

Chemistry and Nutrition Are You Fit For the Challenge?

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Overview

At an alarming rate, teenagers are being predisposed to illnesses and diseases because of poor nutrition. Today, teenagers are at high risk for obesity, diabetes, etc. because of poor food choices. According to the U.S.D.A, the healthy eating index for children during a three year average form 1994-1996 indicated that 63.5 % of females and 62.2 % of males were healthy eaters and that out of children ages 15-18, 60.9 % females and 60.7% of males were healthy eaters.

This curriculum unit is designed to promote awareness of the long and short-term affects of malnutrition and its relationship to chemistry. This unit will assess how we view nutrition, what it takes to maintain a healthy body and what happens when our daily requirements are not met. We will the analyze how the body metabolizes and uses vitamins and minerals, gather a better understanding of what a calorie is and why caloric intake is important, and discuss the negative affects of fast foods and other sources of unhealthy eating.

For this very reason, I decided to prepare a lesson where we focus on the importance of food and the advantages and disadvantages of healthy eating. This unit is designed for students taking a chemistry course between the ages of 15 - 18 and presently in grades

10 – 12. This unit will cover a span of 5 – 7 days.

Rationale

Nutrition is of great concern to me. After all, you have to eat to live. For some time, I have observed my students and their idea of "healthy eating". Truly, I am discouraged by how they view the foods they eat. For the past three years, I have observed my students and what they eat for breakfast and lunch at my school. From my observations, I realize a good breakfast or lunch, sometimes both, consists of the following: a snickers bar, a bag of potato chips, and a soda of any kind.

According to the food pyramid, our daily diet should have 6 – 11 servings of grains, 2 - 4 servings of fruit, 3 – 5 servings of vegetables, 2 –3 servings of meat, 2 –3 servings of dairy and fats and sugars are to be used sparingly. By my observations, it seems as though my students are eating the food pyramid upside down. Meaning, they are eating

6 – 11 servings of fats and sugars and grains, fruits, vegetables, etc. sparingly.

Many children are missing out on the essentials that keep our bodies healthy. At the bottom of the food pyramid is the grain group which consists of a lot of fiber. There is a reason why this group is at the bottom. It is perfectly clear that our bodies need this group more than any group on the chart. Fiber is a very important source of our diet. It is found in whole grain cereals, fruits, seeds, legumes, vegetables and nuts. Without adequate fiber, the intestines and bowel work sluggishly and the waste that result from the digestive process remain in your system longer than it should. A lack of fiber in our diets can also lead to diseases of the bowel, colon and rectum and diseases that can range from circulatory disorders to arthritis (evidence is inconclusive). Many health conscious dieters are concerned that fiber is fattening. Little do they know that most fiber passes through the body without being absorbed and according to medical evidence can help keep weight down in two distinct ways: 1) fiber helps rid the digestive tract of some fats and carbohydrates that otherwise would eventually be absorbed in the body and 2) fibers chewy texture and heaviness create a full feeling, making you less tempted to satisfy yourself with high-calorie foods.

As with most food, too much of anything is bad for you and the same pertains to fiber. If eaten in excess, fiber can cause intestinal gas and hinder the body's ability to absorb certain minerals.

Often times, many of us think that vitamins and minerals are synonymous. Although, they both perform the same function for the body, they are different in nature. Vitamins are organic substances derived from living material – plants and animals. In our daily diets, they add up to about an eighth of a teaspoon. They are required in milligram and microgram quantities. Vitamins assist in the processing of other nutrients (proteins, fats, carbohydrates, and minerals), and they participate in the formation of blood cells, hormones, genetic material, and the nervous-system. Vitamins are also called coenzymes because they assist enzymes in carrying out these various functions.

Minerals are inorganic substances that are necessary for the body to function. There are 60 minerals in the body, 22 of which are considered necessary for good health. Minerals are in bones, teeth, soft tissue, muscle, blood, and nerve cells and are indispensable for mental and physical well being. All the complex substances that the body needs to build new and healthy cells are dependent on minerals. The human body cannot maintain good health without a complete set of minerals that are included in the daily diet.

