local, state, and federal levels.

While none of these changes are occurring, there has been a surge of interest in nutrition since the implementation of the new federal Wellness Policy. In the near future, districts will be held more accountable for what they feed students as well as having a nutrition education plan for their district. The statistics of childhood obesity and related diseases, as well as on-going health concerns of people with sedentary lifestyles, who make poor food choices, are beginning to cause changes that will eventually affect the way children are educated about nutrition.

Practice will follow policy. If the policies change and nutrition education becomes a priority in the elementary classroom, then teachers will teach more nutrition. This will incur a need for teacher education in nutrition, which will lead to more research on the topic of nutrition education. Some teachers do and will teach nutrition because it is a need that they want to fill by incorporating in their classroom. This study's participants took ownership of nutrition and were willing to create lessons with cross-curricular ties to nutrition and incorporate them within their core subject units. There

will be a minority of teachers who will include nutrition in their classrooms, but changes in policy would force the implementation of nutrition into all elementary classrooms assuring that more students would be taught how and why to make healthy food choices.

The three pilot studies and the final study could individually or collectively inspire further research into nutrition education. The first pilot study focused on preservice teachers' experience with nutrition and nutrition education in their teacher preparation program. At a national level, teacher preparation programs could be studied to see how they prepare their students to teach nutrition. Programs that successfully include nutrition could be studied and their techniques shared with other schools that do not incorporate nutrition education into their preparation of teachers.

The second study, which included the creation of the "big ideas" of nutrition and a corresponding nutrition survey, could be used to develop better academic standards for the teaching of nutrition. First of all, the "big ideas" of nutrition should be honed, shared, modified, and reviewed multiple times by many experts before finalizing. Individuals from a variety of backgrounds should play prominent roles in this decision. Nutrition experts, medical professionals, elementary teachers, and others should work together to focus on what is most important for students to know at each age level. Once these principles have been decided, then a more effective survey can be created that assesses what teachers understand about nutrition with regard to the "big ideas" in nutrition.

The creation, implementation, and review of nutrition lessons with fifth graders was insightful for the researcher and could be used in a number of ways for future research. Any type of curriculum could be evaluated using students' feedback.

Language arts textbook publishers could use this method to research which stories to

include in their anthologies based on student feedback about interest level and information learned. Teachers could use this technique while doing action research within their own classroom. Even with published curriculum, the teachers could get feedback on lessons from students that would help the teacher guide and modify the curriculum to meet students' needs. Finally, in preparation for a professional development course, the facilitator/instructor would be able to present student feedback for their ideas to the workshop's attendees. If they had allowed their students to evaluate the information and give feedback before teaching the in-service, then they would be able to share this unique insight with the other teachers.

The nutrition workshop was not taught with the traditional professional development class approach, nor was it a completely participant driven endeavor. Instead this hybrid approach allowed the participants to guide some of the content of the workshop, actively play a contributing role, and receive instruction from the facilitator. The participants reported enjoying the format of the workshop and took a lot of ownership in providing typed lesson plans with reflection to share with their peers. They were active and engaged during the workshop and recollected many of the ideas they had been taught on their surveys at the end of the each workshop. This type of workshop could be researched more in-depth using different content areas.

In order to better explore the success of this type of workshop for nutrition education, the adjustments made during the limitations section could be carried out. A new survey could be created and used as a pre-post assessment. This assessment would be open-ended and focus more on how the teacher would present the information to their students instead of nutrition content. Another change would be to use the first workshop,

or the first part of each workshop, to teach the teachers nutrition content. After which, they would explore resources, lesson plans, and ideas on how to teach those ideas to their students.

Overall, this exploration into nutrition education was a good introduction into the different levels and types of nutrition education associated with the elementary classroom. Students, preservice teachers, and classroom teachers were incorporated into this study of nutrition education. From these groups of individuals, ideas and information has been retained that will hopefully inspire changes in the classroom, at the dinner table, in teacher education programs, and ultimately in society as a whole. These are baby steps in the long journey of change that is needed to bring America's children back to good health, but they are steps in the right direction.

## APPENDIX A

## LESSON PLAN CREATED BY PRESERVICE TEACHERS

Title: Healthy vs. Unhealthy Lifestyles

Grade: 4<sup>th</sup> grade

Time: 30-40 minutes

Type: whole class activity

Instructional Goal: For students to understand and be able to compare and contrast healthy and unhealthy lifestyles.

Objective: After a think-pair-share activity, the students will be able to identify elements of healthy and unhealthy lifestyles by successfully listing the characteristics on a T-chart.

Standard: AZSS 1CH-E3. Explain how health, growth, and development are influenced by the interaction of body systems, genetics, environment, and lifestyle PO1. Contrast healthy and unhealthy lifestyles.

Beginning: Through modeling the thinking, the teacher will show pictures of healthy and unhealthy behaviors to the students and ask which category the behavior would be, i.e. a man smoking versus a woman jogging. Conduct a think-pair-share activity by partnering students up. Ask the student to think of examples of what they think is healthy and unhealthy behaviors. Have them partner with another student and share their ideas. The pairs should write the healthy things on a green post-it note, and the unhealthy things on a red post-it note.

Middle: Students place post-it notes under what side of the chart they think their choices go under. After every student has gone up to the board and placed the post-its on the T-chart, they will return to their seats for a whole group discussion. The teacher will lead the discussion and read the post-it notes aloud to the whole class. If the students disagree on post-its and their placements, they will have to explain why they feel it should not be there. After a unanimous agreement on the post-its and their placements, the students will then write a reflection, consisting of two paragraphs, which will describe a healthy choice and an unhealthy choice.

End: The students will be asked to volunteer and read their paragraphs to the class. The teacher will then ask the question, “Why is it important to understand and compare healthy and unhealthy lifestyles?” because the students will be exploring the effects of both lifestyles at a later date.

Assessment: Students will be informally assessed through observation during the think-pair-share activity and classroom discussion based on their participation and focus on the task. Students will be formally assessed on their individual reflections, based on content and ideas.

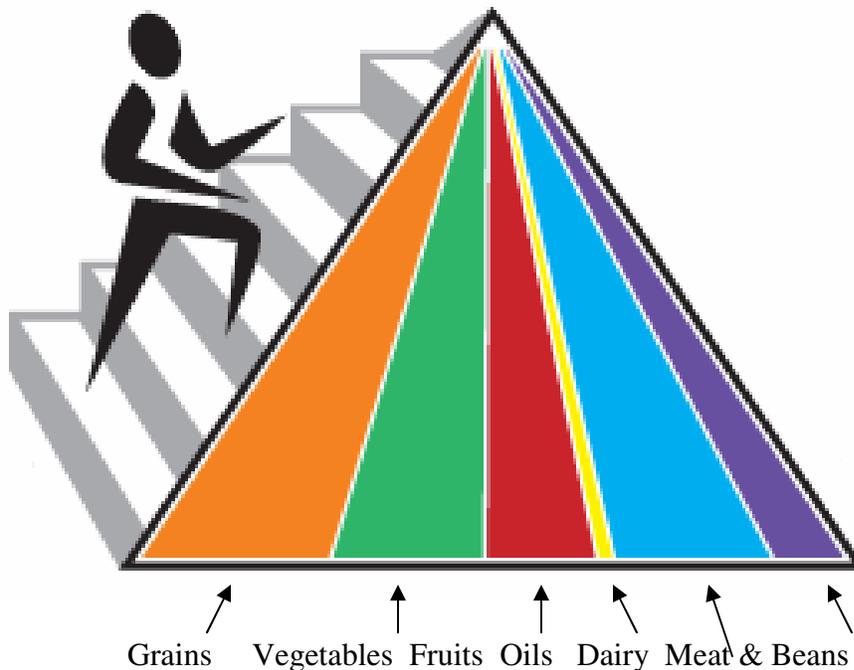
Extension: A math lesson will be given. Student will have to keep a journal jog of their caloric intake for a day. They will be asked to add up their total amount of calories.

Accommodations: Students with special needs will be allowed to draw pictures in their journals describing a healthy choice/activity as well as an unhealthy choice/activity. Students with special needs will be strategically placed with high-level partners.



Nutrition Survey

Using the new USDA Food Pyramid picture below, please answer the following questions.



