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Feeding our Bodies, Fueling our Minds

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Overview

Obesity plagues both our nation's adult and youth populations. In the United States, approximately 30 percent of adults, 16 percent of children ages 6 to 19, and 10 percent of children between the ages of 2 and 5 are obese [1] . Obesity is defined as having a Body Mass Index (BMI) above 30 [2] . Perhaps even more striking as it concerns this curriculum unit is the fact that the numbers of obese Mexican-American children (which represent the overwhelming majority of the student body at my school) are markedly higher than those of Caucasian children. Research indicates that while obesity rates for Caucasian boys and girls are 14.3 and 12.9 percent respectively, the numbers for those same sub-groups of Mexican-American youth are 25.5 percent and 18.5 percent [3] . Therefore, more than a quarter of Mexican-American boys are obese; these numbers are especially troubling and suggest a clear and abundant need to refocus our energy on teaching children about how they can literally change their bodies by making healthier food choices and engaging in regular physical activity.

There are indications that students who are severely overweight have a greater tendency to perform worse in school and are more likely to be placed in special education or remedial classes than students who are not. In their extensive studies of the role of schools in preventing obesity, Mary Story, Karen M. Kaphingst, and Simone French found that "…severely overweight children and adolescents are four times more likely than their healthy-weight peers to report impaired school functioning" [4] . Though other factors, including socio-economic status and level of parent education, are certainly at play as well, the numbers are alarming and beg the need for intervention and prevention.

My colleagues and I have debated the role of schools in this epidemic. As teachers dedicated to educating youth in the twenty-first century, it is our responsibility to share our knowledge about both developing a healthy mind and a healthy body. I do not believe the two spheres can be separated, nor at this time in our history as obesity rates rise to an unprecedented level, should they be. Story and her colleagues state an important point, "More than 95 percent of American youth aged five to seventeen are enrolled in school, and no other institution has as much continuous and intensive contact with children during their first two decades of life." [5] Though many young people are passionate about what they will and will not eat, there is room for change. Caring, impassioned adults in their lives, including parents and teachers, not only have the power but also the responsibility to educate them about the food they eat and how that food subsequently affects their

health. Despite the fact that food costs are rising and many families have limited access to fresh, locally-grown produce, I remain hopeful that programs, such as the one outlined in this unit in addition to others that are being implemented across the country, will ameliorate the growing issues of obesity and mal-nutrition that plague our population. With knowledge comes the ability to change and to share one's knowledge with others. It is my hope, that by educating youth about nutrition and how to make healthier food choices, young people will be instrumental in initiating such change both personally and also on a greater scale.

Rationale

I have a particularly deep personal interest in this unit of study as food choice and exercise play a major role in my life. I believe that our bodies are a fascinating, complex, and unique set of systems that we must value and protect. Two of the ways we can do so are by what we choose to eat and how we use our bodies during our recreational time. It is important to note that I do not have unrealistic expectations. I do not want children to "give up" the foods that are tastiest and most enjoyable to them, like ice cream and sweets; rather, I hope to help them realize that eating a balanced diet, containing foods from all food groups, can be both pleasurable and beneficial. Students who are armed with the knowledge of what food is healthiest and how to maintain a balanced diet, even at a young age, will be able to make more informed decisions about what they eat in the future (be it that school year or when they get older) and will also have the potential to help their friends and family members make similar healthy choices. By sharing knowledge with them about the human body, and how what we eat affects our bodies and our minds, I hope to encourage them to make informed choices.

I teach a sixth grade bilingual class including special education students at Agua Fria Elementary School in Santa Fe, New Mexico. My school is in Restructuring Phase II, as mandated by the state, due to failure to make Adequate Yearly Progress for four consecutive years. We must therefore prepare an Alternative Governance Plan and develop and implement a two-year Educational Plan for Student Success to enhance both instruction and professional development. In addition, 100% of our students receive free breakfast and lunch which means that 90% are at the poverty level. There are approximately 575 students from pre-kindergarten through sixth grade at Agua Fria, 66 % are English Language Learners (ELL), and 92% of the student population is Hispanic while 16% of the students receive Special Education services. My school has adopted an inclusion model of Special Education and is a Title I school meaning that there is a high poverty rate and low rate of literacy. Many of the students live in single-parent homes, and the majority have limited or no access to computer technology at home. Gang activity and levels of violence are rising among the community, and have become particularly prevalent in the sixth grade.

I teach the core content area subjects, including reading, language arts, social studies, science, and math to my sixth grade class. An overwhelming majority of those students are ELL with a home language of Spanish; most are from Mexico and are eleven or twelve years old. Few students have been in the United States for less than three years, while many have been in this country for much of their elementary school career. Nonetheless, the mobility rate of these students is quite high, only a handful each year has been at Agua Fria since kindergarten.

Each year, the academic levels of my students vary greatly. Because I teach a bilingual class, there are students who are truly bi-literate whereas others lack proficiency in either language. Most students have

literacy skills well below the sixth grade level, and only a few are reading at grade level in English. Additionally, some of the students qualify for special education services due to academic and/or behavior issues (a few have tendencies towards violence). As a result of the varied levels and behaviors of my students, I organize my instruction in such a way as to meet the needs of all students while addressing our state standards for the sixth grade. In order to increase comprehension, it is important to introduce the subjects of study in multiple ways, for example, allowing the students to experience education in the physical sense. Together, using this philosophy and a series of activities that cut across ability and literacy levels, we will examine and answer the question, how do the quality of food intake and exercise affect academic achievement.