Minerals that are essential come in two forms: macrominerals and trace minerals (microminerals). Macrominerals are needed in relatively large amounts and micro- minerals in tiny amounts. Examples of macrominerals include calcium, phosphorus, magnesium, potassium, sulfur, sodium and chloride. Microminerals (trace minerals) are iron, zinc, selenium, manganese, molybdenum, copper, chromium, iodine, and fluorine. The best way to obtain the recommended daily allowance of essential vitamins and minerals is through the foods you eat.

When the body has all of the necessary vitamins and minerals that are required to function properly, you can enjoy a healthy life. However, if the body experiences an insufficient amount of vitamins and minerals, your health is now at risk for disease. Most vitamins are obtained from food except vitamin D and vitamin K, which the body can manufacture. There are 13 essential vitamins needed for the body: Vitamins A, C, D, E, K and the B vitamins. The following

information on vitamins was gathered from Brody and Healthcentral on the advantages of vitamins and the effects of deficiencies/megadoses of vitamins.

FAT SOLUBLE VITAMINS

Vitamin A, a fat-soluble vitamin, is primarily found in liver, eggs, cheese, butter, and milk, yellow, orange or dark green vegetables or fruits. Beta-carotene is converted from the orange and yellow fruits and vegetables, as the body needs it. Vitamin A assists in the formation and maintenance of healthy skin, hair, vision, bone growth, teeth development and reproduction and mucous membranes. The absence of this vitamin can lead to night blindness and dryness of eyes; rough skin and infection of mucous membranes, impaired bone growth and tooth enamel. Megadoses can cause blurred vision, loss of appetite, headaches, skin rashes, nausea, fatigue, joint pain, liver damage, insomnia, abnormal bone growth, menstrual irregularities, hair loss and injury to the brain and nervous system. Excessive exposure to beta-carotene can cause yellowing of the skin.

Vitamin D (sunshine vitamin) is found in cheese, butter, margarine, cream, fortified milk, egg yolk, liver, tuna, salmon and fortified cereals. The body can synthesize vitamin D when exposed to sunshine. Ten to fifteen minutes of sunshine three times weekly is adequate enough to produce the body's daily requirement of vitamin D. Vitamin D is essential for the growth and maintenance of teeth and bones and the absorption of calcium and phosphorus. Lack of vitamin D causes rickets in children, stunted bone and tooth growth, softening of bones, muscle spasms and twitching. Megadoses in infants cause calcium deposits in kidneys and excessive calcium in the blood, deafness, nausea, loss of appetite, kidney stones, fragile bones, high blood pressure, high blood cholesterol and increased lead absorption.

Vitamin E is found in vegetable oils, margarine, wheat germ, whole grain cereals, bread, liver, dried beans, green leafy vegetables, nuts, corn, and seeds. Vitamin E helps in the formation of red blood cells, muscles and other tissues. It protects vitamin A and essential fatty acids and is an antioxidant. Not many risks have been detected in the absence of vitamin E in the body but megadoses to vitamin E have caused headaches, blurred vision, extreme fatigue, muscle weakness and destroyed vitamin K in the gut.

Vitamin K is found in cabbage, cauliflower, spinach, peas, potatoes, cereals, liver and other green leafy vegetables. Vitamin K is known as a clotting vitamin and helps maintain normal bone metabolism. Lack of vitamin K may cause hemorrhage, loss of calcium and jaundice.

WATER SOLUBLE VITAMINS

Vitamin C is found in citrus fruits, tomatoes, strawberries, melon, green peppers, potatoes, broccoli and dark green vegetables. Vitamin C promotes healthy teeth and gums and helps in the absorption of iron and the maintenance of connective tissue and wound healing. It may also block the formation of cancer causing nitrosamines. Lack of vitamin C causes scurvy, bleeding gums, degenerating muscles, wounds that won't heal, loose teeth, brown, dry, and rough skin, loss of appetite, irritability and weight loss. Megadoses of vitamin C can cause diarrhea, kidney and bladder stones, urinary-tract irritation, breakdown of red blood cells in persons who have a genetic disorder and may induce B12 deficiency.

