Action Research Project

A report

The researchers of this Action Research Project sought to investigate the best methods for teaching nutrition education that simultaneously uncovered and thwarted student misconceptions. The Action Research Project sought to answer the question: What do fourth graders at Meridian Elementary School know about nutrition, and what effect does our instruction have on their knowledge of the role of nutrients within the human body? Of the twenty seven students within the classroom, twenty four of them were Caucasian, one of them was Hispanic, and two of them were Asian. Using an eight question pre-assessment, the researchers were able to gain insight into the daily diet as well as the previous knowledge of the fourth grade students. After the completion of two hands-on nutrition based lessons in which nutrition based models were generated and incorporated that emphasized the food groups, portion control, and nutrients, the students’ knowledge was then assessed through the usage of a seven question post-assessment regarding the information taught in class. From the analysis of the post assessment, which revealed that the students’ complete knowledge of the five food groups grew as a class by nearly fifty seven percent, the researchers concluded that using models in an inquiry fashion to address student misconceptions is a worthwhile endeavor that should be integrated in teaching nutrition to students of the elementary education level.

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The action research project within a fourth grade classroom showcased the big idea of the impact of models on student understanding of the role the food groups and the nutrients they possess within the human body. The action research question that the researcher used at the basis for the action research project is "What do fourth graders at Meridian Elementary School know about nutrition, and what effect does my instruction have on their knowledge of the role of nutrients within the human body?"

The use of models was utilized to help to enhance the students’ schema within the science topic of nutrition. The researchers found that the models were useful in developing students’ understanding of the five United States Department of Agriculture [USDA] approved food groups, the appropriate suggested portion sizes, and the hidden sugars present in the “junk” foods commonly eaten by elementary school age students. The models generated for the action research project were both created by the researchers for the facilitation of knowledge retention during the lesson plans as well as by the students for the researchers to enhance and assess the students’ knowledge acquisition.

In order to answer the action research question, a series of steps were followed to assess and extend student understanding of the role of daily nutrition. The action research project began February 17, 2012 as the researchers stepped into a fourth grade class from Meridian Elementary school, in Grosse Ile Michigan to observe the common teaching practices of the cooperating teacher.

Within the fourth-grade classroom where the action research project took place, twenty seven students were enrolled. As reported by the cooperating teacher, of the twenty-seven
students enrolled within that classroom twenty-four are Caucasian, two of the students are Hispanic, and one of the students is Asian. According to the cooperating teacher, the students within Meridian Elementary school are not likely to be eligible to receive reduced price or free breakfast and lunch being that Grosse Ile is prominently known as an “affluent” community and the school system is noted to be one of the top in the county for public schooling test scores and academic performance.

When teaching science, the primary teacher of the fourth grade students adheres to an inquiry based approach similar to that of the “Five E’s Method” taught at the University of Michigan-Dearborn. The cooperating teacher begins her lessons with a question to draw the students’ interest and engage them in the scientific concept to be addressed within the lesson. She allows time for student feedback before continuing on with the lesson, allowing the students to achieve the desired understanding with minimal teacher assistance until the evaluation process. For the assessment, the cooperating teacher brings the students together as a whole class by asking them what they have learned and what proof then can provide of any conjectures that they have formed during the lesson. The information is shared among all of the students to allow for the retention of the desired knowledge as well as to address possible student misunderstandings.

After observing the cooperating teacher and the fourth grade class, the researchers sought to investigate the impact that nutrition is having within the elementary school level. With the growing obesity epidemic that has begun to hit school age children, nutritional guidelines have begun cropping up on the Michigan Department of Education [MDE] website dictating to
teachers that among the many other concepts to be covered that are listed in the Grade Level Content Expectations [GLECs], that nutritional standards must also be met (Michigan Department of Education [MDE], n.d.).

In order to best serve the students of Meridian Elementary, the researchers turned to many scholarly based journal articles seeking to discover the ideal methods to use when teaching elementary age student about nutrition as well as possible misconceptions that may arise throughout the lessons.

The first article utilized was a research study of teacher’s opinions on nutrition education. In this article titled, *Assessment of nutrition education needs in an urban school district in Connecticut: establishing priorities through research*, first through sixth grade teachers from a Connecticut school district were given a questionnaire about nutrition education (Perez-Escamilla, Haldeman, & Gray, 2002). This research study is relevant to the action research project because it helps to distinguish the important features necessary within an elementary based nutrition lesson. In order to do this the barriers of the students’ knowledge acquisition should be known. According to the conducted survey, of the two hundred ninety-eight surveys returned, 88% of teachers agreed that a lack of time is a large barrier to nutrition education, and 87.4% agreed that a lack of resources is the largest barrier in nutrition education (Perez-Escamilla, Haldeman, & Gray, 2002). The teachers were asked which barriers to education need to be addressed, and an overwhelming 96.9% agreed that more information resources should be provided (Perez-Escamilla, Haldeman, & Gray, 2002). This nutrition based action research project has taken the advice of these teachers and searched for multiple informative resources
that were utilized. The action research project sought to build upon the “Assessment of nutrition education needs in an urban school district in Connecticut: Establishing priorities through research” study by addressing the most prominent barriers to nutrition education (Perez-Escamilla, Haldeman, & Gray, 2002).

Another barrier to nutrition education, as noted in the Lambert and Carr article, “Perceptions of elementary school nutrition education practices by foodservice directors, teachers, and principals”, is that parents do not have the same understanding of nutritional concepts as their students (2006). Within this article, elementary school food-service directors, principals, and teachers in Arkansas and Idaho based schools were given a survey to evaluate nutrition education programs within their districts (Lambert and Carr, 2006). A common consideration among the questioned professionals was that the parents should learn about nutrition along with their children so as to enhance their students’ learning through shared nutrition based activities (Lambert and Carr, 2006). The action research project has built upon this research by providing students with information that they may carry into their homes and share with their parent(s) or guardian(s). Of the take-home nutritional information provided, students will have possession of healthy eating lists as well as models of nutritious eating with the emphasis of portion control.

Similarly, according to Connie Liakos Evers, nutrition education is best retained when the information can be related to the home life, whether it is in positive or negative examples (2006). Evers states that making nutrition learning fun is the best way to get the students interested and involved (2006). Merely stating facts does indeed bore the students, but creating
hands on activities such as making their own food posters for home is a good way to get the students engaged (Evers, 2006). The idea of take-home nutritional models that are self-created by the students resonated from this article, and it is an idea that was utilized within the first lesson plan of the action research project as an assessment of the students’ knowledge.

As both the Evers and Lambert & Carr studies have shown, parents have a great influence on their child’s learning (2006). The action research project sought to do away with common misconceptions often held by parents and other professionals that are keen on providing nutrition based information to students. It is important that the misconception that nutritional supplements can provide the adequate nutrition that growing elementary age children need is done away with being that it is prevalent among parents, teachers, and school coaches as reported by both Taras and Cotugna, Vickery, and McBee (2005; 2005).

According to Cotugna, Vickery, and McBee, parents often give their children popular brands of multi-vitamin and mineral supplements hoping to boost their child’s growth or performance when in reality these “population-wide” supplements have been shown to have no significant improvement on the students’ learning or bodily growth (2005). Taras’ study agrees, stating that food insufficiency is affecting student’s ability to learn, and that parents or guardians who provide supplements may not realize that they are not a proper substitute for the “real thing” (2005).