Because the majority of my students live in economically disadvantaged settings and often come to school hungry and tired, I will examine the connection between nutrition, exercise, and academic achievement. We live in a fast-paced, efficiency driven society. Many of my students live in single parent homes in which their care-takers work more than one full-time, low-paying job and are not able to be at home with their children after school. The students, who are between the ages of eleven and thirteen, are often left to care and cook for both themselves and their younger siblings. After school, many of them are not enrolled in sports-centered activities or music classes (for various economic and cultural reasons) and sit inside at home, unsupervised, playing video games or watching the television. They eat whatever is in the kitchen, which is often not very nutritious. Our school's "Wellness Team," consisting of the counselor, nurse, and social worker in charge of the Family Resource Center, provides some families with "Healthy Backpacks" filled with snacks for the home and I work after school with girls in grades three-six to teach them about making healthy life choices. Though all of our students are eligible to receive free breakfast and lunch, they generally do not eat the healthy, fresh salads and fruits given in the cafeteria and leave for recess still hungry and unable to perform their best work in the classroom. Through this curriculum unit, I not only aim to provide my students with the experience and knowledge that food choice and physical activity affect one's ability to succeed but also arm them with the tools necessary for eating better and exercising more.

Background Information

The over-arching objective for this curriculum unit is for students to understand and experience the connection between nutrition, exercise, and one's ability to learn. The aforementioned rates of obesity are quite alarming and indicate a clear need to address food choice, yet research also points to a link between exercise and academic achievement. Physical activity enhances brain functioning. In a study of the effects of physical education classes on elementary school testing results, Pamela Tremarche and her colleagues state, "Research has shown that exercise provides more oxygen-rich blood, which nourishes the brain. More neurotransmitters are released, more endorphins are released, and more neural networks are developed with movement." [6] Many studies of late have focused on obesity, student performance in school, and the need to increase funding for physical education programs. Often, in situations where money is scarce, physical education is one of the first "amenities" to be cut from school districts because it is not measured by state assessments. Nonetheless, "Research indicates that physical activity enhances brain functions and produces many cognitive and physiological benefits. Children who are provided with many experiences at an early age develop an abundance of neurons and are better learners [7] .

Tremarche's study, conducted in Massachusetts, found that the fourth grade students who were given access to more physical education classes in a school year scored higher on an English/Language Arts achievement exam [8] . Similarly, in a study performed with high school students, those who engaged in high levels of exercise experienced less depression, had stronger relationships with their parents, were more involved in sports teams, had better grades, and did not use drugs as often as their peers who had low levels of physical activity [9] . Likewise, a report released by "Action for Healthy Kids" claims, "Intense physical activity programs have positive effects on academic achievement, including increased concentration; improved mathematics, reading, and writing test scores; and reduced disruptive behavior" [10] . In sum, "the function and development of the mind is influenced by the health and care of the body." [11]

In yet another study called the 2003 Children's Lifestyle and School-performance Study (CLASS) 5200 fifth grade students in Nova Scotia were part of a sample group in order to study the relationship between diet quality and academic performance. Findings indicate a link between diet quality and achievement; those students with diets rich in fruits and vegetables and a modest intake of fat out-performed their peers [12] . Many researchers and advocates for public education, in turn, argue for the need to implement obesity prevention programs, health education, and health services, in addition to offering more nutritious foods to children in the school setting [13] . In a review of nine articles addressing this theme scholars have found that overweight and obesity are related to a decrease in academic achievement. "Overweight and obese children are more likely to have low self-esteem and they have higher rates of anxiety disorders, depressions, and other psychopathology. These mental health conditions may be the mediating factors for an overweight or obese child to score poorly in school" [14] . All of these facts point to two needs: an emphasis on nutrition education and an increase in time spent engaged in physical activity.

Using this research and my students' needs as a guide, I will teach/review with the students the basic principles about food groups or categories, as per both the USDA's MyPyramid and the Harvard School of Public Health's New Healthy Eating Pyramid. The major groupings vary between the two pyramids but are as follows: whole grains, fruits and vegetables, meat and beans, dairy/milk, plant oils, nuts, legumes, fats, starches and sweets. In an effort to assist the students in eating a healthy, balanced diet, we will discuss how the nutrients in food provide us with the energy we need to live and to operate our body's systems. All food contains nutrients, including carbohydrates, proteins, fats, vitamins, and/or minerals. Carbohydrates provide us with energy, as do fats and we need proteins to make and repair cells. We will discuss how you can use the two food pyramids as a guide for what to eat and how much to eat. Fresh vegetables and fruits are a great source of vitamins. Whole grains (which are readily available, tasty, and inexpensive) are better for your body than products simply containing refined white flour. Fats are an essential part of a healthy diet, but a balanced regime contains more unsaturated fats than saturated fats. Fats from fish, nuts, seeds, and oils are unsaturated, while the fats in many pre-packaged dessert foods and snacks are saturated.

In addition, I will review the process of digestion with students. Human digestion, according to state standards, is addressed in second, third, and fourth grades in New Mexico. I will use videos, pictures, and grade-level nonfiction texts to review this material with the students. We will discuss how digestion begins in the mouth with saliva, continues in the esophagus, and moves into the stomach where our food is churned by a process known as peristalsis. Two neighboring organs, the liver and the pancreas, make chemicals that assist in turning the food into a mushy substance. Then, the food is broken down even further in the small intestine and nutrients are absorbed into the blood. I will also help students understand how during this process what we eat is converted to a green and brown substance called chyme: molecules are extracted and absorbed from chyme for use as fuel in our bodies.

In conjunction with a discussion of nutrients and digestion will be a series of activities about the importance of exercise in maintaining a healthy lifestyle. Food choice and exercise are linked. Leading a healthy lifestyle not only involves eating a balanced diet but also remaining physically active. Exercise has many benefits, including, reduced risk of disease, increased heart rate which results in increased blood flow and subsequent increased oxygen flow to the brain, a decrease in stress levels, increased metabolism, a boost in the immune system, and a burning off of calories. Body systems become more efficient with regular exercise. Because of these benefits, it is recommended that youth and adults get at least thirty minutes of exercise each day.

All food contains calories. The number of calories in a food is a measure of the amount of energy that can be extracted from it. Therefore, food calories are directly related to calories used by activity. Because of this relationship, calories taken in (in food) must equal calories out (in activity) in order for a person to maintain his/her weight. Similarly, if the calories consumed outnumber those expended, weight will be gained and if the calories burned are more than those ingested, a person will lose weight. Through a balanced diet and sufficient exercise, a person can help regulate his/her weight and help his/her body perform at its best.