Vitamin B1 (Thiamin) is found in pork (especially ham), oysters, whole-grain and enriched cereals, pasta and bread, wheat germ, oatmeal, peas, and lima beans. Thiamin helps release energy from carbohydrates and helps the function of the heart, healthy nerve cells and the brain. Lack of thiamin can cause Beriberi: mental confusion, muscular weakness, swelling of the heart and leg cramps.

Vitamin B2 (Riboflavin) is found in liver, milk, eggs, dried beans, peas, dark-green vegetables, pasta, bread, mushrooms and whole-grain and enriched cereals. Riboflavin works with other B vitamins and is important for body growth and red blood cells, and the release of carbohydrates. Lack of riboflavin may cause skin disorders around the nose and lips, cracks and corners of the mouth and sensitivity of eyes to light.

Vitamin B3 (Niacin) is found in liver, poultry, tuna, eggs, whole-grain and enriched cereals, pasta, bread, nuts lean meats and legumes. The body can convert tryptophan in protein to niacin. Niacin participates with thiamin and riboflavin in facilitating energy production in cells and helps in synthesizing the antibodies in the immune system. Lack of niacin causes pellagra: skin disorders, diarrhea, mental confusion, irritability, mouth swelling and smooth tongue. Megadoses of niacin may cause duodenal ulcers, abnormal liver function, elevated blood sugar, and excessive uric acid in blood possibly leading to gout.

Vitamin B6 (Pyroxidine) is found in whole-grain cereals and bread, liver, avocados, spinach, green beans, bananas, fish, poultry, meats, nuts, potatoes, and green leafy vegetables. Vitamin B6 aids in the absorption of protein, helps the body use fats and the formation of red blood cells. Lack of vitamin B6 can cause skin disorders, smooth tongue, convulsions, dizziness, nausea, anemia and kidney stones.

Vitamin B12 is found only in animal foods: liver, kidneys, meat, fish, eggs, milk, oysters and nutritional yeast. Like the other B vitamins, it is important for metabolism and helps with red blood cell formation and maintenance of the central nervous system. Lack of B12 causes pernicious anemia, pale skin and mucous membranes, numbness and tingling in the fingers and toes, loss of balance and weakness and pain in arms and legs. At risk are strict vegetarians who eat no meat, persons who have had part of their stomach removed, or those with a genetic inability to absorb this vitamin.

Folacin (folic acid) is found in liver, kidneys, dark-green leafy vegetables, wheat germ, dried beans and peas. Folacin acts with B12 in the formation of hemoglobin of red blood cells. It is necessary for the synthesis of DNA and tissue and bone growth in cell production. Lack of folacin may cause megaloblastic anemia, enlarged blood cells, smooth tongue, and diarrhea. During pregnancy it may cause loss of fetus or fetal abnormalities. Women on oral contraceptives need extra folacin.

Pantothenic acid is found in all plants and animals. It is also made by intestinal bacteria. It is essential for the metabolism of food and the synthesis of hormones and cholesterol. Lack of pantothenic acid can cause severe abdominal cramping, vomiting, fatigue, difficulty sleeping and tingling in hands and feet. It can possibly cause a thiamin deficiency.

Biotin is found in egg yolk, liver, kidneys, green beans, and dark-green leafy vegetables. It is also made by microorganisms in the intestinal tract. It is essential for the metabolism of proteins and carbohydrates and the synthesis of hormones and cholesterol. Large amounts of egg whites can destroy biotin causing loss of appetite, nausea, vomiting, pallor, depression, fatigue and muscle pain. Cooked egg white has no harmful effect.

MACROMINERALS

Calcium which is found in milk and products, sardines, salmon, dark-green leafy vegetables, citrus fruits, dried beans and peas is essential in the building of bones, teeth and maintenance of bone strength. It maintains cell membranes, blood clotting, and absorption of B12, muscle contraction and the activation of enzymes. The lack of calcium causes bone distortion, osteoporosis and increased susceptibility to fractures. Megadoses of calcium may cause drowsiness, extreme lethargy impaired absorption of iron, zinc and manganese, calcium deposits in tissues throughout the body and mimicking cancer on an X-ray.

Phosphorus is found in meat, poultry, eggs, fish, dried bean and peas, milk and milk produces, phosphates in processed foods and soft drinks. It helps build bones and teeth, release energy from carbohydrates, proteins and fats, formulate genetic material, cell membranes and many enzymes. Lack of phosphorus causes weakness, loss of appetite, malaise and bone pain and cause deficiency of calcium.