In accompaniment, Taras states that schools which provide healthy breakfast options have seen a reduction in the number of absences and tardies among the student body as well as an improvement in cognitive functioning and academic performance among undernourished
school-aged children (2005). Within “Nutrition and Student Performance at School”, Taras researches and discusses over 18 other scholarly journal articles that regard student nutrition and performance through the use of scientific trials where the experimental group of whom would be given an assortment of vitamins in food form is tested against the control group of whom would not receive the vitamins as scientists and researchers noted improvements in the cognitive functioning and fine motor skills of the experimental group (2005). It was reported in both Taras’ study, as well as the studies that his article was making reference to, that students who were given vitamin supplements showed no significant improvement in their cognitive functioning or fine motor skills over the control group of students of whom were not receiving supplements (2005).

In order to determine how much the students already know about nutrition, as well as their parent(s) or guardian(s) involvement in their daily nutrition, it was imperative that the action research project had a pre-assessment from which to create the nutrition based lesson plans.

With the purpose of creating an effective pre-assessment, the article “Development of a reliable and valid nutritional knowledge questionnaire for urban South African adolescents” was utilized to provide a basis for appropriate nutrition based questions (Whati, Senekal, Steyn, Nel, Lombard, & Norris, 2005). Although the research was done in South African students, the article experiments with methods of creating an effective pre-assessment and post-assessment (Whati, Senekal, Steyn, Nel, Lombard, & Norris, 2005). The developmental researchers of the South African study created several drafts of a pre-assessment and post-assessment to administer to
school-aged students in South Africa (Whati, Senekal, Steyn, Nel, Lombard, & Norris, 2005).

After each draft was created they looked for aspects that may be interpreted incorrectly, or that may be unnecessary so as to weed out misconceptions or generalized information that the students would already have knowledge of (Whati, Senekal, Steyn, Nel, Lombard, & Norris, 2005). The action research project has utilized the findings of this article by incorporating all of the necessary components of an effective pre-assessment mentioned in the article such as internal consistency of the assessment and content validity (Whati, Senekal, Steyn, Nel, Lombard, & Norris, 2005). Internal consistency means that the way students answer individual questions should indicate how they will answer other questions within the assessment. An example of this can be seen in the pre-assessment’s question number five: “Name as many food groups as you can.” If a student does not know what a food group is, they would not be able to answer question six and seven, the following two questions: “What food group do you eat the most of?” and “What food group do you eat the least of?” However, if the students do have an understanding of the food groups, they would be able to answer questions five and six, providing an insight into the depth of their knowledge.

The pre-assessment, as can be noted in Appendix B, had analyzed students’ prior understanding of food groups and nutritional models as well as their usage of nutritional models and practices. The pre-assessment was presented in a written survey format. Every student had received a survey comprised of eight questions. The students were informed emphatically that they were not to be graded on their answers because their answers are just used to see how much they know. The questions were read aloud to the students so as to prevent possible
misunderstandings. Information was gathered in both written and visual formats; the occasional question requests that the students draw and describe the information they currently possess.

As stated previously, the pre-assessment includes eight questions. The first question, “What is a model? Why do we use models in science?” was incorporated to provide an insight to the students’ understanding of scientific models and how models are used to enhance student learning. It is because the lessons plans that the researcher had presented included models, both concrete and pictorial, to provide examples of appropriate food proportions as well as informative examples of the food groups. It would have been tactless to incorporate models within the lessons if the students were unfamiliar with them and how they could be employed. This would lead to misconceptions and misunderstandings, both of which the action research hopes to prevent and discourage.

The second question, “Do you know of a model that represents daily food choices? If so, describe or draw this model” was used in order to gain an understanding of what the students already know about models, specifically nutrition models, as well as to make note of the different nutrition models that the students have already been introduced to along with how many students have a strong understanding of what a model is.

The third question, “What pictures or lists, if any, do your parent(s) or guardian(s) refer to when planning family meals? (Pictures and lists can include: Doctor’s Lists, Allergies Lists, Coach’s Recommended Meals Lists, Pictures of Healthy Foods, and so on.) ” was used to grasp an understanding of the students’ exposure to nutritional guidelines within the home. This question provided an awareness of any nutritional needs that should were to be addressed during
lesson plans and with the take-home materials. In order to build upon the Lambert and Carr (2006) article, question three assessed students’ exposure to good nutrition within their homes. This question also provided insight into the diet of the students within the action research project.

If a student has specific dietary needs it is important that the nutritional based lessons did not provide the student with the information that because they are unable to tolerate certain foods or food groups that they will be under-nourished.

The fourth question, “How often do you eat sugary snacks? (Such as candy, soda, cake, or other desserts)” was incorporated within the pre-assessment to provide an understanding of how well students follow nutritional guidelines in regards to sweets. Being that a few of the models created for the action research project are based around the sugar content of candy and soda, such as the Candy Bar Model and the Soda Bottle Model, it is important to ensure that the students had implemented these foods within their daily consumption before providing them with the information about how these foods can be detrimental to their health.

The fifth question, “Name as many food groups as you can” had set the foundation for the lessons presented in the action research project. In order to cover the Fourth Grade Health Curriculum GLECs, it was vital to assess how much the students already knew about the food groups. The student’s answers to this question determined how far in depth the lesson had delved on particular food groups.

The sixth and seventh questions of the pre-assessment go hand in hand. These questions, “What food group do you eat the most of?” and “What food group do you eat the least of?”, were used to determine whether or not students know what the food groups are as well as provided
information about the students’ eating habits. It was important to gain an understanding of the nutritional habits of the students within the action research project because it had provided insight into the direction that the researchers had taken the nutrition based lessons placed for the project. It is prudent for knowledge retention if the lesson plans relate to the daily lives of the students to which they are being delivered.

The eighth question, “Do you take any vitamins? If so, what are they and what do you take them for?” sought to introduce the topic of vitamins and nutrition within the students’ daily lives. The second lesson had presented the students with key nutrients produced by individual food groups, and how these nutrients aid in the development of young minds and bodies. This question sought to assess whether or not students are receiving supplements from their parent(s) or guardian(s), and while the action research project did not exist to deter students from taking the supplements provided to them at home, it did seek to inform students that the use of supplements does not provide the body with all of the nutrition necessary for growth. It is important that the students learn that healthy eating habits are the basis for proper bodily growth and cognitive development, and to only view supplements as complements to their healthy food choices, not replacements.

The action research project has addressed the Michigan Grade Four Health requirements as set by the GLECS. From theses GLCEs, pre-assessment questions were formulized that provide insight into the current health-related information that students already possess and apply daily. These questions include, “How often do you eat sugary snacks? (Such as candy, soda, cake, or other desserts),” “Name as many food groups as you can,” “What food group do you
eat the most of?”, and “What food group do you eat the least of?” Within these four questions the pre-assessment had covered the categories of the food groups as well as their portioning as dictated by the Health GLECS (Michigan Department of Education [MDE], n.d.).

Based on the analysis of the pre-assessment data, the first lesson would created. The first lesson sought to incorporate models to teach students about the food groups, stressing the importance of appropriate portion size and the key nutrients present within that food group with emphasis on their role on the body. Being that a majority of the questions asked during the pre-assessment were not only informative of the students’ current knowledge, but also of the students’ current daily practices, it was difficult to assess the data from the pre-assessment as a whole. Therefore, the questions were to be analyzed and charted individually, for the most part, based on the content the question covers. The answers for the first question were analyzed and charted in one of three categories: does not know, has an idea, does know.