Objectives

A wealth of academic research examines the effects of nutrition on one's ability to learn. Many studies address the role of obesity and socio-economic status in academic performance while others focus on the importance of school breakfast programs as a means for jumpstarting a child's day of learning. The objectives of this curriculum unit, however, are based on quality of food consumption, exercise, and student achievement. Because many of my students come from low-income homes, they often lack access to fresh, healthy foods. It is my aim to observe and examine the effects that an introduction to making healthy food choices and an increase in physical activity through regular exercise will have on their performance in school. If I provide the students with a wealth of information about, and experience with, nutritious foods and access to daily exercise, will their achievement be enhanced?

I will address these objectives while teaching the following set of skills: Students will learn what the multiple intelligences are and why they are important. Students will be able to think critically about what they eat and will learn to make healthy food choices. Students will develop critical thinking skills as we compare and contrast the MyPyramid (formerly known as the Food Guide Pyramid) from the United States Department of Agriculture and the Harvard School of Public Health's "The New Healthy Eating Pyramid." Students will develop content area vocabulary (see Appendix), which is especially important for second language learners. Students will better understand the different "food groups" and how organizations (i.e. government, educational institutions, research foundations) not only interpret information differently and but also advise the public differently about what is "good for us." Students will be able to develop informed opinions about what foods are healthy. Students will understand that food is made up of different nutrients, including, carbohydrates, fats, vitamins, minerals, proteins, water, and fiber. Students will understand the basic principles of digestion in the human body. Students will understand that food provides fuel for the human body. Students will understand how regular exercise improves body function. Students will understand and experience that eating a balanced diet and exercising can lead to better health, physically and mentally.

Therefore, through this curriculum unit, I not only aim to provide my students with the experience and knowledge that food choice and physical activity affect one's ability to succeed but also arm them with the

tools necessary for eating better and exercising more.

Strategies

Multiple Intelligences/Differentiated Instruction

By engaging the students in the learning process, I will impact their ability to meet this unit's goals. I will use strategies based on two educational theories, experiential education in which students, "learn by doing" and Howard Gardner's theory of the Multiple Intelligences. According to Gardner, a professor and psychologist at Harvard University, each of us possesses eight different categories of our competencies, or intelligences: linguistic, logical-mathematical, spatial, bodily-kinesthetic, musical, interpersonal, intrapersonal, and naturalist. Though some of us might learn better through one arena than others (for example, a student who has high spatial intelligence might learn best through art), it is important for students to understand that we are all smart in different ways and that even though we might not be strong in a certain area, we can, in fact, develop our intelligences through practice and focused skill work. Put simply: we can be word smart (linguistic), number smart (logical-mathematical), visual/picture smart (spatial), body smart (bodily-kinesthetic), music smart (musical), socially/people smart (interpersonal), self smart (intrapersonal), and nature smart (naturalist).

Gardner developed this widely-used theory after realizing that there are "many kinds of minds;" the theory is an outcome of his belief that our western definition of what it means to be intelligent based on IQ tests is too constricting [15] . Gardner's theory stems from a respect for diversity for the myriad learning styles and ways of assessing learners. Each intelligence area has qualified as a legitimate intelligence only after passing a series of tests, including those based on brain research. Areas of the brain that control one type of intelligence can be damaged, whereas those controlling another may remain unaffected. For example, a person who is unable to communicate verbally because of trauma to the part of the brain that controls language (linguistic intelligence), might still be able to dance (bodily-kinesthetic intelligence) or perform math tasks (logical-mathematical intelligence). Gardner states,

It is of the utmost importance that we recognize and nurture all of the varied human intelligences, and all of the combinations of intelligences. We are all so different largely because we all have different combinations of intelligences. If we recognize this, I think we will have at least a better chance of dealing appropriately with the many problems that we face in the world [16] .

I believe, wholeheartedly, in creating a classroom environment in which all learners, regardless of their levels of literacy or the nature of their preferred learning style(s) can succeed. In doing so, I have discovered that implementing the Multiple Intelligences into the classroom is empowering for the students as they learn content area knowledge, particularly with units of study in social studies and the sciences, and helps in developing their self awareness and self esteem.

By the time they reach sixth grade, many students have already labeled themselves as learners according to their supposed "deficiencies" rather than recognizing their many aptitudes. For example, a student who struggles with decoding might say, "I stink at reading, I don't like to read!" After completing a number of learning contracts designed around the idea of each one of us possessing multiple, as opposed to one set of,

intelligences, I have heard students say something along these lines: "Jose is a great reader, and I am a good at math." Students who might struggle with one academic area realize their talents in other arenas. Teaching students to think about their own learning styles fosters metacognition (one's ability to reflect about one's own thinking) and heightens self-worth.

An important point on which I would like to focus is the fact that we all possess each of the eight intelligences outlined by Gardner. Though some remain less developed than others (for example, I might not possess much musical intelligence), I am still capable of developing that area and that does not mean that I am not smart. The degree to which we are able to develop these intelligences also depends on a series of factors including, genetics, life history, personal culture, and historical background [17] . I like to remind my students that we are all smart in different ways. I find this teaching strategy to be particularly effective when working with students who are second language learners and students with learning exceptionalities. Many students who are struggling to be literate in a new language become frustrated when they cannot form a complete sentence in English and often internalize this as weakness; it is imperative that they realize this is not a sign of their lack of intelligence. Rather, it is my job as their teacher to differentiate instruction, provide additional materials in their home language when applicable, and allow for them to experience a sense of success and academic growth. Integrating the theory of Multiple Intelligences into my curriculum allows me to do so.

Through a series of hands-on activities, I will introduce students to Howard Gardner's theory of the Multiple Intelligences and help them examine their own areas of intelligence. I have designed a Multiple Intelligences Survey to assist the students in defining their personal areas of strength in addition to areas in need of further development. In addition, I created a Nutrition Multiple Intelligences Contract with activities representing each of the eight distinct areas of intelligences. Students will be empowered to choose their own projects from that list.

Additionally, throughout the course of the unit, I will instruct and assess the students using a variety of modalities, for example, through writing, listening, drawing, viewing, creating games, reading, speaking, acting, and sketching. I will thereby honor the multitude of capacities my students possess. Since many of the students also respond well to moving images, I will use a series of videos from the Discovery Education United Streaming website (See Activities).