1. Have you seen this new version of the food pyramid? If yes, please explain when, where and why?

Yes\_\_\_ No\_\_\_

Explain\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2. Which of the following are examples of grains? (Check all that apply)

- |                                       |                                    |                                  |                                       |
|---------------------------------------|------------------------------------|----------------------------------|---------------------------------------|
| <input type="checkbox"/> yogurt       | <input type="checkbox"/> spinach   | <input type="checkbox"/> popcorn | <input type="checkbox"/> swiss cheese |
| <input type="checkbox"/> pork chop    | <input type="checkbox"/> cereal    | <input type="checkbox"/> carrots | <input type="checkbox"/> strawberries |
| <input type="checkbox"/> baked potato | <input type="checkbox"/> corn      | <input type="checkbox"/> apples  | <input type="checkbox"/> brown rice   |
| <input type="checkbox"/> milk         | <input type="checkbox"/> soy beans | <input type="checkbox"/> tuna    | <input type="checkbox"/> bananas      |

3. Which of the following are examples of meats & beans? (Check all that apply)

- |                                       |                                    |                                  |                                       |
|---------------------------------------|------------------------------------|----------------------------------|---------------------------------------|
| <input type="checkbox"/> yogurt       | <input type="checkbox"/> spinach   | <input type="checkbox"/> popcorn | <input type="checkbox"/> swiss cheese |
| <input type="checkbox"/> pork chop    | <input type="checkbox"/> cereal    | <input type="checkbox"/> carrots | <input type="checkbox"/> strawberries |
| <input type="checkbox"/> baked potato | <input type="checkbox"/> corn      | <input type="checkbox"/> apples  | <input type="checkbox"/> brown rice   |
| <input type="checkbox"/> milk         | <input type="checkbox"/> soy beans | <input type="checkbox"/> tuna    | <input type="checkbox"/> bananas      |

4. How many cups of vegetables does the USDA recommend eating everyday?
  - a. 1
  - b. 2.5
  - c. 5
  - d. does not have recommendations
  
5. What types of food should students be taught to limit?
  - a. grains
  - b. vegetables
  - c. fruits
  - d. oils
  - e. milk products
  - f. meat & beans
  
6. How large is a serving size of milk?
  - a. 5 oz
  - b. 6 oz
  - c. 8 oz.
  - d. 12 oz.
  
7. Which of the following foods has the highest fat content?
  - a. hamburger
  - b. taco salad with ground beef, no cheese
  - c. chicken nuggets (10 piece)
  - d. fried fish filet sandwich
  
8. What is the recommended caloric intake for a moderately active 10-year old?
  - a. 1600
  - b. 1800
  - c. 2000
  - d. 2400
  
9. Which of the following individuals need the most calories?
  - a. moderately active, 40-year old female
  - b. active, 10-year old male
  - c. sedentary, 5-year old female
  - d. active, 17-year old male

Use the nutrition labels below to answer questions 10-13.

### American cheese

Nutrition Facts		
Serving Size 1 slice (19g)		
Servings Per Container 24		
Amount Per Serving		
Calories	60	Calories from Fat 40
%Daily Value*		
Total Fat	4.5g	7 %
Saturated Fat	2.5g	13 %
Trans Fat	0g	0 %
Cholesterol	15mg	5 %
Sodium	250mg	10 %
Total Carbohydrate	1g	0 %
Dietary Fiber	0g	0 %
Sugars	1g	
Protein	3g	
Vitamin A	4%	Vitamin C 0%
Calcium	20%	Iron 0%

\* Percent Daily Values are based on a 2,000 calorie diet.

### Fruit-flavored yogurt

Nutrition Facts		
Serving Size 6 ounces (170g)		
Servings Per Container 1		
Amount Per Serving		
Calories	170	Calories from Fat 15
%Daily Value*		
Total Fat	1.5g	2 %
Saturated Fat	1g	5 %
Trans Fat	0g	0 %
Cholesterol	10mg	3 %
Sodium	125mg	5 %
Total Carbohydrate	33g	11 %
Dietary Fiber	0g	0 %
Sugars	30g	
Protein	6g	
Vitamin A	0%	Vitamin C 0%
Calcium	20%	Iron 0%

\* Percent Daily Values are based on a 2,000 calorie diet.

10. Which of the following is true?
- Yogurt has more calories from fat than American cheese
  - Yogurt and cheese both provide your daily allowance of Vitamin C.
  - If you are watching your cholesterol, you should eat more cheese
  - American cheese is higher in Vitamin A than yogurt.
11. In grams which serving size is larger?
- American cheese
  - Fruit-flavored yogurt
  - They are the same
12. What nutritious value does yogurt provide?
- Fat
  - Protein
  - Vitamin D
  - Fiber
13. Where are nutrition labels usually located?
- On the outside of the food's packaging
  - On the inside of the food's packaging
  - On a magnet on your fridge
  - Nutrition labels are not usually provided

14. Which of the following factors is not used to calculate BMI, body mass index?
- height
  - age and gender
  - caloric intake
  - weight

15. Which of the following trends has been seen in the last five to ten years?
- increase in childhood obesity
  - increase in childhood Type II Diabetes
  - increase in childhood cardiovascular disease
  - all of the above

16. Which of the following is true?
- 10% of new Type II diabetes patients are children/adolescents
  - 20% of new Type II diabetes patients are children/adolescents
  - 33% of new Type II diabetes patients are children/adolescents
  - 47% of new Type II diabetes patients are children/adolescents

17. Which causes are 90% responsible for the increase in childhood Type II diabetes?
- excess weight and lack of exercise
  - poor nutrition and hygiene
  - smoking and alcohol consumption
  - marijuana and poor flossing

18. In your opinion, how important is the teaching of nutrition in the elementary classroom?

Extremely          Very          Somewhat          Not Very          Not at all

Explain your response \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

19. How often do you think nutrition is taught in elementary classrooms in your district?

Weekly          Monthly          Periodically          Not taught at all

Explain your response \_\_\_\_\_  
 \_\_\_\_\_

20. In your opinion, do you feel it is the responsibility of elementary teachers to teach nutrition?

Yes\_\_\_ No\_\_\_

Explain your response \_\_\_\_\_  
 \_\_\_\_\_

21. Please describe briefly a nutrition lesson that you have taught in the past three years.

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22. What barriers, if any, keep teachers from teaching nutrition in their elementary classrooms?

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23. IF you were to attend an in-service on nutrition, please rank the following items with respect to what you would be most interested in focusing on.

lesson plans  
 nutrition content  
 facts and figures of statistics reflecting the importance of nutrition  
 review of state standards on nutrition  
 other (please write in \_\_\_\_\_)  
 other (please write in \_\_\_\_\_)

24. In your opinion, are students given the opportunity to eat healthy in the cafeteria?

Yes\_\_\_ No\_\_\_

Give examples to support your claim \_\_\_\_\_

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25. What advice or input do you have as I work toward supporting the teaching of nutrition in the classroom?

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## Post-Survey Questions

## Survey Question

1. Please rate this survey on its overall clarity. (Circle one.)

Easy to Understand    Understandable    Needs a little work    Needs a lot of work

2. In your opinion, how well did this survey assess the nutrition content pertinent to the elementary teacher? (Circle one.)

Excellent    Very Well    Pretty Well    Needs Improvement    Lacking

3. Please list any topics you think should have been covered in this survey that were not present.

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4. In your opinion, how well did this survey assess the needs and ideas of teachers with respect to future support of their teaching of nutrition? (Circle one.)

Excellent    Very Well    Pretty Well    Needs Improvement    Lacking

\*\*\*Please note that for formatting purposes, the clarity ranking column was removed from this survey. Participants circled a clarity score of one through five and were given space to make comments and/or suggestions.