Answers chosen for the “Does Not Know” category included answers left blank and/or misconceptions. Answers that are left blank are hard to assess because the researcher is not sure if the student left the answer blank because they did not know, they did not have time to answer the question, or they did not want to/know how to answer the question. For the purpose of analysis, it is best to place the blank answers in the “Does Not Know” category and allow for the assumption that the information is amiss rather than assume that information is present and therefore not teach the content at all.
Answers chosen for the “Has an Idea” category were answers where students have listed possible reasons for why models are used in science, has provided an accurate example of a model, and/or has given a brief, accurate description of what a model can be used for.

Answers chosen for the “Does Know” category were answers that had explained, in brief detail, the importance of the use of models in science to enhance learning and provide examples of the intended object, concept, or idea.

The second and fifth questions present in the pre-assessment called for the student’s recollection of the commonly used pictorial model of appropriate nutrition: the Food Plate model or the Food Pyramid. These questions were analyzed and charted into one of four categories: has incomplete knowledge, has minimal knowledge, has adequate knowledge, has complete knowledge.

Answers chosen for the “Has Incomplete Knowledge” category included answers left blank, wrong answers, and/or misconceptions. As stated previously, answers that are left blank are hard to assess because it is not easy to determine why the student left the answer blank, therefore to air on the side of caution, blank answers will be placed in the “Has Incomplete Knowledge” category along with wrong answers and/or misconceptions. An example of a wrong answer or misconception would be if a student were to provide the answer of “Milk” as one of the food groups. “Milk” is not a food group, but is a food group member. Listing a food group member as a food group will be counted as a misconception.

Answers chosen for the “Has Minimal Knowledge” category included answers that contain one to two of the food groups. These answers had provided the information that the
student was somewhat knowledgeable about the food groups so as to be able to name one to two of them, but was not so knowledgeable as to name all of them.

Answers chosen for the “Has Adequate Knowledge” category included answers that comprise of three to four of the food groups. These answers provided the information that the student was sufficiently knowledgeable about the food groups so as to be able to name or draw three to four of them, but was not so knowledgeable as to name or draw them all.

Answers chosen for the “Has Complete Knowledge” category included answers that fully provide the names of all five of the food groups. These answers had revealed that the student was fully knowledgeable about the food groups and was able to accurately name and/or draw them all.

The answers for the third question regarding if the students’ parent(s) or guardian(s) refer to any pictures, coach’s lists, or media suggestions when planning family meals were analyzed and charted into one of four categories: no reference, coach’s advice, media suggestions, and set guidelines.

Answers chosen for the “No Reference” category were those in which the student leaves the answer blank, the student answers that they do not know, or the student states that no referrals or references are used. As stated previously, blank answers are best assumed that the student does not know rather than to assume that the student has participated in practices, or has knowledge, that in actually they do not participate in, or does not have.
Answers chosen for the “Coach’s Advice” category were those in which the students had been advised by coaches and other athletic directors as to what their meals should consist of while training for a particular sport or preparing for an upcoming game. Answers in the “Coach’s Advice” category imply that the parent(s) or guardian(s) of the student have referred to a recommended diet based upon their child’s athletic coach’s suggestions.

Answers chosen for the “Media Suggestions” category were those in which the parent(s) or guardian(s) of students were referring to magazine articles, television suggestions about appropriate eating, posters or other pictorial models when planning for meals based upon the healthy and popular suggestions portrayed in media. Answers in the “Media Suggestions” category imply that the parent(s) or guardian(s) were aware of the popularly accepted beliefs on nutrition in today’s media.

Answers chosen for the “Set Guidelines” category were those in which the parent(s) or guardian(s) have implemented a nutrition based outline for their students. Answers chosen for this category were those in which the students have provided the examples of their daily food meals outline as provided by their parent(s) or guardian(s). Answers chosen for the “Set Guidelines” category implies that the parents(s) or guardians(s) had adequate to complete nutritional knowledge, and often utilized their knowledge when planning meals.

The answers chosen for the fourth question regarding how often the students eat sugary foods, soda, and other sweets were analyzed and charted into one of six categories: daily, often, weekly, rarely, special occasion, and never.
Answers chosen for the “Daily” category were those in which the students had stated that they partook in sweets and junk food one or more times a day.

Answers chosen for the “Often” category were those in which the students had stated that they partook in sweets and junk food two or more times a week.

Answers chosen for the “Weekly” category were those in which the students had stated that they partook in sweets and junk food once a week.

Answers chosen for the “Rarely” category were those in which the students had stated that they partook in sweets and junk food every once in a while, or every two to three weeks.

Answers chosen for the “Special Occasion” category were those in which the students had stated that they partook in sweets and junk food only on certain occasions such as holidays, birthdays, and other memorable events.

Answers chosen for the “Never” category were those in which the students had stated that they never partook in sweets and junk food.

The answers for the sixth and seventh questions regarding which food groups are most commonly and least often eaten by the students were analyzed and charted based on nine categories: fruit, vegetables, grains, proteins, dairy, oils/sweets, none, all, and specified food items.

While some categories, such as those where the five food groups were listed, could be noted as self-explanatory, answers chosen for the “Oils/Sweets” category are those in which the student had stated, or listed, oil, sugar snacks, or candy.
Answers chosen for the “None” and “All” categories were those in which the student had either listed all of the food groups or had stated that their answer is all of the food groups, or the student had stated that their answer is none of the food groups or they had left the question blank.

Answers chosen for the “Specified Food Items” category were those in which the student, rather than stating the name of a particular food group(s), had stated a food item. Food items are items that could be categorized within a food group, but do not represent the food group as a whole.

The answers for the eighth question regarding whether or not the students take a vitamin/mineral supplement could only be answered in a “yes” or “no” format and therefore could only be divided into two categories. The students that had stated that they did take a vitamin/mineral supplement were sorted into the “Yes” category, whereas students who had stated that they did not, or they no longer do, take a vitamin/mineral supplement were sorted into the “No” category.

When analyzing the pre-assessment data it was important for the researchers to make note of possible absences during the pre-assessment so as to prevent possible anomalies from occurring between the pre and post assessment data. It can be noted that student number twelve was absent on the day of the pre-assessment and thus their answers will not be incorporated in the pre-assessment data.
When the researchers reviewed student responses to the pre-assessment, they charted student responses as well as levels of student understanding. From these charts the researchers were able to see the level of understanding students already had before developing the lesson plans. The first question on the pre-assessment was “What is a model? Why do we use models in science?” Twenty-six students were given the pre-assessment, and of these students fifteen had an idea, ten did not know at all, and only one student had a full understanding of what a model is and why it is used in science. From this analysis, the researchers noted that an introduction to models needed to be included in the first lesson plans. Since models played such a large role in the action research, it was important for students to have a clear understanding of what a model is and why they are used. Since only one student had a complete understanding of models, the researchers designed their first lesson plan to begin with a definition of models.

The second question on the pre-assessment was “Do you know of a model or picture that represents daily food choices? If so, describe or draw this model/picture.”
When analyzing students’ answers to this question, we decided to use the same guidelines for analysis as question five “Name as many food groups as you can.” When answering question number two, two students had incomplete knowledge of nutritional models, nine had moderate knowledge, eleven had adequate knowledge, and four had complete knowledge of nutritional models. In the case of question five, one student had incomplete knowledge of the food groups, six had moderate knowledge, twelve had adequate knowledge, and seven students had complete knowledge of the food groups. From the analysis of these responses, it was apparent that most students had some understanding of the food groups and models of these groups, but very few students had a full understanding of these two concepts. For this reason, it was necessary for the researchers to incorporate food groups and nutrition models as a key element of the lesson plans.