Teaching with a Real-World Application

I have learned, throughout the past six years as I have worked with this student population, that the majority of my students "learn by doing." I am a volunteer coach of an after school fitness program for girls in grades three through six (Girls on the Run). My colleagues and I teach the students important life skills, such as communicating, eating healthy, and exercising, while preparing them for a 5 kilometer race. We have noticed a marked increase in their self esteem as a result of this hands-on experience. Because all students can benefit from such an experience, I have designed this curriculum around their learning needs and a greater societal need to focus on the importance of making healthy lifestyle choices. By writing a curriculum unit that is relevant and meaningful to their development, it is my hope that they will extend their knowledge beyond the classroom and apply this information to their lives both in and outside of the classroom.

Experiential Education

As previously mentioned students "learn by doing." I, therefore, want them to experience their education through a series of hands on activities. In this curriculum unit, after teaching them about the benefits of physical activity (as we learn about how our bodies burn calories and how food fuels our body with energy), I

will extend the opportunity for them to experience the effects of exercise. Each day we will walk the track in the schoolyard together. Students will record how much they walked, in terms of distance and in minutes. Then, they will record how they felt after exercising. They will also be responsible for compiling a list of various healthy physical activities they can do at home or during recess. Many of the students already jump-rope, play basketball, and play soccer, in addition to others who ride their bikes to the park and skate in their mobile home parks.

Literacy-based Learning: Read Alouds, Shared Reading, Interactive Writing, and Oral Language Development

Another strategy that I regularly employ in the classroom is the integration of content areas; in other words, no subject matter is taught in isolation. This unit's theme is rooted in science but will be implemented with a literacy and math focus as well. When working with second language learners, I find it especially useful to incorporate the five language arts (reading, writing, speaking, listening, and viewing) and real-world math problems into all areas of study. Language and math skills are, therefore, reinforced throughout the day in all units of study. Language acquisition is also enhanced through the study of science and its related vocabulary. Additionally, the objectives of this unit are centered upon New Mexico state learning standards in Science, Math, Language Arts, and Physical Education as outlined in the Appendix.

As part of my emphasis on literacy throughout the school day, I will employ a series of useful literacy teaching techniques in this unit such as, read aloud, shared reading, and interactive writing. I will read aloud excerpts from a series of age-appropriate nonfiction texts (see student resources) and recipes; this technique is a powerful way for the students to develop fluency skills in their second language as they listen to the teacher read a text out loud to them. Shared reading, a strategy used to heighten comprehension and increase fluency and decoding skills, will be employed when I work with the Multiple Intelligences survey, the comparison of the two food pyramids, the Nutrition Multiple Intelligences Contract, and at various other times throughout the lesson. The students and I will choral read (read aloud simultaneously) a text together and will both have copies of the same text. They are therefore able to see and hear the text concurrently unlike during read aloud when the teacher is the only one with the text and the students are active listeners. Finally, I will use interactive writing, a process in which the students and the teacher work together to write a text by literally sharing the pen, to write a model recipe with the class.

Vocabulary Development: Chants

Because almost all of my students are ELL, I regularly employ strategies to increase their knowledge of content area vocabulary in English. As part of this unit, I will use chants to reinforce the words and concepts we are studying. (See Appendix). This form of instruction, which is adapted from Marcia Brechtel's work, is effective for a number of reasons: it provides repetition, it is enjoyable, it is a comfortable and safe avenue through which to explore new vocabulary words as students read aloud the text together, and it is kinesthetic. While reciting our "Nutrients" chant, the students and I will gather in the corner of the room where I will have a copy of the chant printed on large poster paper. First, I will read a line aloud in order to model proper pronunciation and inflection, and then they will repeat it as a class. Many voices reading aloud together provides a sense of security for those who are learning content area words in a new language. In addition, I will ask students to create appropriate hand gestures for key words within the text. For example, I might request that the students devise a movement for the word "digesting" and they will repeat that gesture as we chant the line. The "Nutrients" chant will be revisited at various points throughout the unit both during whole class and independent activities in order to reinforce key ideas and vocabulary.

Measuring and Assessing Achievement through Surveys and Data Folders

I will administer both pre- and post-surveys to the students about what they are eating, how they feel, and how much they exercise. Though it will be difficult to measure, I will also keep data folders on each student to mark any changes in his/her academic achievement throughout the unit. Despite the fact that improvements in academic performance may not be solely attributable to a heightened focus on food choice and exercise, helping students realize that there is a connection between eating, exercising, and achievement is a success in its own right.

Teaching Critical Thinking Skills and Scientific Inquiry

After introducing students to the idea that food choice is important for our physical and mental growth, we will compare and contrast the two aforementioned versions of a food pyramid. We will use both outlines in an effort to define parameters for our eating. We will use the principles of scientific inquiry to highlight similarities and differences in both graphics and to understand that information can be interpreted and displayed in different forums and that the viewer must discern between fact and possible myths/uncertainties.

Activities

Overview

I used the theory of the Multiple Intelligences to design a learning contract for the students to complete as part of this unit. There are at least two activities in all of the sub- categories of intelligence. First, I will introduce the idea of the Multiple Intelligences. I will give each child a hand-out explaining the origin of this theory and we will share-read the materials using an overhead projector. Then, I will show a poster I created that highlights each of the eight intelligences with an accompanying picture. For example, for the bodily-kinesthetic intelligence, I drew sporting equipment and a body in motion. I deem it important to present this concept prior to asking students to the complete the aforementioned Multiple Intelligences Survey for many reasons. Students will be familiar with the language of this theory, which can at first be a difficult concept for sixth graders to grasp. Secondly, students are then able to associate pictures and simpler meanings with each intelligence area after our discussion and viewing the poster. Third, because a number of the students receive special education services and most are ELL, I want them to understand that they all are intelligent in different ways and each student can succeed at his/her own academic level. After this introduction, they will complete the survey. They will, then, choose projects from the contract based both on their personal interests and the results from the survey. The number of projects chosen will vary based on time constraints and on a student's abilities. This particular group of projects lends itself to differentiated instruction, as it is easy for a teacher to adjust the number of projects a student has to complete and the depth with which the work should be completed.