Magnesium is found in leafy, green vegetables (eaten raw), nuts (especially almonds and cashews), soybeans, seeds and whole grains. Magnesium builds bones and manufactures protein, releases energy from the muscle glycogen, conducts the nerve impulse to muscles and adjustment to a cold. Lack of magnesium may cause muscular twitching and tremors, irregular heart beat, insomnia, muscle weakness, leg and foot cramps and shaky hands. Deficiency may occur in persons with prolonged diarrhea, kidney disease, diabetes, epilepsy, alcoholism and those taking diuretics. Megadoses of magnesium can cause catharsis.

Potassium can be found in orange juice, bananas, dried fruits, meats, bran, peanut butter, dried beans and peas, potatoes, coffee, tea and cocoa. Potassium helps muscles contract, maintain fluid and electrolyte balance in cells, releases the energy from carbohydrates, proteins and fats and aids in the transmission of nerve impulses. Lack of potassium causes abnormal heart rhythm, muscular weakness, lethargy, kidney and lung failure. Excessive potassium in the blood causes muscular paralysis.

Sulfur is found in beef, wheat germ, dried beans, peas, peanuts and clams. Sulfur forms bridges between protein chains to create firm proteins of hair, nails and skin. The deficiency of sulfur in the body is not known.

Chloride is found in table salt and other naturally occurring salts. Chloride regulates the balance of body fluids and acids and bases and activates the enzyme in saliva. Lack of chloride causes a disturbance in the acid-base balance in body fluids.

MICROMINERALS (Trace minerals)

Iron is found in liver, pork, kidneys, red meats, egg yolk, green leafy vegetables, dried fruits, dried peas, potatoes, blackstrap molasses and enriched whole-grain cereals. Iron helps with the formation of hemoglobin in the blood and myoglobin in muscles, which supplies oxygen to cells and parts of several enzymes and proteins. Lack of iron causes anemia, fatigue, weakness, pallor, and shortness of breath. Megadoses of iron can lead to toxic build-up in the liver, pancreas and heart.

Copper is found in nuts, cocoa, powder, beef and pork liver, kidneys, dried beans and corn oil margarine. Copper also helps with the formation of red blood cells. Lack of copper can lead to violent vomiting and diarrhea. Cooking acid foods in unlined copper pots can lead to toxic accumulation of copper.

Zinc is found in meat, liver, eggs, poultry, seafood, milk and whole grains. Zinc is a constituent of about 100 enzymes. Lack of zinc causes delayed wound healing, diminished taste sensation, loss of appetite. In children, failure to grow and mature sexually and prenatally: abnormal brain development. Megadoses of zinc can lead to nausea, vomiting, anemia, bleeding in the stomach, premature birth and stillbirth, abdominal pain and fever. Zinc can aggravate marginal copper deficiency and produce atherosclerosis.

Iodine is found in seafood, saltwater fish, seaweed, iodized salt and sea salt. Iodine helps the thyroid to function and is essential in normal reproduction. Lack of iodine causes goiter, in newborns: cretinism, protruding abdomen, swollen looking features, thick lips, and an enlarged tongue.

Fluorine is found in fish, tea, animal foods, fluoridated water, and foods grown with or cooked in fluoridated water. Fluorine helps prevent tooth decay and maintains bone strength. Lack of

fluoride can cause excessive tooth decay and possibly osteoporosis. Megadoses of fluorine can lead to mottling of teeth and bones.

Chromium is found in meat, cheese, whole-grain breads and cereals, dried beans, peanuts and brewer's yeast. Chromium metabolizes glucose. Lack of chromium can lead to abnormal sugar metabolism and adult onset diabetes.

Selenium is found in seafood, whole grain cereals, meat, egg yolk, chicken, milk and garlic. Selenium is an antioxidant that prevents the breakdown of fats in other body chemicals. It also interacts with vitamin E. Lack of selenium can cause cancer and deaths from high blood pressure.