In the first lesson plan, the researchers used the nutritional model of the plate model, which represented the food groups, as the overlying theme of the lesson.

Question number three on the pre-assessment asked students “What pictures or lists, if any, do your parent(s) or guardian(s) refer to when planning family meals? (Pictures and lists can include: Doctor’s Lists, Allergies Lists, Coach’s Recommended Meals Lists, Pictures of Healthy Foods, and so on.)” From the twenty-six responses received, eleven students said they do not use any references, twelve students refer to media suggestions, two students have set guidelines such as allergies, and one student follows their
coach’s advice. From the responses to this question, the researchers recognized that most students do not have a valuable model of nutrition within their home. The researchers decided to give students materials to create nutritional models they could keep at home, in order to follow research they had done prior which discussed the importance of nutritional understanding within the home.

The fourth question on the pre-assessment was “How often do you eat sugary snacks?” Six out of twenty-six students answered with rarely, eight students said rarely, one student said just on special occasions, seven responded with daily, and four said weekly. From the responses to this question, the researchers learned that students do not eat sugary snacks very often. These responses indicate that students have prior knowledge of the effects of sugar and why it should be eaten in moderation. For this reason, sugar was not the main focus of either lesson. Although it was not a major concept in the lesson planning process, the researchers created a small extension to the lesson that showed the negative effects of too much sugar.
The sixth question asked students “What food group do you eat the most of?” The responses varied, and the total number of responses did not come out to twenty-six because some students replied with more than one food group. Two students did not write a food group but rather specified a food item, seven students said they eat protein the most, thirteen students said they eat mostly fruits, one student claimed to eat all of the food groups equally, eight said they consumed the most dairy, two students said they eat mostly vegetables, and only one student responded with grain. When analyzing this data, the researchers also looked at student responses to question seven “What food group do you eat the least of?” Six students specified a food item instead of a food group, six said oils and sweets, six students responded with vegetables, one claimed they ate none of the food groups less than others, three said grains, two said dairy, two responded with protein, one answered with fruit. From these responses, the researchers concluded that students either did not have a strong understanding of which food groups should be
consumed the most, or did not follow these food portion guidelines. Either way, they realized that it was important to cover portions as a major focus of the lesson. They included portion sizes in the explain portion of their first lesson and utilized models as a method for demonstrating portion sizes.

The eighth and final question on the pre-assessment was “Do you take any vitamins? If so, what are they and what do you take them for?” Sixteen said they did take vitamins and said they did not. The researchers concluded that most students had some sort of vitamin deficiency they needed to fill with vitamin supplements. The researchers decided that students did not have a strong understanding of how to get certain vitamins through food, so they knew a focus of one of their lessons should be which food groups contain what vitamins and the role of each of these vitamins within the body.

Once the data was collected and analyzed, it was time to create the lesson plans. The researchers took the results from the pre-assessment analysis when creating their lesson plans for the students. Both of the lesson plans sought to surround nutrition with emphasis on the five USDA approved food groups, the nutrients available within particular food groups, the suggested USDA approved portion size for each food group as well as the importance of limiting junk food and why. Needless to say, the researcher’s goals were rather ambitious.
The first lesson plan, which can be noted in Appendix C, was originally set to cover the above mentioned concepts within the allotted forty five minute time that the cooperating teacher had set aside for the lesson. The researchers were able to draw the students’ interest with the engage portion of the lesson as well as facilitate student knowledge and participation within the explore portion of the lesson. It was at this point that the researchers noted that their allotted time was nearly half spent and decided to draw out the basic concepts of the lesson plan, the five food groups and their corresponding portion size suggestions, from the explain portion of the lesson to teach the students. The researchers bypassed the extension portion of the lesson being that they believed it was more important for the students to reach the evaluative performance assessment portion of the lesson. For the performance assessment, the students were asked to create their own food plate model just as the researchers had done while providing the information in the explain portion of the lesson. It was vital that the students be allotted the time to create their food plate models because it allowed the researchers to evaluate the students’ current level of comprehension on the concepts of the five food groups and suggested portion sizes being that this information would provide the foundation for the second lesson plan, as well as provide the students with their own hand-made take home materials.

When compiling the second lesson, as can be noted in Appendix C, the researchers referred to the concepts from the first lesson that were not excluded due to a lack of time such as the nutrients present within the food groups and why junk foods should be eaten in moderation. As with the first lesson, the researchers drew the students’ interests with the engage portion of the lesson by asking questions that sought to help the students recall the information they had learned in the first lesson. For the exploration the students were placed into groups of four and
asked looked over the nutrition labels from common food items to facilitate discussion before revealing what they saw to the class at large. The researchers lead into the explain portion of the lesson from the students’ discussion in the explore portion of the lesson by taking about the serving sizes that the students noted within the nutrition labels. For the extension portion of the lesson plan the researchers had created two concrete models: the candy-bar model and the soda-bottle model. These models were used to accurately show how much sugar is present within soda and candy bars as well as provide an inlet to the discussion of why junk food items should be chosen in moderation. Being that for this second lesson plan the researchers were, again, only allotted a forty five minute time slot, the evaluation of second lesson plan was omitted. The researchers felt that it was more important that the students gain the information about the serving sizes and why junk food should be eaten in moderation rather than have that information go amiss.

The researchers took the objectives from both lesson plans into consideration before creating the post-assessment. They only wanted to assess the students’ knowledge on concepts that had been covered during the researchers’ lesson plans and not outside material.

When analyzing the post-assessment data it was important for the researchers to make note of the absences among that class that took place during the lessons as well as during the assessments so as to account for possible anomalies. It can be noted that student number six was absent for the first lesson plan and thus was un-able to fully answer the first and second questions of the post-assessment whereas student number twenty was absent for the second lesson plan and thus was unable to fully answer questions six and seven. The researchers also
were aware that during post-assessment that students number twelve and fourteen were absent, and thus their answers were not incorporated into the post-assessment data.

The questions for the post assessment, for the most part, differed from the pre-assessment being that the pre-assessment questions were those that asked about the students’ current daily dietary habits for the researchers to base their lesson plans around. The information about the students’ nutritional habits, for the most part, have more than likely not been greatly affected by the lesson plans presented by the researchers, and therefore questions regarding student nutrition did not need to be integrated into the post-assessment.

The first question from the pre-assessment, “What is a model? Why do we use models in science”, was kept for the pre-assessment because the researchers felt that the information gained by the students is key for this understanding of the lesson being that it contained models used to enhance student knowledge in the subject of nutrition. The answers for the first question were analyzed and charted into one of three categories present in the analysis of the pre-assessment: does not know, has an idea, does know.

Answers chosen for the “Does Not Know” category included answers left blank and/or misconceptions. Answers that are left blank are hard to assess because the researcher is not sure if the student left the answer blank because they did not know, they did not have time to answer the question, or they did not want to/know how to answer the question. For the purpose of analysis, it is best to place the blank answers in the “Does Not Know” category and allow for the assumption that the information is amiss rather than assume that information is present and therefore not teach the content at all.
Answers chosen for the “Has an Idea” category were answers where students had listed possible reasons for why models are used in science, had provided an accurate example of a model, and/or has given a brief, accurate description of what a model can be used for.

Answers chosen for the “Does Know” category were answers that can explain in brief detail the importance of the use of models in science to enhance learning and provide examples of the intended object, concept, or idea.