## APPENDIX C

## TEACHERS' AND PRESERVICE TEACHERS' RESPONSES TO THE NUTRITION SURVEY

	Number of participants with the correct response			
	Teachers		Preservice Teachers	
	n	%	n	%
1. How many cups of vegetables does the USDA recommend eating everyday?	35	48.6	18	72.2
2. What types of food should student be taught to limit?	35	80	18	77.8
3. How large is a serving size of milk?	35	77.1	18	66.7
4. Which of the following foods has the highest fat content?	35	2.9	18	22.2
5. What is the recommended caloric intake for a moderately active 10-year old?	35	28.6	18	22.2
6. Which of the following individuals need the most calories?	35	57.1	18	55.6
7. Which of the following is true?	35	88.6	18	66.7
8. In grams which serving size is larger?	35	88.6	18	88.7
9. What nutritious value does yogurt provide?	35	80	18	72.2
10. Where are nutrition labels usually located?	35	97.1	18	88.9
11. Which of the following factors is not used to calculate BMI, body mass index?	35	74.3	18	55.6
12. Which of the following trends has been seen in the last five to ten years?	35	85.7	18	88.9
13. Which of the following is true?	35	31.4	18	50
14. Which causes are 90% responsible for the increase in childhood Type II diabetes?	35	88.6	18	50
Total Mean Score	35	66	18	67

## APPENDIX D

## AMENDMENTS TO SECOND DRAFT OF NUTRITION CONTENT SURVEY

The second version of the nutrition content survey was identical to the first version with the exception of the changes and additions below.

*Changed Question:*

7. Which of the following foods has the highest fat content?
- plain hamburger
  - plain taco salad with ground beef, no cheese
  - plain fried chicken nuggets (10 piece)
  - plain fried fish filet sandwich

*Added Questions:*

18. Which of the following is a reason to eat fruits and vegetables.
- to gain weight
  - to intake vitamins A, C, & E
  - to raise blood pressure
  - to increase the risk of cancer
19. Why is it important to consume dairy products like milk?
- increase calorie consumption and overall weight
  - increase naturally consumed fats
  - to intake protein for the lutien
  - to intake calcium for bones
20. Why is it important to eat?
- to decrease exercise endurance and heart rate
  - without eating we would have high metabolism and live longer
  - provides nutrients and energy to body
  - it helps keep you from taking drugs
21. Approximately how many calories can be burned by a brisk 30-minute walk?
- 10 calories
  - 80 calories
  - 200 calories
  - 400 calories
22. Which of the following would be the most nutritious lunch for an elementary student?
- turkey sandwich, carrot sticks, apple, and milk
  - a Twinkie, Ho-ho, and popsicle
  - ham sandwich, celery sticks, Gatorade, and fat-free pudding
  - pizza, soda, and ice cream



6. 1 large apple would equal \_\_\_\_
- a. one-half of your daily allowance of fruits
  - b. one-fourth of your daily allowance of fruits
  - c. all of your daily allowance of fruits
  - d. two-thirds of your daily allowance of fruits
7. Which of the following is NOT a vitamin found in milk?
- a. Vitamin A
  - b. Vitamin D
  - c. Vitamin E
  - d. Riboflavin
8. How many ounces of milk and/or dairy products should a person intake daily?
- a. 8 oz
  - b. 16 oz
  - c. 24 oz.
  - d. 32 oz.
9. Which of the following are good examples of sources for Vitamin C?
- a. oranges, cheddar cheese, and broccoli
  - b. strawberries, grapefruit, and broccoli
  - c. oranges, milk, and peppers
  - d. strawberries, grapes, and yogurt
10. How much of the human body's weight comes from water?
- a. 60%
  - b. 90%
  - c. 45%
  - d. 33%
11. Which of the following is NOT a vitamin found in spinach?
- a. Vitamin K
  - b. Folate
  - c. Vitamin B<sub>6</sub>
  - d. Vitamin D
12. Which of the following is NOT a disease caused by nutrition deficiency?
- a. Rickets
  - b. Cretinism
  - c. Scurvy
  - d. Osteomalacia

13. Which of the following foods would be the *healthiest* for a student to bring for snack?
- Baked Cheese Crackers
  - Nonfat fruit yogurt
  - Diced peaches in light syrup
  - Sour cream & Onion Pringles
14. Where are nutrition labels usually located?
- the back of the packaging
  - the inside of the packaging
  - they are not readily available
  - on the actual food product
15. What does “% Daily Value” mean?
- the minimum amount you should eat in a serving
  - the Vitamin A in each product
  - the portion each serving gives toward the day’s total
  - the amount of Saturated Fat is in the total fat
16. In order to find the percentage of sugar weight in a product what should you do?
- simply read the nutrition label
  - look on the internet for conversion table
  - divide sugar grams by total grams then multiply by 100
  - divide grams of sugar and carbohydrates then multiply by 100
17. Which of the following categories is NOT included on a nutrition label?
- cholesterol
  - lutein
  - protein
  - carbohydrate
18. Which of the following meals is most healthy *and* includes a variety of food groups?
- hamburger, French fries, and a vanilla shake
  - vegetable stir-fry with peppers, onions, tomatoes, and zucchini
  - blackened steak, potatoes, carrots, and green beans
  - grilled chicken, brown rice, green beans, and fruit salad
19. Which is NOT a function of fat in the body?
- fat is the only nutrient stored as energy
  - fat protects internal organs
  - fat helps maintain body temperatures
  - fat provides the most amount of calories per gram

20. Which of the following has the most energy
- 1 gram of carbohydrate
  - 1 gram of fat
  - 1 gram of protein
  - 1 gram of sodium
21. Which of the following nutrients provide energy?
- water, protein, and vitamins
  - vitamins, protein, and fat
  - proteins, carbohydrates, and fats
  - minerals, carbohydrates, and proteins
22. A food that contains 2 grams of fat, 11 grams of carbohydrates, and 6 grams of protein. How many calories does that food provide?
- 86 calories
  - 95 calories
  - 110 calories
  - 142 calories
23. Which of the following is NOT a reason why it is important to eat breakfast?
- more brain power to complete mental activities
  - more energy to do daily duties
  - lower weight overall
  - lower metabolism throughout the body
24. Some of the health benefits of fiber include
- increased risk of heart disease
  - increased risk of diverticulosis
  - increased feeling of fullness
  - increased likelihood of hemorrhoids
25. What is a calorie?
- unit of fat
  - amount of food
  - amount of carbohydrates
  - unit of energy
26. What is the recommended daily caloric intake for a moderately active 10-year old?
- 1600
  - 2800
  - 2000
  - 2400

27. Which of the following individuals need the most calories?
- moderately active, 40-year old female
  - active, 10-year old male
  - sedentary, 5-year old female
  - active, 17-year old male
28. How many calories would a 154-pound man use walking for 30 minutes?
- 140 calories
  - 245 calories
  - 350 calories
  - 405 calories
29. How many calories are in one slice of multigrain bread?
- 65 calories
  - 110 calories
  - 156 calories
  - 185 calories
30. Which of the following trends has been seen in the last five to ten years?
- increase in childhood obesity
  - increase in childhood Type II Diabetes
  - increase in childhood cardiovascular disease
  - all of the above
31. What grade do you teach?  
K \_\_\_ 1 \_\_\_ 2 \_\_\_ 3 \_\_\_ 4 \_\_\_ 5 \_\_\_ 6 \_\_\_ Other \_\_\_\_\_
32. How many years have you been teaching?  
0-5 \_\_\_ 6-10 \_\_\_ 11-15 \_\_\_ 16-20 \_\_\_ 21+ \_\_\_
33. How many years of education have you completed?
- \_\_\_ Bachelor's degree  
\_\_\_ Bachelor's degree plus 18 credits  
\_\_\_ Bachelor's degree plus 36 credits  
\_\_\_ Master's degree  
\_\_\_ Master's degree plus 18 credits  
\_\_\_ Master's degree plus 36 credits
34. Where have you received nutrition education? Mark all that apply.
- \_\_\_ Never  
\_\_\_ Before High School  
\_\_\_ High School  
\_\_\_ Undergraduate  
\_\_\_ Post Graduate  
\_\_\_ Professional Development

35. When do you typically teach nutrition during the school year?

- weekly  
 monthly  
 during a specific unit(s)  
 I do not teach nutrition

36. In your opinion, is nutrition a priority in your *district's* curriculum? (Circle one)

Strong yes	Yes	Somewhat	Not really	Not at all
5	4	3	2	1

37. How *often* do you think nutrition is taught in elementary classrooms at *your school*?

Weekly	Monthly	Semi-annually	Annually	Not at all
5	4	3	2	1

38. In your opinion, how *important* is the teaching of nutrition in the *elementary classroom*?

Extremely	Very	Somewhat	Not very	Not at all
5	4	3	2	1

39. IF you were to attend an in-service on nutrition, please mark which item would interest you most.

- lesson plans  
 nutrition content  
 facts and figures of statistics reflecting the importance of nutrition  
 review of state standards on nutrition  
 other

## APPENDIX F

## SYNOPSIS OF NUTRITION LESSONS

The first lesson, “Nutrition Statistics, Childhood Obesity, & Diseases” taught the students how to calculate Body Mass Index (BMI) and discussed the increasing rates of obesity and related diseases in children. At the start of the lesson, the pretest was taken to assess students’ understanding of obesity, related diseases, and exercise’s part in helping people stay healthy. During this lesson, students used a worksheet to calculate the BMI of four individuals and place them in weight categories. Although this lesson was intentionally structured not to target students in the class personally, most of the students tried to hide the fact that they were also calculating their own BMI. Ways of lowering your BMI were then identified by circling a collection of possible actions.