Manganese is found in nuts, whole grains, vegetables and fruits, tea, instant coffee and cocoa powder. Manganese helps normal bone structure, reproduction, part of enzymes and the function of the nervous system. Megadoses of manganese can cause blurred speech, involuntary laughing spastic gait and hand tremors.

Molybdenum is found in legumes, cereal grains, liver, kidney and some dark-green vegetables. It helps part of the enzyme xanthine oxidase. Megadoses of molybdenum can cause a gout like syndrome and loss of copper.

Objectives

The goal of this curriculum unit is enable students to understand the importance of vitamins and minerals and how they impact our bodies chemically. They will examine the recommended daily allowances of vitamins and minerals provided by the U.S.D.A. and analyze whether their diets are adequate or deficient of these nutrients. I also want my students to be aware of the harmful affects of megadoses of these essentials. Using our food diaries, we will refer to the food pyramid for guidance as to how we can select food to suit our nutritional needs and students will also understand how to read food labels.

Chemistry plays a big part in the production and consumption of food in our bodies. Because of this, students will get a better understanding of what a calorie is and the distinction between a calorie and a Calorie. They will gain an understanding as to why caloric intake is important. Lastly, fast foods seem to be the norm for this generation. I intend to expose my student to the gruesome, dark side of fast food.

Strategies

The three-day diary that the students keep will be the crucial part of this curriculum unit. This diary will enable students to take a closer look at their eating patterns. Using the food pyramid and all the information we gather from the lessons on vitamins, minerals, calories, fast food, etc., they will be able to decide whether their daily diets are nutritional or unhealthy. I will use several surveys that assess their way of eating. I will also engage them in the following activities: a calorimetry lab that illustrates how calories are burned in food, a serving size luncheon, and a fast food trivia. These lessons and activities were designed to fit the National Teaching and Learning Standards that were adopted for the state of Pennsylvania (See Appendix D).

Classroom Activities

A week prior to the teaching of this curriculum unit, the students will keep a 3-Day Diary of the foods they have eaten, the vitamin and minerals (if any) in these, and the caloric count (See Appendix A). It does not have to be three consecutive days. They are to bring this completed food assessment the first day the curriculum unit begins. From this assessment, we will discuss their diaries, analyze the vitamin and mineral daily requirements and make suggestions as to how they can perhaps incorporate or substitute foods that will enable them to obtain these essentials. After an intensive overview of the impact of vitamins and minerals on our bodies we will end this unit with a survey that will assess how much the students have learned (See Appendix B).

Vitamins and Minerals (Days 1 & 2) (Standards: ST#1,2,4,5,8 MA#1,2,6 CO#2-6)

Vitamins and minerals are a necessity for our bodies. They give us the nutrients we need to stay healthy and to live longer. As we embark on our daily routines, vitamins and minerals are slowly depleted from our bodies. The major cause of this depletion is lack of good nutrition and physical activities that we engage in. While diets don't have to be precisely balanced each day to assure good nutrition, prolonged elimination of one or more food categories or over emphasis of certain foods at the expense of others can lead to shortages that compromise health according to Brody. So why is it important to make sure our bodies have all the necessary vitamins and minerals to function? For that reason, we will explore the importance of vitamins and minerals important.

Calories (Day 3) (Standards: ST#1,2,4-8 MA#1-6 CO#2,3,6)

Everything that you eat contains calories. A calorie is defined as the quantity of heat that raises the temperature of 1 g of pure water 1°C. There is an important difference to be made between "calorie" and "Calorie". The calorie, written with a small c, is defined above and is usually used except when referring to food. The dietary Calorie, written with a capital C, always refers to food. One dietary Calorie is equal to one kilocalorie, or 1000 calories (1 Calorie = 1 kcal = 1000 cal). The statement "10 g of sugar has 41 Calories" means that 10 g of sugar releases 41 kilocalories of heat when it burns completely to produce carbon dioxide and water.

The calorie is related to the joule, the SI unit of heat and energy (1 kcal = 4186 J and 1 J = 0.239 cal). One joule of heat will raise the temperature of 1 g of pure water 0.239°C.

The experiment that we will engage in will determine the energy given off by a peanut. The procedure that is used is called calorimetry and the measuring device is called a calorimeter. During calorimetry, chemists can determine how much energy is stored in foods. They determine this by burning a known amount of food under controlled conditions and carefully measuring the quantity of thermal energy it releases.