The second question, “What was the food model that we created together in class?” is a slight variation of the question from the pre-assessment which asked the students to draw any nutrition related model. The researchers, along with the class, used and discussed the USDA’s Food Plate Model as the main representation of appropriate daily food choices, as well as their suggested portion size, within the lessons. The researchers even helped the students create their own Food Plate Models to take home. Therefore, the researchers feel that the assessment of the students’ retained knowledge of the nutrition based models is necessary to chart and analyze. The answers for question two were sorted into one of five categories: absent, plate-labeled, plate-not labeled, pyramid-labeled, pyramid-not labeled.

Answers chosen from the “Absent” category were those in which the student had listed that they were absent and thus did not recall the models that had been discussed in class during the first lesson plan.

Answers chosen from the “Plate-Labeled” category were those in which the student had drawn the Food Plate Model that had been discussed during the first lesson plan and had labeled the five food groups presented on their drawing.
Answers chosen for the “Plate-Not Labeled” category were those in which the student had drawn the Food Plate Model that had been discussed during the first lesson plan, but they had not labeled the food groups within their drawing.

Answers chosen for “Pyramid- Labeled” category were those in which the student had drawn the Food Pyramid Model that had been discussed during the first lesson plan and had labeled the five food groups presented on their drawing.

Answers chosen for the “Pyramid-Not Labeled” category were those in which the student had drawn the Food Pyramid model that had been discussed during the first lesson plan, but they had not labeled the food groups within their drawing.

The third question of the pre-assessment asked the students’ to reveal to the researchers from where they have previously obtained their nutritional information that they use for planning meals and choosing snacks. This question will not be incorporated into the post-assessment because the researchers feel that the answers will not change from the pre-assessment to the post assessment. In addition, as research has shown that when students are able to bring information to the home to share with parents or guardians, that information has assured retention. The students did not need to be asked twice if information exists in the home being that within the first lesson the students made their own Food Plate Models, therefore the researchers have been able to note that the information exists at home.

Instead, the third question of the post assessment, “Name as many food groups as you can”, was taken from the pre-assessment’s fifth question, which also requested the students to name as many of the food groups as they were able. The researchers felt that it was important to
keep this question being that the food groups were the main objective of the first lesson as well as the foundation of student information for the second lesson. This question was analyzed and charted into one of four categories just as pre-assessment question five had been: has incomplete knowledge, has minimal knowledge, has adequate knowledge, has complete knowledge.

Answers chosen for the “Has Incomplete Knowledge” category included answers left blank, wrong answers, and/or misconceptions. As stated previously for the pre-assessment, answers that are left blank are hard to assess because it is not easy to determine why the student left the answer blank, therefore to air on the side of caution, blank answers were placed in the “Has Incomplete Knowledge” category along with wrong answers and/or misconceptions. An example of a wrong answer or misconception would be if a student were to provide the answer of “Milk” as one of the food groups. “Milk” is not a food group, but is a food group member. Listing a food group member as a food group will be counted as a misconception.

Answers chosen for the “Has Minimal Knowledge” category included answers that contain one to two of the food groups. These answers have provided the information that the student was somewhat knowledgeable about the food groups so as to be able to name one to two of them, but was not so knowledgeable as to name all of them.

Answers chosen for the “Has Adequate Knowledge” category included answers that comprise of three to four of the food groups. These answers have provided the information that the student was sufficiently knowledgeable about the food groups so as to be able to name or draw three to four of them, but was not so knowledgeable as to name or draw them all.
Answers chosen for the “Has Complete Knowledge” category included answers that fully provide the names of all five of the food groups. These answers have revealed that the student was fully knowledgeable about the food groups and was able to accurately name and/or draw them all.

The fourth question of the pre-assessment, asking students how often they eat sugary snacks, will not be kept in the post-assessment. The researchers feel that the answer would not have changed from the pre-assessment to the post assessment. The same can be said for the pre-assessment questions six and seven, which cover the food groups that student eat most and least often, as well as question eight regarding if the students take vitamin supplements or not. The students’ daily diet and nutrition has been charted and logged, therefore it did not need to be analyzed once more, being that information was originally gathered so as to influence the lesson plans.

The fourth post-assessment question instead was “How many servings of sugary snacks should you limit yourself to a day?” being that the students discussed the repercussion of sugary snacks on the body with the researchers as well as were shocked at the models of the sugar present in those snacks when presented with them during the lesson. This question was analyzed and charted into one of two categories: has incomplete knowledge, has complete knowledge.

Answers chosen for the “Has Incomplete Knowledge” category were answers that did not list the given range of servings for sugary snacks, which is 4-6 servings a day being that a serving size is one thumb. A student that listed any servings sizes that were not in the parameters
of 4-6, whether the quantity the student listed was less or more than the suggested serving size, was listed as having answers that demonstrated incomplete knowledge.

Answers chosen for the “Has Complete Knowledge” category were answers that did list the given range of 4-6 servings for sugary snacks. A student that listed serving sizes within the parameters of 4-6, including 5, was listed as having answers that demonstrated complete knowledge.

The fifth question for the post-assessment, “Why should you limit your sugary snacks?”, sought to accompany the fourth question. After the students listed the recommended servings for sugary snacks, or “extras” within the fourth question, this question was included to analyze student’s understanding of the effects that excess amounts of sugar can have on the body as discussed within the lesson plans. This question was analyzed and charted into one of two categories: has incomplete knowledge, has complete knowledge.

Answers chosen for the “Has Incomplete Knowledge” category included answers left blank or vague answers; a student who states they did not know why they should limit their sugary snacks or state generalized reasons such as “Because it is unhealthy”. The student was unable to specific why a large quantity of sugar is unhealthy for the body and therefore their answer was considered incomplete.

Answers chosen for the “Has Complete Knowledge” category included answers that did not only state the large quantities of sugary snacks are unhealthy, but also listed the repercussions that sugar can have upon the body such as weight gain, sickness, tooth decay, and the large boosts of energy that lead to a sudden lack of energy an hour after consumption.
The sixth question for the post-assessment, “What do these nutrients help your body do?” also listed three of the nutrients discussed in class: vitamin b, protein, and vitamin c. Next to the listed nutrients students were to write, as discussed in within the second lesson plan, what that nutrient does for the body. This question was analyzed and charted into one of four categories just as pre-assessment question five was: has incomplete knowledge, has minimal knowledge, has adequate knowledge, has complete knowledge.

Answers chosen for the “Has Incomplete Knowledge” category included answers left blank and wrong answers. Wrong answers were those in which the student was unable to correctly identify the purpose of the nutrient within the human body.

Answers chosen for the “Has Minimal Knowledge” category included answers in which the student was only able to correctly identify the purpose of the nutrients within the body for one of the three nutrients listed. These answers showed that the student was correct about at least one of the nutrients, but was unsure of the purpose of the other two nutrients.

Answers chosen for the “Has Adequate Knowledge” category included answers in which the student was able to correctly identify the purpose of the nutrients within the body for two of the three nutrients listed. These answers show that the student was correct about two of the nutrients, but was unsure of the purpose of the remaining nutrient.