The second half of the lesson focused more on the statistics of childhood obesity and disease. Students read some statistics and answered three follow-up comprehension questions. A projected overhead helped them fill out a graphic organizer illustrating good health verses poor health and how poor health could lead to diseases.

“Food Groups & the Food Pyramid” was an exploratory lesson into students’ understandings of food groups. Each group of 3-5 students was given a bag full of plastic food. Each group was asked to divide the food into groups and to label each group. Students created their own categories and then the class took a museum walk. They spent 30 seconds at each of the other tables looking at the categories other groups had created *without* touching anything. After validating the students’ choices for categorizing their foods, the teacher introduced the food pyramid as the way the government grouped

different types of foods. The pyramid was covered briefly as a transition from the students' food grouping activity to the next lesson on the new food pyramid. The pre/post test and student questionnaire followed.

The nutrition lesson called "The Food Pyramid & Food Portions" followed introducing the new food pyramid in more depth. Students were given a copy of the food pyramid that had been ordered from the United States Department of Agriculture's website (U.S. Department of, 2005). The packet from the USDA provided each student with their own colored food pyramid, as well as a poster-size food pyramid for the classroom. The poster had portion sizes that had to be copied on to the students' food pyramids. Students discussed the changes from the old pyramid to the new, as well as the different portion sizes that were recommended for each food group. Once again a pre/post assessment was used followed by a student questionnaire about the lesson.

As part of a homework assignment for "Food Groups & Food Logs" students completed a three day food log. They had to write the time of day, food they ate, and approximate serving size of each food. For the pre/post test, students had to predict which food group they ate from the most and least. During this lesson, students were asked to identify the food group for each of the foods on their food log. When foods, like pizza and hamburgers, were listed, the students were asked to choose the two food groups that made up the biggest portion of the item. For example, pizza was described as a bread and dairy product for the crust and cheese. The pepperoni was left out because it was a smaller portion of the food than the other two ingredients.

On their worksheets, students were asked to tally how many servings from each food group they ate each day. The final chart was a total of all of the servings for each

category that they had eaten over the three day time period. Students were then asked to average their consumption under each food category. Unlike the other pre/post tests, students were able to compare predicted data to actual data.

The Blast-Off Game gave the students an opportunity to use their food log data in a fun and educational way. On the USDA's website, there is a child-friendly game called Blast-Off. Using their understanding of food groups and serving sizes, students can successfully launch a rocket. A presentation station was used in the classroom to play the game with the whole class. Students were required to fill out their food pyramid worksheet, as the teacher manipulated the game. The goal of the game is to have the right balance of fuel to get the rocket ship across the universe. In order to get fuel, one must choose foods that help attain the daily requirements for each food group. Exercise must also be included in order for the rocket to make it to its destination.

The following day, in the computer lab at their school, the students were given the opportunity to play the game by themselves or with a partner. They filled out a worksheet to record what foods they chose to fuel their rocket. Students were asked to complete a pre/post test and student questionnaire about this lesson.

Approximately two months prior to the introduction of the nutrition unit, students were asked to start bringing in food packaging that was empty, clean, and had a nutrition label. With a now large collection, the teacher distributed 10-15 labels per group of 3-5 students. The students were asked to locate the nutrition label and the class discussed what information was located on these labels. Students then discussed why it was important to eat and that there were eating disorders where people did not eat right/enough and became very sick. The groups were asked to put the nutrition labels in

order using different criteria: most calories to least calories, most grams of fat to least grams, most sugar to least sugar. At the end of the lesson, “Food Labels” students completed their posttest and student questionnaire.

The last nutrition lesson, “Making Meals” focused on the use of labels and the students’ understanding of calories and daily nutritional needs. Using the Food Calorie Table students were asked to create a healthy meal that gave them a healthy number of calories, fat grams, protein, and carbohydrates for the day (Lynch, 2002). After deciding on three healthy meals, they calculated to make sure that the meals would give them approximately 2000 calories and less than 65 grams of fat for the day. They were only allowed to choose foods that they would actually eat. The Food Calorie Table lists hundreds of foods and their caloric, protein, fat, and carbohydrate values. It allowed for a more complete list of nutrition facts than just the nutrition labels that had been collected from the students. Meats, dairy, and other perishables are included on the list, where these labels would often be unsafe to store.

During the nutrition unit, there were two lessons that were entitled, “Just Try It!” These lessons were taste tests with purpose. Students were allowed to decline participation if they did not want to eat or could not eat the foods offered. The first lesson focused on chocolate. The students were asked to try white, milk, and dark chocolate chips. They had to suck, not chew, on the chips and write down descriptions of the tastes and textures on their worksheets. The teacher discussed facts about chocolate like dark chocolate has antioxidants and no dairy. White chocolate is not actually chocolate at all. After the lesson students were asked to write down at least one fact that they had learned about chocolate.

The second “Just Try It!” lesson included Saltine and Triscuit crackers. Students were asked to let their saliva dissolve the crackers on their tongues. The students compared the Saltine and the Triscuit after each had been in their mouths for 1 minute. The class then discussed the health benefits of eating whole grain, like the Triscuit, over white refined flour found in Saltine crackers. Again students were asked to write down at least one fact that they had learned from the day’s lesson.

## APPENDIX G

## RECRUITMENT LETTER FOR “NUTRITION THROUGH THE EYES OF FIFTH GRADERS”

April 27, 2006

Dear Parents,

I can hardly believe that the year is almost over. It seems like only a little while ago I was organizing our classroom for the first day of school. Yet, I know when I look at each face that we have learned from one another, about one another, and progressed through a year of life together, as a class. Now, I find myself reflecting thankfully on the enthusiasm for learning that so many of my students displayed throughout the year.

I am writing this letter today to ask for your help, on a more personal level. As many of you know I too am a student. I am currently working on my PhD at the University of Arizona. My research focus is nutrition and nutrition education, which is the same as our next science unit. Today, I am requesting your permission to involve your child in my pilot study of the nutrition curriculum that I designed. All students will be learning nutrition in this unit and fully participating in all activities, but I need your consent to use the information in my study. For example, when students take tests, I will keep track of the classes' progress. I will not keep individual data, just the scores to help me evaluate the lesson I taught. Students will also be asked to give feedback on the lessons. Only the *data* from students' answers will be used. All information included in my study will be kept anonymous.

If you are willing to consent to your child's participation in this study, you will find a copy of the consent form attached. The form is for your consent and your child's assent to participating in the study. Please read it over, initial at the bottom of each page, sign the second page, and have your child sign the last page. After receiving the signed copy, I will make a photocopy and send it home with your child for you to keep. Please remember that your child's participation in this study is voluntary and you may quit the study at any time.

Thank you so much, in advance, for allowing your child to participate in my student. If you have any questions please e-mail or call.

Sincerely,

Flavia Gibson  
[\\*\\*\\*@schoolmail.org](mailto:***@schoolmail.org)  
(520) \*\*\*\_\*\*\*\*

## APPENDIX H

## COMMENTS FROM EXPERT REVIEW OF NUTRITION CONTENT SURVEY

Question #3: Which of the following are examples of meats & beans?

**Comment:** “Give more examples of foods in the meats and bean category.”

Question #5: Which type of food should students be taught is most important to limit?

**Comment:** “Add sweets”

Question #7: Which of the following fast foods has the highest fat content?

**Comments:** “What size?” –about hamburger and

“Is this with shell?” –about taco salad

Question #9: Which of the following individuals need the most calories?

**Comment:** “Is this something they would go on mypyramid.gov?”

Question #11: In grams which serving size is larger?

**Comment:** “Relevancy?”

Question #12: What nutritional value does yogurt provide?