The following procedure will be used to determine how much energy is released when a peanut burns:

Materials needed:

Cork stopper	Paper clip	Doritos
12-oz soft drink can	Ring	
Thermometer	Ring Stand	
Peanut	Rod	
Matches	Goldfish Snack Crackers	

The following Data Table will be prepared for this experiment.

Date Table		
	Trial 1	Trial 2
Brand of peanut		
Mass of peanut, g		
Mass of peanut residue, g		
Mass of peanut burned, g		
Volume of water in can, mL		
Mass of water in can, kg		
Initial temperature of water, °C		
Final Temperature of water, °C		

1. Make a simple stand for the peanut using a paper clip and cork as shown in Figure 2 in the textbook.
2. Measure 200 ml of room-temperature water in a graduated cylinder. Pour the water into an empty soft drink can.
3. Use a thermometer to measure the temperature of the water to the nearest 0.2°C. Leave the thermometer in the can.
4. Measure the mass of the whole peanut and record this value. Put the peanut on the support stand and place it under the can, so that the peanut is about 2 cm from the bottom of the can.
5. Use a kitchen match to light the peanut directly.
6. *As soon as* the peanut stops burning, carefully stir the water with the thermometer. Measure the final (highest) temperature of the water. Record this value.
7. Allow the peanut residue to cool, and then measure its mass. Record this value.
8. Repeat Steps 3 –7 with a new peanut (Trial 2)

The following calculations will be made using the data from this experiment:

1. Calculate the mass of the water heated, first in grams and then in kilograms (kg): 1 kg = 1000 g. The density of water is 1.0 g/mL. Thus, each milliliter of water has a mass of 1 g.
2. Calculate the temperature change in the water. This equals the final (highest) temperature minus the initial temperature.
3. Calculate the number of calories used to heat the water.

Remember 1,000 calories (cal) = 1 kilocalorie (kcal) = 1 Calorie (Cal)

4. a. Calculate the Calories used to heat the water
b. Determine the number of Calories given off by the burning peanut.
5. Calculate the Calories per gram of peanut burned for each sample then calculate the average Cal/g.
6. Use data from the label of the peanut package to determine the Cal/g for the peanut you used:

Cal per serving
mass (g) of one serving

7. Use the values you found in Steps 5 and 6 to calculate the percent difference between the label value and the experimental average value:

Label value – Experimental average value

% difference = Label value X 100

After this lab is completed, we will discuss our data, calculations and the possible sources of error. (This lab will also be done using Goldfish Snack Crackers and Doritos. The same procedure will be followed.)

Serving Size Luncheon (Day 4) (Standards: ST#1,2,4,5,8 MA#1,2,6 CO#2-5)

This luncheon is designed to give my students an idea of how much food is actually contained in a serving size. During this luncheon, students will pay close attention to the amount of food that a serving size permits. For example, a bag of chips might contain 3 servings. However, one serving size might be 7 chips. The object is to only give my students exactly what the serving size calls for. I hope that my students will realize a couple of things: 1) how overeating the amount indicated in the serving size can cause excess calories, thus, leading to excess weight. 2) How many calories is actually contained in a bag of chips, soda, banana, grapes, candy bar, etc. 3) Do you get more food in a serving size when you're eating healthy food or junk food.

Students are required to bring in one healthy treat and one junk food treat. They have to bring enough to feed 25-30 people. Students are to select 5 healthy foods to eat and 5 junk foods. We will distribute our food according to the serving size on the food label. While they are eating, they will answer the following questionnaire:

Serving Size Luncheon Questionnaire

1. Did you find the serving size of food adequate or inadequate? Explain.
2. What did you want more of?
3. Why is it important to pay attention to serving sizes?
4. Did you get more healthy food or junk food in your serving size?
5. Explain why you think you got more healthy food or junk food?
6. Were there more calories in the healthy food or the junk food?
7. Did you receive more nutrients in the healthy food or the junk food?
8. Explain why you think it is important to monitor what we eat?