Throughout the curriculum unit, all students will participate in a series of activities, including creating and maintaining a food journal and recording how their body feels after each meal or snack and throughout the day. They will also keep an exercise log and record how their body feels after each time they exercise throughout the day, and walk/jog the track with our class on a daily basis. In addition, in an effort to strengthen the home-school connection, they will be working with their parents, or an adult family member, to write a family recipe in both English and Spanish that represents healthy food choices. We will type these recipes in the computer lab, bind them together into a bilingual book, and share them with all families. As a celebratory event, we will enjoy a "pot-luck" meal together at the end of our unit of study prepared from recipes written by students and their families. What follows is an outline of three specific activities used in this

curriculum unit.

Sample Activities

Time frame for the unit: 3-4 weeks for approximately one hour each day

Activity 1: An Introduction to the Multiple Intelligences (Day 1)

Objective: The students will learn what the Multiple Intelligences are and why they are important.

Materials: Teacher-created poster highlighting each intelligence area, background on the theory of Multiple Intelligences (see Background Information), one copy of the Multiple Intelligences Survey for each student, copies of the Nutrition Multiple Intelligences Contract for each student.

Procedure:

1) Introduce Howard Gardner's theory of the Multiple Intelligences using the technical names for each sub-group and pictures to represent each area. I have created a poster with the name of each intelligence area, an accompanying picture to represent that area, and a simpler definition of that intelligence. For example, for the intrapersonal intelligence, I might draw a picture of a journal and write next to it, "self" smart, so that students know the basic meaning of the term, *intrapersonal*. Be certain to remind students that we are all smart in different ways, so that they know that not any one intelligence area is more important or better than another. This exercise is as much a lesson in building self esteem as it is in teaching content area knowledge.

2) Administer the Multiple Intelligences survey to each child. I prefer to read aloud the questions and answer choices to each question so that all students, regardless of their reading level, will be able to answer each item. If further explanation is necessary, answer any questions the students have about a category. Projecting a copy of the survey onto a screen either with an LCD projector or an overhead projector is also helpful.

3) After answering all questions, students will add the number of boxes they have marked in each category and find out how they are smart; then they will share results in groups.

4) Students will use the survey results to help them choose a series of projects on the Nutrition Multiple Intelligences Contract. After the projects are completed, students will share their knowledge and build oral language skills by selecting one project to present to the class orally. (Work on the contracts will begin after the information about nutrition and exercise is presented, ideally after day 7).

Assessment: The Multiple Intelligences Survey will serve as a means of assessment, and students will be graded on their Multiple Intelligences Contract using a rubric that we write together in class using the process of interactive writing. After completing the projects, students will also grade themselves with the same rubric that the teacher uses.

Activity 2: Making Healthy Food Choices (Days 2, 3, 4)

Objective: Students will learn how to make healthy food choices and develop critical thinking skills by comparing and contrasting the USDA's MyPyramid and the Harvard School of Public Health's Healthy Eating

Pyramid.

Materials: Color copies of both food pyramids for each student, overhead transparencies of food pyramids, one copy of a Venn Diagram per group, Venn Diagram pocket chart

Procedure:

1. Present the whole class with a seemingly simple question, "How do we make healthy food choices?" They will brainstorm answers with a small group (Day 2).
2. Review with them the concept of food groups and what it means to eat a balanced diet.
3. Compare and contrast the two food pyramids and discuss how we are "consumers of information," how agencies have a responsibility of sharing information with the public, and how we, as consumers, need to discern whether or not the information is correct. Students will complete a Venn Diagram with their groups and then will share their answers with the class. They will write what is similar and what is unique to each pyramid. After our discussion we will add their answers to a class Venn Diagram pocket chart hanging on the wall (Day 3).
4. At this time, the students and the teacher begin the food journals and keep a regular log of what is eaten at each meal and for snack during the course of the unit. The teacher can model how to complete each entry for the students on an overhead projector (Day 4) (See Appendix for a sample page of a food journal).

Assessment: Students will be assessed on their participation in, and completion of, all activities, including the Venn Diagram and the food journals.

Activity 3: Food for fuel (Days 5, 6, 7)

Objective: Students will learn about nutrients, digestion, and how we get energy from food (See Background Information).

Materials: Copy of the nutrients chant written on poster-board, Access to a computer,

Books from the student resources list for read aloud and student research

Procedure:

1. Read aloud from one of the various children's/young adult books about nutrition. Present the students with the sample vocabulary list (See Appendix). Have them listen for key words during read aloud. Students will learn about the basic nutrients: carbohydrates, protein, fats, vitamins, and minerals as stated in the Background Information. They will connect this information with what was learned from the above food pyramid and balanced diet activity. (Day 5) As an extension to reinforce key concepts and new words, a team of students can be assigned a vocabulary word and create a poster displaying information, such as proper spelling of the word, a definition in student-friendly language, an illustration of the word or concept, and the word used in a sentence. For sixth grade (and grades 4-8), the book Food Rules! By Bill Haduch is an exceptional choice and Chapter 3 is an effective read aloud text (See Student Reading List).
2. To enhance vocabulary development, students will learn the Nutrients Chant (See Appendix). Gather students in the corner of the room where a copy of the chant is hanging on the wall. The teacher will lead the chant, and students will repeat each phrase. The first time, the students will just read it. On

subsequent occasions, students will create hand gestures to go with the key vocabulary words and processes, such as digestion. The chant will be revisited at various points throughout the unit. (From Day 5 on).

3. Students will watch a video from www.unitedstreaming.com about digestion, after which the teacher will review the process of digestion with the class using pictures and nonfiction texts from the Student Reading List (Day 6). Revisit the chant, adding hand gestures to accompany key vocabulary and key concepts.
4. The teacher and students will discuss how energy is extracted from food. Review how nutrients pass into blood vessels and are used throughout the human body as fuel for growth and repair. Then, discuss about how students think different foods will affect their energy levels (Day 7). Students will follow-up by entering information into their food journals and examining their own food choices. This discussion will lead to further activities about the importance of exercise and its effects on the brain.