**Comment:** d—crossed out “fiber” and added “Calcium”

Question #19: Why is it important to consume dairy products like milk?

**Comment:** c—corrected spelling of lutein

## APPENDIX I

## NUTRITION PRE-UNIT ASSESSMENT

1. What is nutrition?
2. Why is it important to eat?
3. What kinds of food are good for you? Why are they good for you?
4. What kinds of food are bad for you? Why are they bad for you?
5. What is the food pyramid? Draw it if you can.
6. Name the different food groups.
7. Why should you drink milk?
8. Why do people use nutrition labels? Tell me as much as you can about this label.
9. What is a calorie? Can you gain and/or lose calories? If so, how?
10. Write down anything you would like to know about nutrition. (You can list them or ask questions.)

## APPENDIX J

## EXAMPLE OF A NUTRITION LESSON'S PRE-POST TEST

## Lesson 1

## Nutrition Statistics, Childhood Obesity &amp; Diseases

**PRETEST**

1. What is the difference between overweight and obese?
2. What are three of the childhood diseases that are caused by obesity?
3. What are three ways a person can lower their weight?

## Nutrition Statistics, Childhood Obesity &amp; Diseases

**POSTTEST**

1. What is the difference between overweight and obese?
2. What are three of the childhood diseases that are caused by obesity?
3. What are three ways a person can lower their weight?

## APPENDIX K

## STUDENT QUESTIONNAIRE FOR NUTRITION LESSONS

Name of the lesson:

Date of the lesson: Wednesday, May 3, 2006

1. How much did you enjoy the nutrition lesson today?

tons	a whole lot	some	not much	very little	not at all
6	5	4	3	2	1

2. How much did you learn about nutrition today?

tons	a whole lot	some	not much	very little	not at all
6	5	4	3	2	1

3. Write at least one thing you learned today?

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4. What did you like *most* about today's lesson?

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5. What did you like *least* about today's lesson?

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6. Do you have any suggestions on how I could make this lesson better?

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More comments, thoughts, advice, or anything you would like to write about today's lesson

## APPENDIX L

## NUTRITION POST-UNIT ASSESSMENT

1. What is nutrition?

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1b. Why is it important to understand good nutrition?

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2. Why is it important to eat?

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3. Healthy Food

- a. Name one food group that is healthy for you. \_\_\_\_\_
- b. Give three examples of foods in that food group.  
\_\_\_\_\_
- c. Tell why it is important for you to eat foods from that food group  
\_\_\_\_\_

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4. Unhealthy Foods

- a. Name one food group that is unhealthy for you.  
\_\_\_\_\_
- b. Give three examples of foods in that food group.  
\_\_\_\_\_
- c. Tell why it is important for you to eat less foods from that food group  
\_\_\_\_\_

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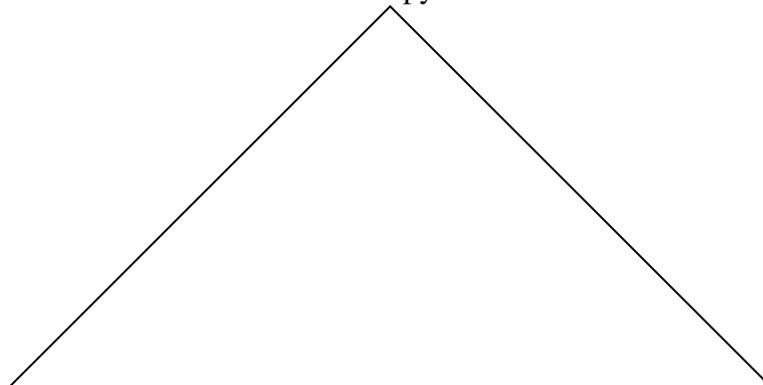
---

5. What is the food pyramid?

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6. Draw and label the NEW food pyramid.



7. Why should you drink milk?

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8. Why do people use nutrition labels?

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8b. List as many items as you can remember that are on a food label.

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9. What is a calorie?

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9b. Can you gain and/or lose calories? If so, how?

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10. Do you think what you have learned about nutrition will affect what food choices you will make? Why or why not?

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## APPENDIX M

## PRE-POST UNIT QUESTION COMPARISON

	Question on Pretest	Question on Posttest
Question 1	What is nutrition?	What is nutrition? Why is it important to understand good nutrition?
Question 2	Why is it important to eat?	Why is it important to eat?
Question 3	What kinds of food are good for you? Why are they good for you?	Healthy Food: Name one food group that is healthy for you. Give three examples of foods in that food group. Tell why it is important for you to eat foods from that food group.
Question 4	What kinds of food are bad for you? What are they bad for you?	Unhealthy Foods: Name one food group that is unhealthy for you. Give three examples of foods in that food group. Tell why it is important for you to eat less foods from that food group.
Question 5	What is the food pyramid? Draw it if you can.	What is the food pyramid?

---

Question 6	Name the different food groups.	Draw and label the NEW food pyramid.
Question 7	Why should you drink milk?	Why should you drink milk?
Question 8	Why do people use nutrition labels? Tell me as much as you can about this label. (Label on overhead)	Why do people use nutrition labels? List as many items as you can remember that are on a food label.
Question 9	What is a calorie? Can you gain and/or lose calories? If so, how?	What is a calorie? Can you gain and/or lose calories? If so, how?
Question 10	Write down anything you would like to know about nutrition.(You can list them or ask questions.)	Do you think what you have learned about nutrition will affect what food choices you will make? Why or why not?

---

## APPENDIX N

## SYNOPSIS OF NUTRITION WORKSHOPS

**Nutrition Workshop Session 1**

On the first night of the workshop teachers were asked to sign in, grab a notebook, and have a seat. Healthy snacks were provided consisting of several fresh fruits, light popcorn, and pretzels. As per district policy, the researcher began with an overview of the rights, responsibilities, and reminders of the professional development process. After which an overview of the agenda was shown on the overhead, while the participants read their copy located inside the notebooks. The design and goals of the workshop were addressed on the overhead as well as hard copy.

Design:

- Three two-hour sessions with a two-week interim between sessions allows for participants to practice what they learn and create.
- This workshop is designed to be a collaborative effort by all participants.
- The facilitator will provide opportunity, supplies, and support for the efforts of the participants.
- Individual and collaborative efforts will benefit the entire group with ideas and resources.

Goals:

- Participants will have a greater understanding of nutrition concepts.
- Participants will feel more confident about teaching nutrition to their students.
- Participants will have better resources for teaching their students nutrition concepts.

Each participant was given the nutrition survey that had been previously administered throughout the district. Most of them had taken the survey during the previous district-wide administration. The purpose of this administration was to evaluate whether this small group was representative of the larger group.

In order to convey the importance of nutrition education in the elementary classroom, the nutrition statistics and calculations portion of the workshop came first. The participants' notebooks contained reproducible master copies of all of the worksheets from the researcher's nutrition unit studied the previous semester with her fifth graders. Based on feedback given from the students on this lesson, the researcher split the lesson in two and gave the statistics part more depth. Initially the lesson had been too long, especially since it was full of facts and statistical figures.

Maps, charts, articles, and other current information and statistics on childhood obesity were given from reputable internet sources. While some articles and visual representations were printed and included in the participants' notebooks others were not. Instead, the last section of the notebook was reserved for lists of multiple website resources for further research into the different elements of nutrition education as covered in the workshop.

As part of the section on statistics and childhood obesity, hypothetical scenarios for body mass index calculations were practiced. Inevitably, the researcher reported, the students will want to figure out their own weight category even though it is not a requested part of the lesson. The researcher felt that this part of the nutrition curriculum was best suited at the forefront as it serves to persuade people of the importance of the rest of the information. For teachers in the workshop, she hoped that it would help them buy into trying more of the ideas presented and created in the workshop in their own classrooms.

The participants' favorite of the workshop, as well as the students; favorite during the nutrition lessons, was the "Just Try It!" events. The rules of the "Just Try It!" events are

simple; once you know what the food products for the lesson are you choose to be all in or all out. Students cannot choose to participate in some, but not others. The first “Just Try It!” lesson was chocolate, just like performed with the students in the “Nutrition Through the Eyes of Fifth Graders”. The participants were instructed that they would experience the “Just Try It!” similar to the way that they could teach it in their own classrooms. The researcher gave each participant three chocolate chips: one milk, one dark, and one white. As they tasted each chip, the researcher talked about the benefits of dark chocolate, no dairy for those who are allergic and antioxidants for all. Participants were asked to write down one thing that they learned about chocolate.