9. Will you pay attention to serving sizes on packages for now on?

10. Write a brief paragraph explaining what you learned about food from this luncheon?

Serving Size Luncheon Chart				
Healthy Food	Food Selection	Calories	Vitamins	Minerals
Junk Food				

Total Calories from Healthy Food _____ Total Calories from Junk Food _____

Fast Food (Day 5) (Standards: ST#1,2,4,7,8 MA#1,6 CO#2-6)

American eating habits have drastically changed during the last century. The rate of change has accelerated over the last few decades. No longer are we relying on home cooked meals. Our lives have become more hectic, thus allowing no time to eat at home. We skip breakfast, lunch and sometimes dinner not realizing the impact this has on our health and how we are to function throughout the day. According to Gilbert, we drink less milk. We don't eat as many fresh fruits and vegetables as we used to. We eat more poultry or beef than our parents did and when they were our age and we consume more grain than Americans did in the past, much of which comes indirectly as baked goods, packaged cereals and meat from grain-fed animals.

Americans have also begun to eat out more. Gilbert writes that in 1975, thirty-five cents of every food dollar was spent on food eaten away from home as compared with the few pennies in 1950. Today, Schollosser writes that Americans now spend money on fast food than they do on higher education, personal computers, software, and new cars. Americans spend more money on fast food than on movies, books, magazines, newspapers, videos and recorded music – combined. Truly, eating fast food has become a way of life for many Americans. In 1970, Americans spent about 6 billion on fast food. In 2000, we spent more than 110 billion.

Fast food is the number one choice of food for many American children. When you ask kids what they want to eat, you would hope they would ask some vegetables, a piece of meat and some macaroni. Unfortunately, our kids want pizza from Pizza Hut, a happy meal from McDonald's or a whopper with cheese from Burger King. Most of these meals contain empty calories. So, where is the nutritional value? Are our children going to grow up to more independent on a building with a playground, which is considered family entertainment or a way for families to come together to eat? Eat what? Are we promoting irresponsibility in choosing foods that are unhealthy at our children's expense?

Today more than 30% of our children are overweight. Who is to blame? Should we blame the major proprietors of the Fast Food in industry, the parents who no longer feel the need to provide three square meals for their children or the schools who use vending machines as a source of fundraising for the school?

There was a time when ads, promotions, and other sources of advertisement for food in our nations schools were unheard of. Today, the nation's fast food chains are marketing their products in schools across the U.S. They have become lunchroom franchises and have even filtrated into classroom teaching materials. Coca-Cola, Pepsi and Cadbury-Schweppes control 90.3 percent of the U.S. market in terms of soda sales. More teenagers are drinking sodas at an alarming rate. In 1978, a typical male teenager would drink about 7 ounces of soda every day. Today, they are drinking 5 or more cans a soda a day (12 oz a can). At the same time, about one-fifth of the nation's one and two-year olds are now being fed soda through baby bottles.

My goal is make my students aware of the gruesome, dark side of fast food. We will refer to the book, "Fast Food Nation: The Dark Side of the All-American Meal" by Eric Schlosser. Before we begin our journey into exploring fast food, the following survey will be conducted (See Appendix C). After we discuss the survey, we will analyze how fast food is manufactured. We will discuss how food is handled while in the slaughter houses and answer the biggest question, what are we actually eating? By the end of this lesson, I hope my students will gain a new appreciation for the things they deprive themselves of most, healthy food.

Bibliography

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This book provided a detailed explanation of what is contained in vitamins and minerals, their functions and the effects of megadoses of these essentials.

Hillman, Howard. Kitchen Science: A Guide to Knowing the Hows and Whys for Fun and Success in the Kitchen. Boston: Houghton Mifflin Company, 1989.

This book provided an understanding of the many questions that are asked pertaining to the foods we select to eat and their effects on us.

Gilbert, Sara. You are What You Eat: The Common Sense Guide to the Modern American Diet. New York: Macmillan Publishing Company, Inc., 1977.

This book explains why the foods we eat directly impact our state of being: healthy or unhealthy. It gives many explanations on how the American society has changed its way of eating and the implications of this change.

McGee, Harold. On Food and Cooking: The Science and Lore of the Kitchen. New York: Simon & Schuster, 1997.