Assessment: Students will be assessed by their participation in, and completion of, all activities, including attentiveness during read aloud, the vocabulary poster, the chant, and the food journals.

Further activities

Administer Pre- and Post-Surveys about nutrition and exercise (See Appendix), discuss why exercise is important for the body and the brain, walk the track/school yard as a class on a daily basis, use interactive writing to compile a list of safe, fun ways to exercise at recess and at home, complete an exercise log, and celebration event at which students share their projects from the Nutrition Multiple Intelligences Contract, and enjoy a healthy meal with their parents and peers. Homework activity: After the teacher uses interactive writing to complete a recipe card for one of his/her favorite healthy family recipes, the students will complete their own at home with their parents. Since most of the students' home language is Spanish, the recipes will be written in both English and Spanish, bound into a cookbook, and shared with parents at a celebratory event.

Resources

Reading List for Teachers

Armstrong, Thomas, *Multiple Intelligences in the Classroom*. Alexandria: Association for Supervision and Curriculum Development, 2000. Excellent resource explaining the origins of Multiple Intelligences and their effectiveness in the classroom with a preface by Howard Gardner.

Breakfast for Learning. Food Research and Action Center. Washington, DC: FRAC. 1-5.

Research presented on the link between nutrition and academic performance.

"Capital At Home and At School: Effects on School Achievement." Social Forces 79 (2001): 891-911. Answers the question what effect does social capital have on one's performance in school.

Field, Tiffany, Miguel Diego, and Christopher E. Sanders. "Exercise is Positively Related to Adolescents' Relationships and Academics." Adolescence 36 (2001): 105-107. Presents findings that indicate a positive relationship between exercise and

happiness, including having healthier relationships and succeeding academically.

Florence, Michelle D., Mark Asbridge, and Paul J. Veugelers. "Diet Quality and Academic Performance." The Journal of School Health 78 (2008): 209-215. Investigates the impact of food quality on academic success.

Gable, Sara, and Susan Lutz. "Household, Parent, and Child Contributions to Childhood Obesity." Family Relations 49 (2000): 293-300.

Jukes, Matthew, Judith McGuire, Frank Method, and Robert Sternberg. Nutrition and Education. Nutrition: a Foundation for Development. Geneva, 2002. 1-4. Reports how nutrition affects intellectual growth.

Lambert, Leslie T. "The New Physical Education." Educational Leadership 57 (2000). A discussion of the need to increase time spent on physical education despite many districts' decisions to cut such programs.

Murphy, J M., Cheryl A. Wehler, Maria E. Pagano, and Et. Al . "Relationship Between Hunger and Psychosocial Functioning in Low-Income American Children." Journal of the American Academy of Child and Adolescent Psychiatry 37 (1998): 163-170. Addresses the impact of food insecurity on one's behavior.

Obesity, Food Insecurity, and the Federal Child Nutrition Programs: Understanding the Linkages. Food Research and Action Center. FRAC, 2005. 1-33. Outstanding analysis of food insecurity and obesity in low-income communities.

Overweight Prevention Program May Cut Risk of Easting Disorders Among Girls. Harvard School of Public Health. Boston, 2007. Addresses the impact of a new obesity prevention program 5-2-1-Go!.

Pollan, Michael, *In Defense of Food: An Eater's Manifesto,* NewYork: The Penguin Press, 2008. An interesting discussion of the need to return to eating real "food" and realizing that a focus on nutritionism has its downfalls.

Potts-Datema, William, and Howard Taras. "Obesity and Student Performance At School." The Journal of School Health 75 (2005): 291-295. Study examines the relationship between obesity, absenteeism, and school achievement.

Rogers, Jennifer. Healthy Eating and Student Achievement. Michigan Association of School Boards. Lansing, 2003. 1-12. Reports on the responsiblity of schools in addressing childhood obesity.

The Role of Sound Nutrition and Physical Activity in Academic Achievement. Action for Healthy Kids. 2004. 1-3. Report on the effects of nutrition in school.

Story, Mary, Karen M. Kaphingst, and Simone French. "The Role of Schools in Obesity Prevention." 16: 109-14216. Examines the many ways schools can help prevent students from becoming overweight through nutrition programs and physical activity.

Tremarche, Paula V., Ellyn M. Robinson, and Louise B. Graham. "Physical Education and Its Effects on Elementary Testing Results." The Physical Educator 64 (2007): 58-64. Study indicating that students with more time spent in physical education class scored higher on language arts exams.

Willett, Walter C. *Eat, Drink, and Be Healthy*. New York: The Free Press, 2001. A thorough and informative publication from the Harvard School of Public Health that presents an alternate approach to nutrition and challenges the USDA's food pyramid.

Reading List for Students

d'Elgin, Tershia, *What Should I Eat? A Complete Guide to the New Food Pyramid*. New York: Ballantine Books, 2005. A thorough look at how the New Food Pyramid helps you make healthier food choices. There are also tips about how to read food labels.

Haduch, Bill, *Food Rules!* New York: Dutton Children's Books, 2001. A humorous book loaded with interesting facts about nutrition.

Levchuck, Leslie, *Fuel Up! A Girl's Guide to Eating Well.* New York: Rosen Central, 1999. A fabulous resource for pre-teen girls about making healthy choices, snacking, fast food, and feeling good as a girl.

Llewellyn, Claire, *The Body in Action: Eating*, North Mankato: Smart Apple Media, 2005. A kid-friendly book about eating and what happens to food in our bodies.

Shanley, Ellen and Colleen Thompson, *Fueling the Teen Machine*. Palo Alto: Bull Publishing Company: 2001. A teen-friendly book that offers information about nutrients, weight management, eating disorders, sports nutrition, and healthy recipes.

Shryer, Donna, *Body Fuel: A Guide to Good Nutrition*. New York: Marshall Cavendish Benchmark: 2008. Another teen-friendly read offering information about eating, exercising and making healthy choices.