The next section of the nutrition workshop focused on the federal government’s implementation of a new Wellness and Food Safety Policy in schools (National School, 2006). This new policy has presented a challenge to teachers and food service personnel working in elementary and junior high schools. Classroom parties, student birthdays, and food available at schools have all been changed. The high school remains unaffected by these changes, but all other grades are adapting to these policies as quickly as possible. School cafeterias, snack bars, and vending machines are being modified to meet the new requirements. Student’s birthdays must be celebrated with store bought goods that are healthy. Parents are no longer allowed to bring homemade goodies for their children to share with classmates.

A list of nutrition criteria has been distributed district-wide, but the manufacturers of food products are not yet making products that meet these requirements and that agree with the taste buds of children, or parents and teachers. For example, in the store bought cookie section of a grocery store, the only product that was found to meet the criteria

were the Fig Newtons. A list of products from Sunbelt and Little Debbie that fit the criteria was brought by one of the participants. Interestingly, none of the products on the list could be found on the shelf of the local grocery stores for the researcher's inspection. The lesson that was used to help students understand these new policies is entitled, "Making Sense of Food Labels". Using multiple food labels students learn to read the labels. This lesson was modified for higher interest and better comprehension after the study conducted with fifth graders. These skills can then be used, practically, to evaluate whether a product meets the Wellness and Food Safety criteria.

The last event of the night, was another "Just Try It!" This time Saltines and Triscuits were passed out to each participant. They were instructed to put the cracker in their mouth, but not chew. The Saltine dissolves. The Triscuit, undergoing the same treatment, maintains its shape. The teacher can use this opportunity to teach the students the difference between white refined flour and multi-grain and wheat products. The students are then asked to write a fact they learned about this lesson.

The two hours were almost up and the researcher wrapped up the workshop with a homework assignment and an exit survey. The homework assignment sheet was located in the participants' notebooks. Each participant was asked to teach a nutrition lesson during the two week interim. Participants were asked to write a summary and reflection of a nutrition lesson and bring it with them to the next workshop. The summaries would be collected, copied, and then distributed among all of the participants in the workshop. For the work of one lesson, everyone would receive 11 lesson plans to use.

Finally, the exit survey was given and participants were asked to turn it in before they left that evening. The exit survey consisted of the following questions:

1. During the “Nutrition Statistics & Calculations” section of the workshop, what did you learn? Were you surprised by the statistics?
2. What did you think of the “Just Try It!” lessons? Would you do them in your classroom? Why or why not?
3. What is the topic of the nutrition lesson(s) you will teach before our next meeting?

## **Nutrition Workshop Session 2**

Upon arrival at the second workshop, two weeks later, the participants signed in, and received a new agenda and packet of information to add to their notebooks. After signing in, the participants were encouraged to read over the agenda for the evening.

Three groups were then formed within the workshop. Primary teachers, intermediate teachers, and special subject teachers separated into groups. The largest group consisted of primary teachers, mostly kindergarten and first grade teachers. There were five members in this group, while there were three in each of the other groups. Each group shared a detailed explanation of their lesson to their group members. After each group was finished, each person was asked to give a one to two sentence summary of their lesson. The summaries were then turned in to the researcher. Prior to the last workshop, these lesson plans were copied and distributed so that everyone would have a copy of the entire set of lesson plans created during the workshop for their repertoire.

The group lesson was followed by the third “Just Try It!” This lesson focused on different types of milk. This acted as more of a taste test than the previous lessons. When teaching this lesson, students are not told what milk they are drinking, they just have to describe the taste. The milk choices are non-fat, 1%, 2%, and vitamin D milk. As a

visual, at the end of the lesson, a glass of nonfat milk and a glass of vitamin D milk are compared by pouring a teaspoon of oil into the nonfat. By doing so the fat content becomes the same as the vitamin D milk. Students see why it is important to limit the intake of fats through milk, while the importance of milk drinking is still encouraged.

The section on “Food Groups & the Food Pyramid” included four lessons that were designed and implemented during the nutrition unit with the fifth graders. The four lessons are entitled: food groups, food pyramid & food portions, food groups & food logs, and the Blast-Off Game. A mini-lesson plan was given for each lesson and was accompanied by the necessary handouts for each lesson. A summary or brief account of the purpose and procedure for each lesson was given. The last lesson, Blast-Off Game, is found on the USDA’s website (U.S. Department of, 2005) The game allows for students to make healthy choices that provide fuel for the rocket ship. Using the presentation station, the researcher demonstrated the game for the workshop participants.

The fourth “Just Try It!” followed, with another liquid taste test. This time the beverages were regular cola, diet cola, diet caffeine-free cola, and unsweetened tea. As each of the sodas were tasted, the caloric content, artificial foods and colors were discussed. Finally, as a visual, a glass of the regular cola and a glass of the unsweetened tea were placed next to each other. Dramatically, the researcher added twelve teaspoons of sugar to the tea. The participants were then invited to try the tea, learning that the tea now had the same amount of sugar as a can of regular cola.

As before, another homework assignment was given before the participants’ departure. They were asked to try one of the ideas that they had seen that night, or make up another lesson that would have similar objectives. The participants were then given

another exit card, but this time it focused on what they would still like to learn about in the last workshop.

### **Nutrition Workshop Session 3**

The third workshop began much like the second. Participants were asked to sign in, read over the evening's agenda, and then meet with their group to share the lessons they had taught during the two-week interim. After sharing in more detail within their group, participants were asked to share a short summary with everyone. After everyone had shared, they again turned in their summaries. Later, the researcher copied the lesson plans and sent them through district mail to each of the participants.

The researcher distributed copies of the lesson plans from the previous workshops to all of the participants for their notebooks. With almost everyone participating in the creation of lessons, each participant received a total of twenty lesson plans that had been designed and taught by their colleagues. This did not include the fifteen or so lesson plans contributed by the workshop facilitator. Ultimately the participants' notebook would have over thirty-five lesson plans for their future teaching of nutrition endeavors.

The fifth "Just Try It!" included trying a variety of fresh fruits: bananas, apples, oranges, grapes, kiwi, and blueberries. Participants were encouraged to also consider doing this lesson with vegetables. The participants sampled each fruit and were given the opportunity to learn the benefits of eating each type of fruit. In the notebooks, there were resources to use when/if they taught this lesson to their own students in the future. For example, a vegetable chart, showing the vitamins and minerals found in eighteen different vegetables was included. A similar chart of fruits was also available on the same website (Decuypere, 2002). Also included in their notebook was an article

explaining the human body's necessity for different vitamins and minerals. The article was entitled "Vitamins and Minerals" (Vitamins and, 2003)

At the end of the second session, participants filled out an exit card. The last question, asked the participants what they would like to learn most in the last session. Almost unanimously, they asked for more resources. In response to their request, the researcher listed over thirty nutrition based websites under the categories of: "More teacher resources with ideas, lesson plans and supplies," "Informational sites about good nutrition," and "Informational sites about good nutrition for kids". Using the presentation station, the researcher visited some of the websites for the participants to see the resources that were available on the internet. A list of Children's Books about Nutrition was also provided from the School Nutrition Association (Children's Books, 2006).

As part of the section of nutrition resources, the researcher distributed hard copies of nine different articles on nutrition, childhood obesity, and nutrition and exercise. Instead of having all of the participants read all of the articles, each participant was given an article to read/skim and summarize for the group. As each group or individual gave their summary, the participants followed along on their own copy of the article where they could write notes or highlight important information.

The sixth, and last, "Just Try It!" is no longer allowed in schools, but was taught at the nutrition workshop anyway. Homemade goods are no longer allowed to be brought in for distribution among students due to the new Food Safety Policy. However, the lesson was taught in the workshop, in case that the Policy is later amended to exempt food associated with lessons. Each participant is given a small piece of cake and asked to eat it. It is a regular boxed yellow cake with chocolate frosting from the can. Unlike the

other “Just Try It!” lessons, a math problem and chart are discussed. The following chart is created on the board and the students are asked to copy it on their papers.