Answers chosen for the “Has Complete Knowledge” category included answers in which the student was able to correctly identify the purpose of the nutrients within the body for all three of the nutrients listed. These answers show the student has complete knowledge regarding the role that nutrients play within the body.
The seventh and final question for the post assessment is a picture to picture match. The students were presented with pictures of popular food items from a particular food group and asked to draw a line to match with the picture of the model of the appropriate portion size (example: a piece of bread and a CD case being that grains have the suggested portion sizing of a common household CD case). The researchers thought to use popular foods from food groups, and not the food group titles, so as to present the answers for a previous question within the post-assessment. This question was analyzed and charted into one of four categories: has incomplete knowledge, has minimal knowledge, has adequate knowledge, has complete knowledge.

Answers chosen for the “Has Incomplete Knowledge” category included answers left blank or wrong answers. If the student has aligned the food items to all of the incorrect categories then those answers would be considered wrong imply that the student has incomplete knowledge regarding the food portion models discussed in class.

Answers chosen for the “Has Minimal Knowledge” category included answers in which the student was only able to correctly match one to two of the food items to the corresponding food portion models as discussed in class.

Answers chosen for the “Has Adequate Knowledge” category included answers in which the student was able to correctly match three to four of the food items to the corresponding food portion models as discussed in class.

Answers chosen for the “Has Complete Knowledge” category included answers in which the student was able to correctly match all of the food items to the corresponding food portion models as discussed in class. By matching all six of the food items to their corresponding food
portion models that student has demonstrated that they have complete knowledge of the suggested USDA approved food portions.

After administering the post-assessment, the researchers analyzed the data in order to track change in student knowledge of the taught concepts. The first question on the post-assessment “What is a model? Why do we use models in science?” was also asked in the pre-assessment. Twenty-five students were given the post-assessment, four students did not know the answer, twenty-one students had an idea of what a model was, and no students had a full understanding of what a model was. From the pre-assessment to post-assessment results did not change much. The number of students who did not know what a model was dropped from ten to four. This shows a small improvement in understanding of models. Although no students had a full understanding of what a model was in the post-assessment, most students had some idea. It came to the attention of the researchers that the number of students who knew the answer dropped from one to zero. They compared this student’s answers to the first question in the pre-assessment and post-assessment and noticed that this student’s post-assessment answer was not as detailed. This does not necessarily show a decrease in understanding, there could be many reasons why this student’s second answer was not as detailed.
The second question in the post-assessment was a measure of how well the food plate model was obtained by students. All but one student drew an acceptable model. The reason this student did not draw a model was because they were absent when the first lesson was taught. Of the remaining twenty-four students seventeen drew the plate model that we had used in class. Thirteen of these students labeled their model with words or drawings, while the other four left the plate unlabeled. Eight students did not draw the model focused on in the lessons, instead they drew the food pyramid, six of which were labeled and two that were not. When totaled there is a discrepancy in number of answers and number of students present. This is due to the fact that one student included both a plate and pyramid model in their post-assessment. The food pyramid is an acceptable model, although not taught in the lessons from this research project. When asked to draw a model of daily food choices in the pre-assessment, most of the students drew the food pyramid. This prior understanding of the pyramid may be a good indicator as to why these eight students chose to draw it on their post-assessment. In the pre-assessment, only four students had a complete understanding of models of eating choices. From analysis of the post-assessment it is evident that a majority of students had a complete understanding of some model of eating choices, and the students who did not label their models
had an adequate understanding. This shows that student understanding of models of eating choices was increased through this research project.

When assessing the post-assessment, the researchers used the same criteria to evaluate questions number three, six, and seven. The third question “Name as many food groups as you can.” Was evaluated based on how many food groups students could name. No students showed incomplete or moderate knowledge, fourteen students showed adequate knowledge, and eleven students showed complete knowledge. Between the pre-assessment and post-assessment, seven students raised their level of knowledge from the incomplete or moderate level to the adequate or complete level. This change shows that student understanding of the food groups grew through the researchers’ lessons and use of models. It is important to note that the level of students with complete knowledge would have increased if students had worded their answers differently. Three student assessments contained the word wheat in place of grains. Had these students used the proper terminology they would have been moved up from the adequate to complete understanding level.
The sixth question in the post-assessment asked students to identify how vitamin C, protein, and vitamin B help their bodies. Three students had incomplete knowledge of these vitamins, ten students had a moderate understanding, eight students had an adequate understanding, and four students had a complete understanding of these vitamins. Unfortunately, the researchers did not ask this question on the pre-assessment. Doing this, would have been helpful to seeing how student understanding grew throughout this research project.

Question number seven on the post-assessment asked students to match images of food items to the correct model of their recommended portions. When answering this question no students had an incomplete understanding of food portions, three students had a moderate understanding, twelve students had an adequate understanding, and ten students were categorized as having a complete understanding of the portions for each food group. Although the researchers did not ask about portion sizes in the pre-assessment they did ask students to identify which food groups they ate the most and least of. In the pre-assessment one student said they ate mostly grains and three students said they ate grains the least of any food group. Grains are the food group that should be consumed the most, and through student matching of grains with the largest portion size model, it is shown that they now have an understanding that grains should be eaten in larger portions, although they may not have followed this before. This was also evident with other food groups.

When evaluating responses

![Graph](image.png)
to the fourth and fifth questions on the post-assessment, the researchers used the same method to categorize student responses. Twelve students had incomplete knowledge of the portion size for sugary snacks and thirteen students had complete knowledge of the appropriate portion size. In the post-assessments it was evident that most students remembered that the tip of a thumb was an accurate measure of a serving of sugary snacks. Most students alluded to the thumb in their answer, but only thirteen students remembered that somewhere between four and six servings should be eaten daily. Through analysis of these answers it can be said that students learned about how to model portion sizes of sugary snacks, but most students did not obtain information about number of servings that should be consumed each day, which was not modeled.

Analysis of the fifth question in the post-assessment “Why should you limit your sugary snacks?” showed that a majority of students were not able to correctly identify reasoning why sugary snack consumption should be limited. Fifteen students came out of this research project with an incomplete understanding, whereas only ten students had a complete understanding of why sugary snacks should be limited. When looking at student answers it was evident that all twenty-five students understood that sugary snacks act negatively upon the body. Ten students were able to give an example of how they impacted the body; while the other fifteen students said in their own way that sugary snacks are bad for the body. This shows that students have an understanding that sugary snacks can be harmful to the body. When asked in the pre-assessment how often they eat these types of snacks, students gave answers that showed they understood that sugary snacks should not be eaten in large amounts. For this reason, the researchers cannot say that student understanding of the impact of sugar on the body was increased through their lessons.
Nutrition is an important topic considering the rising rates of obesity among school age children as well as other nutritional based health risks including heart disease and diabetes. The action research project set out to find the best way to inform students about the foods they are eating by using a multitude of research as well as concrete and pictorial models both created for and by the students.