Walker, Richard, *Digesting Food*. Alexandria: Franklin Watts: 2004. A wonderful overview of the process of digestion that includes pictures.

In addition, I have found the following websites to be particularly useful:

www.unitedstreaming.com This Discovery education website requires a password but has a wealth of resources for students in all grade levels. There are videos on just about all themes we study.

http://kitses.com/animation/swfs/digestion.swf This is a fun, colorful depiction of what happens in the human body during digestion.

www.MyPyramid.gov This is the USDA sponsored web-site that allows adults and children to interact with the MyPyramid, and some information is available in Spanish.

www.hsph.harvard.edu/nutritionsource This is a branch of the Harvard School of Public Health's website with an emphasis on nutrition.

Materials for Classroom Use

Poster-paper, Copies of Multiple Intelligences Survey, Copies of Nutrition Multiple Intelligences Contract, Copies of Dr. Willett's New Healthy Eating Pyramid (found at the Harvard School of Public Health's website www.hsph.harvard.edu/nutritionsource), Copies of MyPyramid (found at www.MyPyramid.gov)

Appendix: Implementing State and District Standards

Language Arts

Benchmark I-A: Listen to, read, react to, and interpret information.

Benchmark I-B: Gather and use information for research and other purposes.

Benchmark I-C: Apply critical thinking skills to analyze information.

1. Students will use critical thinking skills to evaluate texts, explore bias,

and recognize point of view.

2. Students will demonstrate competence in the skills and strategies of the

reading and writing processes.

3. Students will use speaking as in interpersonal communication tool.

Science

Strand I: Scientific Thinking and Practice

Standard I: Understand the processes of scientific investigations and use inquiry and scientific ways of observing, experimenting, predicting, and validating to think critically.

5-8 Benchmark I-A: Use scientific methods to develop questions, design and conduct experiments using appropriate technologies, analyze and evaluate results, make predictions, and communicate findings.

1. Students will develop graphs using the information.

2. Students will examine the reasonableness of data.

3. Students will justify predictions and conclusions based on data.

Benchmark I-B: Understand the processes of scientific investigation and how scientific

inquiry results in scientific knowledge.

1.Students will understand that knowledge is reviewed and revised with new information.

2. Students will understand that scientific investigations use a set of common processes.

Benchmark I-C: Use mathematical ideas, tools, and techniques to understand scientific

knowledge.

1. Students will evaluate the usefulness and relevance of data to an investigation.

2. Students will use patterns and relationships to explain data and observations.

Standard III: Science and Society

Strand I: Understand how scientific discoveries, inventions, practices, and knowledge

influence and are influenced by, individuals and societies.

Benchmark IIIA: Explain how scientific discoveries and inventions have changed

individuals and societies.

1. Students will examine the role of scientific knowledge in decisions, such as what

to eat.

Math

Benchmark I-C: Compute fluently and make reasonable estimates.

Benchmark II-C: Use mathematical models, such as graphs, to represent and understand

quantitative relationships.

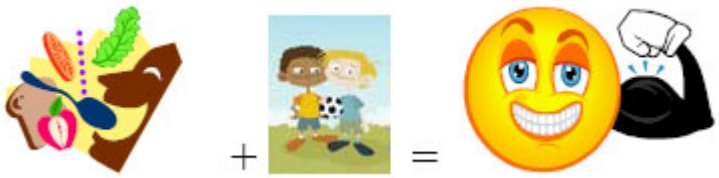
Students will be able to convert fractions to decimals to percents.

Appendix: Nutrition and Exercise Survey

Name _____

Date _____

Nutrition and Exercise Survey



1) I feel _____ about who I am.

2) I feel _____ about how I look.

3) If I could change one thing about what I eat I would change _____.

4) My idea of a delicious dinner is _____.

5) My idea of a healthy dinner is _____.

6) To get exercise I _____.

7) I exercise about _____ minutes each day.

8) I love to play _____.

9) My favorite food to buy at the grocery store is _____.

Circle either *healthy* or *unhealthy* for question #10.

10) I feel like I am a healthy/unhealthy person because _____.

Appendix: Multiple Intelligences Survey

Name _____

Date _____

How are you smart? - Multiple Intelligences Survey

Read each category and check-off all that apply to you and your interests. Then, add the checks from each category and find out how you are smart!

Linguistic Intelligence

_ I love to read magazines, books, comics, etc.

_ I keep a journal.

_ I like to write letters and emails.

_ I like to tell stories.

_ I enjoy playing word games, like Scrabble.

Total:

Logical-Mathematical

_ I like to do science experiments.

_ I can do math problems in my head.

_ I like to play games like Checkers and Chess.

_ Math and Science are two of my favorite subjects in school.

_ Numbers make sense to me.

Total:

Spatial

_ I am good at reading maps and charts.

_ I like to draw and sketch.

_ Art class is so much fun!

_ I doodle, or draw, on my notebooks.

_ I like doing puzzles and/or games like building with LEGOS.

_ Total:

Bodily-Kinesthetic

_ I have a difficult time "sitting still" and I am always moving around.

_ I love to play sports.

_ I like to touch things so that I can learn more about them.

_ I like making things with my hands, like building models.

_ If I am learning something new, I like to be able to try it out rather than just reading about it.

Total:

Musical

_ I play, or want to play, a musical instrument.

_ I like to listen to music when I am feeling happy or sad.

_ I know the words to a lot of songs.

_ I hum or whistle sometimes without even thinking about it.

_ I like to sing.

Total:

Interpersonal

_ I have a bunch of close friends.

_ My friends come to talk to me if they are having problems.

_ I like team sports (like basketball or soccer) better than individual ones (like swimming and jogging).

_ I am comfortable around a group of people.

_ I like doing group projects and working with other people.

Total:

Intrapersonal

_ I have a special place that I like to go when I want to be alone.

_ I like to do projects and work by myself.

_ I keep a journal to record my thoughts.

_ I can express how I am feeling.

_ I like to learn more about myself.

Total:

Naturalist

_ I would much rather be outside than indoors.

_ I like hiking, camping, or watching the sunset.

_ I have a garden.

_ I like to collect things from nature, like rocks, shells, or leaves.