Figure 4

*Fat, Calorie, and Cholesterol Content of a Cake Made with Different Ingredients*

	Total Calories	Total Fat	Total Cholesterol
Dry Cake Mix	180	3 g	0
Cake Mix with 1 1/3 cup water, 1/3 cup vegetable oil, 3 large eggs	270	12 g	55mg
Cake Mix with 1 cup water, 1/2 cup applesauce, 3/4 cup egg beaters	320	3 g	0

The cake the participants ate was made with applesauce and egg beaters, which are egg substitutes. Participants were asked to compare the taste of this cake with the cakes they usually made or ate. They discussed the nutrition values of the two cakes. The researcher had brought the nutrition labels for all of the ingredients, and they compared different elements of the nutrition information. For example, was it worth the higher calories to have less fat and less sodium? The applesauce accounted for the additional calories in the form of sugars. The trade-off was that applesauce also provided 2 grams of fiber and 100% of the recommended daily amount of vitamin C.

A Crisco shortening container was the focus of the last workshop lesson. Each participant was given a plastic sandwich bag. They were asked to think of a common item they had eaten at one of the following fast food restaurants: Taco Bell, McDonalds,

Burger King, Jack-in-the-box, or Arby's. Then each participant filled their baggy with the amount of lard that they thought was in the fast food item they had chosen. Nutrition information from each restaurant was available for comparison. Each tablespoon of Crisco is equal to 12 grams of fat, and therefore a typical quarter-pound hamburger would have about 2 tablespoons of Crisco worth of fat. The participants immediately began discussing potential modifications and uses for this demonstration in the introduction of fats in their own classrooms. In order to prepare the participants to teach about fats, they were given several handouts.

At the end of the last workshop, participants were asked to fill out the district's program evaluation. The evaluation consists of fifteen Likert Scale questions and four open ended questions. Participants' growth petitions were returned before they departed. These growth petitions had to be signed by the researcher so that the participants would receive their recertification hours and salary growth credit.



**What knowledge and skills will participants acquire?**

Teachers will learn or relearn about nutrition content knowledge. The content will focus on the nutrition state standards as found in the health standards grades K-8. Teachers will also be given a variety of lessons that they can implement in their classrooms.

**How will the new learning be implemented?**

Teachers will take their newly attained knowledge and enthusiasm for nutrition education back to their classroom and enlighten their students.

**How will the implementation be evaluated? What data and assessment will inform classroom practice?**

I would like to be given the opportunity to visit volunteers' classrooms while they implement a lesson, but only if time and individuals allowed. Between sessions, participants will be asked to teach at least one lesson and return to the next session with feedback about their lesson.

**How will the implementation be sustained over time?**

Teachers should be able to use the nutrition lessons each year. Although students may see some repetition, some of the lessons are pertinent enough to be repeated and appreciated at each age. The structure and complexity of the lesson would increase as the students age increased.

**What follow-up will be planned to assist implementation?**

- |  |  |
|--|--|
| <input type="checkbox"/> Coaching                                | <input checked="" type="checkbox"/> Homework assignment    |
| <input checked="" type="checkbox"/> Reflection/feedback activity | <input checked="" type="checkbox"/> Collaborative planning |
| <input checked="" type="checkbox"/> Instructional resources      | <input type="checkbox"/> Implementation monitoring         |
| <input checked="" type="checkbox"/> Student assessment           | <input type="checkbox"/> Peer conferencing                 |
| <input type="checkbox"/> Other: _____                            |  |

Submitted by Flavia Gibson Date January 30, 2006

Title Fifth Grade Teacher Site Coyote Trail

\*\*\*\*\*

APPROVAL

Are you using your allocated Title II funds for this professional development activity? If so, please indicate the amount and attach a P.O. request if necessary.

\_\_\_\_\_  
Principal/Department Administrator Date

\_\_\_\_\_  
Professional Development Department Date

## APPENDIX P

## PRE-UNIT ASSESSMENT RESULTS

Question 1: What is nutrition?

	Pretest
Healthy Food/Good for you	34
Something to be healthy	5
Exercise	5
Body Fluid/Chemical in body	2
Vitamin	2
How you keep yourself healthy	3
Other, off topic	2
How your body works	1
Total Responses	54

Question 2: Why is it important to eat?

Death/Starvation	18
Eating gives you energy	12
To be healthy/fit	11
Body needs nutrients	6
Prevent hunger	3
Stay in shape	6
Live	4
Use the restroom	1
Prevent Illness	5
	66

Question 3: What kinds of food are good for you? Why are they good for you?

Fruits	44
Veggies	35
Stuff without sugar	1
Meat	16
Breads/Wheat Products/Cereal	4
Dairy/Milk/Cheese	8
Trail Mix	1
Water	1
All food	1
	111

Prevent you from getting fat	1
Prevent you from hurting your teeth	2
Strength/Muscles	8
Protein	8
Energy	13
Healthy/body needs it	14
Fluids move faster	1
Strong Bones	7
Good for your eyes	6
Nutritious/Vitamins	19
Fiber	2
Cures cancer	1
	82

Question 4: What kinds of food are bad for you? Why are they bad for you?

Hamburgers	4
French Fries	5
Chicken Nuggets	1
Cookies, Cakes, Chocolate	17
Steak	1
Soda	11
Candy/syrup	38
Potato & other chips	11
Junk Food/fast food	10
Raw Meat	1
Expired Milk	1
Meat	2
Ramen Noodles	1
Donuts	3
Coffee	3
Pizza	1
Popcorn	1
	111

Fat/Grease	20
Sugar	17
No nutrition/poor nutrition	7
Bad for your teeth	12
Slows you down/weak	7
Sick	6
Too much salt	3
Increases Blood Pressure	1
Caffeine	1
Gain Weight	6
dehydration	1
	81

Question 5: What is the Food Pyramid? Draw it if you can.

Drawn 75%+ accuracy of old pyramid	17
Drawn w/ groups, disproportionate amounts	3
Drawn 50-74% accuracy of old pyramid	9
Drawn <50% accurate	3
Drawn—how much you should have of groups	8
Drawn—what groups you should eat from	15
Drawn—but empty	5
Not Drawn—shows good/bad foods	9
Not Drawn—healthy foods only	2
Not Drawn—shows food groups	3
Not Drawn—food groups & servings	3
Really Off	1
	78

Question 6: Name the Different Food Groups

Fruits	33
Vegetables	32
Meats/protein	37
Candy/Sugar	24
Junk Food	11
Bread/wheat	35
Dairy/Cheese	25
Calcium	4
Vitamins	5
Oils/fats	4
Carbohydrate	1
	215

Question 7: Why should you drink milk?

Strong Bones	20
Strong Bones/Teeth & Calcium	14
Calcium	2
Nutrition	2
Strong Bones & Teeth	8
Vitamin A	1
Teeth & Muscles	1
Strength	2
Vitamin C	1
Prevention of Osteoporosis	1
	52

Question 8: Why do people use nutrition labels? Tell me as much as you can about this label.

Fat	25
Cholesterol	11
Sodium/salt	10
Calories	22
Protein	16
Ingredients	19
Sugar	6
Carbohydrates	6
Percent of daily value	2
Vitamins	11
Amount per serving	4
Nutrition/stuff you need	12
Minerals	5
Dieting	3
Fiber	1
	368

Question 9: What is a calorie? Can you gain and/or lost calories? If so, how?

Gain by eating/lose by exercising	32
Found in food	9
Something like fat	18
Energy	2
Exercise	6
Eating	9
They are bad	5
A pound/gain weight	6
Vitamin/Nutrient	2
Carbohydrate	1
	90

Question 10: Write down anything you would like to know about nutrition. (You can list them or ask questions).