According to the data collected by the researchers, the students’ overall schema regarding models was not enhanced by the researchers’ instruction. From the pre-assessment the researchers were able to assess that one student did have a basic knowledge of what a model is and how it can be used within science. However, as can be noted in the post assessment data, none of the students had a basic knowledge of what models are and how they can be used in science. The researchers feel that if more discussion regarding models could have been utilized during the engage portion of the first lesson plan that the students’ knowledge may have been enhanced. Regardless, the researchers were delighted to note that the overall student knowledge regarding the five USDA approved food groups had been enhanced by the researchers’ instruction. The researchers believe that it was the incorporation of pictorial models as well as the hands-on performance assessment, in which the students created their own nutritional models, which allowed for the maximum retention of information. It was also noticed that topics taught using models were retained more than topics that were not. In the post-assessment data, all students had either adequate or complete knowledge of the food groups, whereas only twelve students, just under half, had an adequate or complete understanding of the nutrients. It seemed a key factor that a model of the food groups was used in teaching, but there was no model used in when teaching about the various nutrients and their effect on the body.
All in all, the researchers feel that the best way to enhance the nutritional schema of fourth grade students is to allow plenty of time for discussion, integrate many concrete and/or pictorial models into the lesson plans to provide insight and examples, and to create an engaging, hands-on performance assessment that allows for the individualization as the students work with their knowledge in a concrete manner.
References


### Appendix A

<table>
<thead>
<tr>
<th>Activity</th>
<th>Date/Time</th>
</tr>
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<tbody>
<tr>
<td>Observe the Classroom</td>
<td>February 17, 2012 9:00am-10:45am</td>
</tr>
<tr>
<td>Research and Develop Action Research Question</td>
<td>February 18-28, 2012</td>
</tr>
<tr>
<td>Formulate a Pre-Assessment</td>
<td>March 2, 2012 10:00am-12:00pm</td>
</tr>
<tr>
<td>Administer the Pre-Assessment</td>
<td>March 24, 2012 10:45am – 11:30am</td>
</tr>
<tr>
<td>Analyze Data from the Pre-Assessment</td>
<td>March 24-25, 2012</td>
</tr>
<tr>
<td>Generate the First Lesson Plan</td>
<td>March 26-28, 2012</td>
</tr>
<tr>
<td>Perform the First Lesson Plan</td>
<td>March 29, 2012 10:45am – 11:30am</td>
</tr>
<tr>
<td>Evaluate the First Lesson Plan</td>
<td>March 30-April 1, 2012</td>
</tr>
<tr>
<td>Generate the Second Lesson Plan</td>
<td>April 1-2, 2012</td>
</tr>
<tr>
<td>Perform the Second Lesson Plan</td>
<td>April 2, 2012 10:45-11:30am</td>
</tr>
<tr>
<td>Evaluate the Second Lesson Plan</td>
<td>April 5-6, 2012</td>
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<tr>
<td>Formulate a Post Assessment</td>
<td>April 7-11, 2012</td>
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<tr>
<td>Administer the Post Assessment</td>
<td>April 16, 2012 12:00pm-1:00pm</td>
</tr>
<tr>
<td>Analyze Data from Post Assessment</td>
<td>April 18-25, 2012</td>
</tr>
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Both parties provided equal efforts of contribution.
Appendix B

Name and number: ____________________

Pre-Assessment

1. What is a model? Why do we use models in science?

2. Do you know of a model or picture that represents daily food choices? If so, describe or draw this model/picture.

3. What pictures or lists, if any, do your parent(s) or guardian(s) refer to when planning family meals? (Pictures and lists can include: Doctor’s Lists, Allergies Lists, Coach’s Recommended Meals Lists, Pictures of Healthy Foods, and so on.)

4. How often do you eat sugary snacks? (Such as candy, soda, cake, or other desserts)

5. Name as many food groups as you can.

6. What food group do you eat the most of?

7. What food group do you eat the least of?

8. Do you take any vitamins? If so, what are they and what do you take them for?
Post-Assessment

1. What is a model? Why do we use models in science?

2. What was the food model that we created together in class? Please draw that model.

3. Name as many food groups as you can.

4. How many servings of sugary snacks should you limit yourself to each day?

5. Why should you limit your sugary snacks?

6. What do these nutrients help your body do? Below are three of the nutrients discussed in class.

   Please write what they help your body to do. (Example: Fiber- Helps you to digest)

   a. Vitamin C-
   b. Protein-
   c. Vitamin B-
7. Match the foods below with the model that shows the correct portion size. Draw a line connecting the food item on the left with the correct model of portion size on the right, as discussed in class.
Appendix C

Nutrition Lesson 1:
Food Groups, Vitamins, and Portions

Grade level: Fourth

Concept: How the food we eat affects our body through vitamins and minerals

Objectives:
- Students will be able to name all of the food groups.
- Students will be able to discuss the vitamins and minerals that are gained from each food group, and how they affect bodily development.
- Students will be able to describe the appropriate portion size of each food group.
- Students will be able to construct their own plate model.
- Students will be able to discuss what a models are and how they can be used in science

Standards/Benchmark: (Science and Health GLECs)
Health
- 1.1 Describe the food groups, including recommended portions to eat from each group.
- 1.3 Explain why some food groups have a greater number of recommended portions than other food groups.
- 1.4 Associate recommended food portions to the sizes of common items.
Science
- S.RS.04.11 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.

Materials:
- 30 paper plates
- Markers
- 30 sheets of 11x14 construction paper
- Deck of cards
- Baseball
- CD case
- 30 blank Plate Template worksheets
- Soda bottle model
- Candy bar model
- Bottle of soda/ candy bar
- Teacher created demonstration plate and paper cut-out portion representations to be filled in during “Explain”
- Scissors
- ELMO digital projector
- White board

Safety Concerns, Materials Guidelines or Cleanup Procedures:
Have students use the scissors at their desk to avoid any injuries that could possibly occur. Being that students are in the Upper Elementary level, this is a minimal concern.

References:


Engage:
1. The teachers will ask the students, “What is a model?” We will call on a few students that raise their hands and have them share their ideas with the class.
2. The teachers will then ask Student Number 3 if they would like to share their idea from the pre-assessment, because they had a complete understanding of what a model is and does.
3. Next, the teachers will ask the students “Do you know of a model of nutrition? Can you explain the model?” When students raise their hands we will ask a few of them for their ideas.
4. Then, the teachers will ask Student Numbers 1, 17, and 18 if they would draw their models from the pre-assessment on the board because they had complete drawings of various nutrition models.
5. Our Explorable Question is, “What are the aspects of a balanced meal, and why?”
Explore:
1. Each student will receive a blank Plate Template worksheet. This worksheet is a picture of the plate model without words or markings.
2. Students will use markers to draw a picture of a meal they would like to eat. Students will be asked them to draw their ideal meal: a meal with no restrictions. This drawing will be later compared to the students’ newly obtained knowledge from the “Explain”.

Explain:
1. The teachers will discuss each of the food groups, what key vitamins and minerals they contain, how those vitamins and minerals affect bodily development, and the appropriate portion size of each food group.
2. The teachers will discuss that fruits are a food group and ask students for three examples of fruits to be written on the white board under the heading “Fruits.”
   The teachers will present that fruits contain vitamin C, which helps prevent diseases. A serving of fruit is 1.5-2 cups, or the size of a baseball, and 3 servings of fruits should be consumed daily. The teachers will hold up a baseball to demonstrate the portion size. The “Fruit” paper cut-out will be placed paper plate under the ELMO.
3. The teacher will discuss that vegetables are a food group and ask students for examples of vegetables, writing the students’ ideas on the white board under the heading “Vegetables.” The teachers will resent that vegetables contain vitamin C, which fights illness, and vitamin A, which promotes skin health. A serving of vegetables is 1.5-3 cups, or the size of a baseball, and 4 servings of vegetables should be consumed daily. The teachers will hold up their first as an example of the portion size, asking the students to likewise hold up their fists so as to facilitate student involvement. Then, the teachers will add the “Vegetables” paper cut-out to the paper plate under the ELMO.
4. The teachers will discuss that proteins are a food group and ask students for examples of proteins which will be written on the white board under the heading “Proteins.” The Teachers will present that proteins contain protein, which helps muscle growth and gives us energy. A serving of proteins is 3-6 ozs., or the size of a deck of cards, and that 2 servings of protein should be consumed daily. The Teachers will hold up a deck of cards as an example of the portion size. Then, the teachers will add the “Protein” paper cut-out to the paper plate under the ELMO.
5. The teachers will discuss that grains are a food group and ask students for examples of grains which will be written on the white board under the heading “Grains.” The teachers will present that grains contain fiber, which helps with food digestion. A serving of grains is 4-8 ozs., or the size of a CD case, and 5 servings of grains should be consumed daily. The teachers will hold up a CD case as an example of the portion size. Then, the teachers will add the “Grain” paper cut-out to the paper plate under the ELMO.
6. The teachers will discuss that dairy is a food group and ask students for examples of dairy which will be written on the white board under the heading “Dairy.” Present that dairy products contain vitamin D, which strengthens bones and teeth, and helps clot blood. A serving of dairy is 2-3 cups, or the size of a fist, and 3 servings of dairy should be
consumed daily. The teachers will hold up a fist as an example of the portion size, asking the students to also hold up their fists to facilitate student involvement. Then, the teachers will add the “Dairy” paper cut-out to the paper plate under the ELMO.