_ I am interested in learning more about animals, plants, and events like earthquakes.

Total:

Appendix: Nutrition Multiple Intelligences Contract

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1. Linguistic:
2. Write a letter from the point of view of a food item telling about their travels through the digestive system.
3. Create a cookbook of at least 5 healthy recipes.
4.) Logical-Mathematical:
5. Write and solve a series of math word problems having to do with our study of nutrition.
6. Calculate what percentage of your daily intake of food for a selected day came from each food group and graph that data.
7. Calculate what percentage of the school lunch for a day came from each food group and graph that data.
8. I) Intrapersonal:
9. Reflect on your own eating habits and set personal goals about ways to improve your health.
10. Answer the following question, "If you could be a piece of food, what would you be and why?" You can write about it, draw about it, or express yourself in any other safe way. J
11.) Interpersonal:
12. Interview family members about their food choices.
13. Survey other sixth grade classes about their knowledge of a balanced diet.
14. Spatial:
15. Design and build a three-dimensional model of a food pyramid of your choosing (use one that was studied or create your own).
16. Draw a cartoon showing what happens to food when it enters the body and how it is digested.
17.) Musical:
18. Write a rap song about digestion.

19. Create your own chant about nutrition.
20. I) Bodily-Kinesthetic:
21. Write and perform a public service announcement about kids making healthy food choices.
22. Create and play a board game based on some aspect of our unit of study.
23. II) Naturalist:
24. Participate in the school garden project. Or, pretend you are a landscape architect hired to design a garden for your school and draw up your plans.
25. Plant and care for a seedling of your choice.

Appendix: Exercise Log

Name _____

Week of: _____to_____

EXERCISE LOG

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Exercise Amount of time:					
I feel…					
Exercise Amount of time:					
I feel…					
Exercise Amount of time:					
I feel…					

Appendix: Food Log

Name _____

Week of: _____to_____

FOOD LOG

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Breakfast					
I feel…					

Snack
I feel…
Lunch
I feel…
Snack
I feel…
Dinner
I feel…

Appendix: Nutrients Chant

Nutrients

Nutrients here, nutrients there,

Nutrients, nutrients everywhere!

Carbohydrates digesting,

Proteins and fats providing,

Vitamins energizing,

And minerals absorbing.

Carbs in vegetables and whole grains,

Protein from lentils and lean meat,

Fats from cheese and olive oil.

Nutrients from balanced diets.

Nutrients here, nutrients there,

Nutrients, nutrients everywhere!

Nutrients! Nutrients! Nutrients!

Appendix: Vocabulary List

Vitamin, mineral, nutrient, nutrition, digestion, carbohydrate, protein, metabolism, calorie, saturated, unsaturated, macronutrient, micronutrient, peristalsis, chyme

Appendix: Extension Activities

While in the midst of writing this curriculum unit, I had an epiphany moment: a wonderful way to extend this introduction to nutrition, food choice, and exercise would be to integrate it with our social studies curriculum which, in the sixth grade emphasizes ancient history. With their background of factors influencing food choice and of a balanced diet, students would be able to examine the food of the ancient cultures (for example, Egypt, China, Mesopotamia, Rome, Greece, and India). We can discuss the question, "Did the ancient people of ____ eat a balanced diet?" And, "Why did they make the food choices they made?" We address the importance of rivers, (i.e. The Nile River, The Tigris and Euphrates Rivers, The Yellow River) as they pertain to the development of civilizations. The Egyptians, Sumerians, Chinese, among many other groups, began their societies along the banks of a river and their diet was tied to their immediate surroundings. I am particularly fascinated by the fact that many of our relationships with food in the twenty-first century in the United States have evolved to a state of disconnectedness, whereas the people of the Ancient world ate from the earth, in many senses. I look forward to further developing this extension of my curriculum unit.

Notes

1. Food Research and Action Center, "Obesity, Food Insecurity and the Federal Child Nutrition Programs: Understanding the Linkages." (2005): 1-33.

2. Walter C. Willet, *Eat, Drink, and Be Healthy* (New York: Free Press, 2001).

3. Food Research and Action Center, "Obesity, Food Insecurity and the Federal Child Nutrition Programs: Understanding the Linkages." (2005): 1-33.

4. Mary Story, et al, "The Role of Schools in Obesity Prevention," Childhood Obesity 16 (2006): 110.

5. Mary Story, et al, "The Role of Schools in Obesity Prevention," Childhood Obesity 16 (2006): 110.

6. Pamela V. Tremarche, et al., "Physical Education and its Effect on Elementary Testing Results," The Physical Educator 64 (2007): 59.

7. Pamela V. Tremarche, et al., "Physical Education and its Effect on Elementary Testing Results," The Physical Educator 64 (2007): 59.

8. Pamela V. Tremarche, et al., "Physical Education and its Effect on Elementary Testing Results," The Physical Educator 64 (2007): 58-64.

9. Tiffany Field, et al., "Exercise is Positively Related to Adolescents' Relationships and Academics," Adolescence 36 (2001): 105.

10. Action for Healthy Kids, "The Role of Sound Nutrition and Physical Activity in Academic Achievement." (2004): 2.

11. Pamela V. Tremarche, et al., "Physical Education and its Effect on Elementary Testing Results," The Physical Educator 64 (2007): 58.

12. Michelle D. Florence, et al., "Diet Quality and Academic Performance," The Journal of School Health 78 (2008) 211.

13. Mary Story, et al., "The Role of Schools in Obesity Prevention," Childhood Obesity 16 (2006): 109-142.

14. William Potts-Datema and Howard Taras, "Obesity and Student Performance at School," The Journal of School Health 75 (2005): 292.

15. Thomas Armstrong, *Multiple Intelligences in the Classroom* (Alexandria: Association for Supervision and Curriculum Development, 2000: vii.

16. Thomas Armstrong, *Multiple Intelligences in the Classroom* (Alexandria: Association for Supervision and Curriculum Development, 2000: 1.

17. Thomas Armstrong, *Multiple Intelligences in the Classroom* (Alexandria: Association for Supervision and Curriculum Development, 2000.