Facts about fruits and vegetables	4
How come things, like candy, sugar, & junk food, aren't good for you at all?	4
How can meat be good for you if it has a lot of fat in it?	3
What is a calorie?	17
Why do you need milk?	3
What is the exact process of burning calories?	2
What are the best foods to eat to be healthy?	7
What is a nutrition label?	4
Can you die/be unhealthy by not having nutrition or having too much?	5
What is nutrition?	13
What are the food groups?	6
What does the food pyramid look like?	12
How do vitamins help you stay healthy?	2
Terms: Cholesterol, sodium, water, protein	6
How do people get fat?	1
	89

## APPENDIX Q

## EXIT CARD FROM FIRST NUTRITION WORKSHOP

**Question #1—During the “Nutrition Statistics & Calculations” section of the workshop, what did you learn? Were you surprised by the statistics?**

Participants' Responses	Frequency
No—on the news	2
Charts/graphs used during math	1
Knew about the increase, but “the numbers speak volumes”	2
How to calculate BMI	3
% of sugar by weight—new & interesting	2
New guidelines	2
No—I am familiar with reading labels	1
Some things we feed the kids, don't follow new nutritional standards	1
How to make healthy choices by tasting	1
Yes—more than they thought	1
Yes—we should have practiced calculating BMI	1

**Question #2—What did you think of the “Just Try It” lessons? Would you do them in your classroom? Why or why not?**

Participants’ Responses	Frequency
Great, Fantastic	2
Yes—tie in with word choice	1
Yes—making healthy choices	1
Yes—kinesthetic ways to help students learn	1
Yes—with 3 <sup>rd</sup> grade students, but not 1 <sup>st</sup> and 2 <sup>nd</sup> — they may not follow directions	1
Yes—hands-on & gives students choices	1
Yes—kids are so curious and willing to try new things	1
Yes—incorporate in counseling lessons	1
Yes—would continue to do this type of lesson— have done some already in their own classroom	1
No—but would if they taught in a general education classroom...they are a specialist	1
No—maybe if she taught a higher grade level	1

**Question #3—What is the topic of the nutrition lesson(s) you will teach before our next meeting?**

Participants’ Responses	Frequency
Nutrition labels	4
Apple a Day lesson, but add a graph element	1
Making choices with eating	2
Stickers on fruit	1
Just Try It!—Saltines & Triscuits	1
Learn about fruit by singing	1
Cooking class teacher—will focus on healthy substitutions	1
Serving sizes	1
Getting energy from food	1

## APPENDIX R

## FEEDBACK FORM FROM THE SECOND NUTRITION WORKSHOP

**Question #1—What lesson topic do you think you will teach before our last nutrition workshop?**

Participants' Responses	Frequency
Pyramid	6
Food groups	6
Amount of sugar in soda	2
Nutrition guides from McDonalds	1
Dateline—childhood obesity video	1
Exercise	1
Not sure	1

**Question #2—What has been the most helpful part of the nutrition workshops so far?**

Participants' Responses	Frequency
Sharing with other primary teachers	1
Discussion about new guidelines	1
Handouts for kids & lesson plans	5
Nutrition in general—being more aware	3
Websites	2
Pre/posttests	1
Food pyramid	2
Nutrition labels	1
Food portions	1
Healthy choices	1
Demonstrations	2
Just Try It!	2

**Question #3—What would you suggest be done differently?**


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Participants' Responses	Frequency
No answer given	4
Nothing	2
Positive note to presenter	4
Ideas about healthy meals	1

---

**Question #4—List at least three things that you would like to learn/cover/review at the final nutrition workshop.**


---

Participants' Responses	Frequency
Resources: lessons & materials	3
Core lessons	1
List of items approved for snacks	1
Websites	4
Nutrition's effect on learning—focus/alert	1
Obesity statistics in U.S. school children	1
Obesity information	1
Serving sizes for kids	1
Serving size parameters when using labels	1
Diet for overweight children	1
Healthy meals	1
Ways for teachers to become healthier	1
Relationship between exercise, healthy eating, and obesity	1
Ways to share new guidelines with parents and students	1

---

## APPENDIX S

## DISTRICT EVALUATION FROM THIRD NUTRITION WORKSHOP

District Evaluation Questions	AVERAGE
To what extent was the information presented today...	
1. relevant to your professional responsibilities	3.36
2. useful in addressing an important need that you may have	3.45
3. applicable to your practice	3.36
4. effective in enhancing your understanding of the topic	3.82
5. relevant to improving student learning	3.73
To what extent was the speaker/facilitator of this session...	
6. knowledgeable	3.91
7. prepared	3.91
8. organized	4.00
9. effective	3.91
10. respectful	4.00
To what extent were the materials/activities in this session...	
11. relevant	3.73
12. useful	3.64
13. organized	3.82
14. engaging	3.73
15. sufficiently varied	3.82

**Question #1—List three things that you learned.**


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Participants' Responses	Frequency
New food pyramid	6
Websites	6
Videos – <i>Unitedstreaming</i> videos	1
Approaches for primary classroom	1
Nutrition information sources	4
Introduce and teach nutrition lessons	5
Fats	2
Just Try It	1
Nutrition facts	1
Relationship between food & exercise	1
New Food guidelines	1
No answer	1
Childhood obesity statistics	1

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**Question #2—List two things that you will implement in your classroom.**


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Participants' Responses	Frequency
Eating healthy food	2
How food effects learning	1
Food group lessons	1
exercise	1
Continue monthly nutrition lessons	1
Just Try It lessons	2
Food Diary	1
Blast Off Game	2
Nutrition labels	1
Resources	2
New lessons	3
No answer	2

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**Question #3—List one thing that you still have a question about.**

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Participants' Responses	Frequency
Videostreaming	1
Where does nutrition fit in the standards	1
Why are some breakfasts still so unhealthy?	1
Would like a further class that has the time to go even more in depth	1
None—maybe later	1
No answer	7

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**Question #4—Please add any comments or suggestions that you might have for this professional development opportunity.**

- 
- “Looking at standards”
  - “Wonderful. Great resources. Class went by very fast. Looked forward to each session.”
  - “Thanks Flavia—I learned a lot!”
  - “Wonderful Class. Flavia did an excellent job of involving us all.”
  - “I thought it was wonderful! It would be beneficial for all classroom teachers.”
-

## APPENDIX T

## WORKSHOP PARTICIPANTS' REFLECTIONS ON THEIR NUTRITION LESSONS

**Students enjoyed the lesson**

- “The students were very interested. They had a positive attitude about the topic. (Participant #3)
- “The kids had fun moving the food items into one of the categories on the Smart Board.” (Participant #3)
- “The students did seem enthusiastic about the lesson and they were excited to discover all of the ways that apples benefit a person’s health. (Participant #4)
- “This (nutrition) was a very engaging topic and there was much enthusiasm to participate in the discussion. (Participant #5)
- “Students participated more eagerly than I expected.” (Participant #8)
- “The students were interested and participated fully.” (Participant #9)
- “I think the kids would enjoy having more opportunities to use the plastic food; so doing a similar activity in teams could be an effective way to provide additional exposure to the food groups.” (Participant #3)

**Students applied information to their personal lives**

- “They (the students) made comments like, “My dad doesn’t check the labels when he buys cereal.” And, “For a birthday party you could have a healthy treat like fruit or crackers instead of cake.” (Participant #3)
- “I asked how many had changed their eating habits as a result of the lesson. 85% said they had definitely made a change. I was very surprised to hear the details of their changes. Some students had switched to diet soda. Others were making

healthy choices from the McDonalds menu. Another said he was eating a McDonalds every day before the (Dateline) video and had not eaten there since.”

(Participant #5)

### **Teacher enjoyed teaching lesson**

- “I (the teacher) thought it was fun to teach this lesson...it is exciting to empower kids to make healthy choices. It also has a ripple effect onto their families.”

(Participant #3)

- “I like teaching about nutrition.” (Participant #8)

- “It (teaching nutrition) was a pleasant break for us as well as the students.

(Participant #6)

### **Teacher exhibits enthusiasm toward teaching nutrition now and in the future**

- “Once I finished this introductory lesson, I couldn’t stop thinking about where I’ll go next!” (Participant #3)

- “In the past I have taught nutrition at the end of the school year, but this taught me I will always need to teach this (nutrition) in the beginning of the year.”

(Participant #5)

- “Afterwards, I decided that having the students find current event articles dealing with food would also serve as a springboard to the health unit. (Participant #6)

- “As a counselor, I always get asked by the nurse or classroom teacher to work with the students that seem overweight or seem self conscience about their weight. This new emphasis on health and healthy eating seems to be a positive way to address this issue.” (Participant #8)

- “I can see where teaching students about nutrition can lead to a change in eating habits. This could be life changing for some students. (Participant #9)
- “If things had gone as planned, I think it would have been more exciting and worthwhile, but the students still got the gist of it. We’ll keep practicing!”  
(Participant #3)
- “I can see in the future it would be interesting to find reading material that tie into good nutrition and use it for reading. Teaching nutrition is very worthwhile for the students as well as the teachers.” (Participant #6)

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