7. The teachers will then talk about the extra foods, which consist of oils, fats, and sweets. The teachers will ask for examples of these types of foods and write them on the white board under the heading “Extras.” The teachers will explain that these foods are not considered food groups because they do not contain adequate nutritional value, and only 4-6 tablespoons of these extra foods should be eaten daily. Being one tablespoon is equal to a thumb print, the teachers will hold up their thumbs, asking the students to hold up their thumbs also to facilitate student involvement. The “Sweets” paper cut-out will be placed next to the paper plate under the ELMO.

**Extend:**

1. The teachers will present a candy bar and a bottle of soda, asking the students “How much sugar do you think is in this candy bar?” and “How much sugar do you think is in this soda drink?”

2. The teachers will call on students who have raised their hands to present their estimates.

3. The teachers will then place the “Soda Bottle Model” next to the actual bottle of soda, and the “Candy Bar Model” next to the actual candy bar. The teachers will explain that the models, of which as see-through plastic/glass cases, represent the approximate size and shape of the actual soda drink and candy bar, but reveal to the students the amount of sugar present in each.

4. The teachers will explain that these sugary snacks are considered part of our “Extras” category of food because they high amounts of sugar deemed unhealthy for the body.

5. The teachers will discuss with the students the side effects of high amounts of sugar consumption, such as stomach aches, tooth damage and decay, and the “Sugar High”, which gives you a short burst of energy, but soon leaves you feeling tired.

6. The teachers will make note to the students that the “Extras” category does not need to be eliminated altogether, but that food from the “Extras” category should be enjoyed in moderation.

**Performance Assessment:**

1. The students will create their own “Flood Plate Model” to be taken home and used as a daily reference for meal preparation and food choices.

2. They will use the plate, markers, and construction paper to create a meal that follows the proper food guidelines discussed within the lesson such as proper portion sizing and representations of all of the food groups.

3. Students will be assessed on their representations of the food groups and appropriate portion sizes within their “Food Plate Model”.


Nutrition Lesson 2: Food Groups, Vitamins, and Portions

Grade level: Fourth

Concept: How the food we eat affects our body through the nutrients they possess

Objectives:
- Students will decipher important information from nutrition labels.
- Students will be able to state the harmful effects that excess sugar has on the body.
- Students will be able to describe the appropriate portion size of each food group.
- Students will be able to discuss the vitamins and minerals that are gained from each food group, and how they affect bodily development.
- Students will be able to discuss what models are and how they can be used in science

Standard/Benchmark: (from MI Curriculum Framework)

Health
- 1.3 Explain why some food groups have a greater number of recommended portions than other food groups.

Science
- L.O.L.E.1 Life Requirements- Organisms have basic needs. Animals and plants need air, water, and food. Plants also require light. Plants and animals use food as a source of energy and as a source of building material for growth and repair.
- S.IA.04.13 Communicate and present findings of observations and investigations.

Materials:
- 30 nutrition label charts
- 30 nutrition labels from varying food groups
- White board
- Candy bar model
- Pop bottle model
- 30 worksheets for evaluate

Safety Concerns, Materials Guidelines or Cleanup Procedures:
Leave the glass candy bar model out of student reach to avoid and injuries.
Engage:
1. Ask students, “Do you remember on our pre-assessment we asked if you take any vitamins?” Then ask “How many of you take vitamins?”
2. Then the teachers will call on student number 13 and ask if they will share their idea about vitamins they expressed in their pre-assessment.
3. The **Explorable question** is: What nutrients do we get from the foods we eat?

Explore:
1. Students will be broken up into seven groups of three or four students. The teachers will hand out one nutrition label chart to each student and three nutrition labels from three different food groups to each group.
2. The group members will first determine which food group their label belongs to. Then they will look at the vitamins and list the three most prominent vitamins in their food.
3. They will then note if their food has protein and how many grams of sugar are in the food. Each group will do this for all three of their labels and chart their findings on the nutrition label chart.

Explain:
1. The teachers will write the name of each food group on the board and begin with the fruit food group.
2. The teachers will ask students what food labels they found from the fruit food group. As students name these foods we will write them on the white board. The teachers will then ask these students to name the most three most common vitamins in their food. The teachers will write all of these vitamins they name on the board. Then students will say if their food item had protein, and how much sugar was in their food.
3. The teachers will repeat step two for vegetables, proteins, grains, dairy, and extras.
4. The teachers will then discuss what the main vitamin or mineral from each food group is and how it affects the body. The teachers will begin with fruits and explain how they contain vitamin C which helps prevent diseases.
5. The teachers will then talk about how vegetables contain vitamin B which gives us energy.
6. Next the teachers will talk about the protein food group and how proteins give us energy.
7. The teachers will then discuss grains and how they contain fiber, which aids in food digestion.

References:
8. Then the teachers will talk about the dairy food group, and how dairy contains vitamin D which strengthens teeth and bones, and helps blood to clot.
9. Lastly, the teachers will discuss how the extra foods do not contain any important vitamins, but high amounts of sugar.

**Extend:**
1. The teachers will present a candy bar and a bottle of soda, asking the students “How much sugar do you think is in this candy bar?” and “How much sugar do you think is in this soda drink?”
2. The teachers will call on students who have raised their hands to present their estimates.
3. The teachers will then place the “Soda Bottle Model” next to the actual bottle of soda, and the “Candy Bar Model” next to the actual candy bar. The teachers will explain that the models, of which as see-through plastic/glass cases, represent the approximate size and shape of the actual soda drink and candy bar, but reveal to the students the amount of sugar present in each.
4. The teachers will explain that these sugary snacks are considered part of our “Extras” category of food because they high amounts of sugar deemed unhealthy for the body.
5. The teachers will discuss with the students the side effects of high amounts of sugar consumption, such as stomach aches, tooth damage and decay, and the “Sugar High”, which gives you a short burst of energy, but soon leaves you feeling tired.
6. The teachers will make note to the students that the “Extras” category does not need to be eliminated altogether, but that food from the “Extras” category should be enjoyed in moderation.

**Evaluate:**
1. The teachers will hand out a nutrition assessment worksheet to each student, which they will complete individually.
2. The teachers will ask students to choose one type of food from each food group in order to fill out their worksheet.
3. Students will write the name of the food in the first column, the food group or groups it belongs to in the second column, and the vitamins attributed to that food group in the third column.