This book also provided an understanding of the many questions that are asked pertaining to the foods we select to eat and their effects on us.

Schlosser, Eric. Fast Food Nation: The Dark Side of the All-American Meal. Boston: Houghton Mifflin Company, 2001.

This book seeks to explain the dark, gruesome side of the All-American Meals that are known as Fast Foods.

Textbooks

ChemCom: Chemistry in the Community, A Project of the American Chemical Society.

Dubuque Iowa, Kendall/Hunt Publishing Company, 1998.(Third Edition)

This textbook contained the calorimetry lab that was used to find the calories contained in peanuts.

Wilbraham, Antony and Dennis Staley, Michael Matta. Addison-Wesley Chemistry. Addison Wesley Publishing Company, Inc., 1997.

This textbook provides the overall explanation of a calorie and a Calorie.

Bibliography

Internet Resources

<http://www.childstats.gov/ac2000/econtxt.asp#econ4b>

This sites gives vital statistics on the daily food intake of adolescence. This source of this data was provided by the U.S. Department of Agriculture: Center for Nutrition Policy and Promotion, Continuing Survey of Food Intakes by Individuals.

<http://healthcentralsympatico.com/mhc/top/002399.cfm>

This site explains the specific function of vitamins and indicates whether they are fat soluble or water soluble.

<http://instruct1.cit.cornell.edu/courses/ns421/vitamins.html>

This site provided the food guide pyramid and an explanation of vitamins and minerals.

<http://www.vitacomplete.com/q&a.html>

This site explains the questions that are frequently asked about vitamins and minerals, gives detailed explanations on why we take vitamins and minerals, their function and the effect they have on our bodies.

Student Reading List

Brody, Jane E. Jane Brody's Nutrition Book: A Lifetime Guide to Good Eating for Better Health and Weight Control. New York: W.W. Norton & Company, 1981.

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This book also provided an understanding of the many questions that are asked pertaining to the foods we select to eat and their effects on us.

Schlosser, Eric. Fast Food Nation: The Dark Side of the All-American Meal. Boston: Houghton Mifflin Company, 2001.

This book seeks to explain the dark, gruesome side of the All-American Meals that are known as Fast Foods.

<http://www.vitacomplete.com/q&a.html>

This site explains the questions that are frequently asked about vitamins and minerals, gives detailed explanations on why we take vitamins and minerals, their function and the effect they have on our bodies.

Materials Needed for Curriculum Unit

Calorimetry Lab

Cork stopper
12-oz soft drink can
Thermometer
Peanut
Matches
Doritos

Paper clip
Ring
Ring Stand
Rod
Goldfish Snack Crackers

Serving Size Luncheon

1 Healthy Food Item and 1 Junk Food Item

APPENDIX A

ASSESSMENT

3-Day Food Diary

Food Times	Foods Eaten	Vitamins/ Minerals	Calories
Breakfast	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.
Lunch	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.
Dinner	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.	1. 2. 3. 4. 5.

APPENDIX B

SURVEY

How much do you know about vitamins and minerals?

Name _____ Date _____

1. What are vitamins?
2. How many are recommended daily?
3. Name 3 – 5 essential vitamins.
4. What are minerals?
5. Name 3 – 5 essential minerals.
6. What mineral is essential for the prevention of osteoporosis?
7. What mineral helps to alleviate cold symptoms?
8. What vitamin is pertinent for fetal development?
9. What vitamin is known as the "sunshine vitamin"?
10. What mineral helps the thyroid to function properly?
11. What mineral maintains strong healthy teeth?
12. What mineral is found in bananas?
13. What vitamin helps fights colds?
14. What vitamin helps blood to clot?
15. Why are vitamins and minerals important?

APPENDIX C

Fast Food Survey

Questions	1-3 times	4-10 times	11-30 times	Never
How many times do you eat fast foods a day?				

How many times do eat fast food in a week?				
How many times do you eat fast food in a month?				
How many times do you eat from the vending machines a day?				
How many times do you eat from the vending machines in a week?				
How many times do you eat from the vending machines in a month?				
During the week, how many times do you eat a home cooked meal?				
How many times do you eat a home cooked meal in a month?				
How many times a week do you eat a healthy meal?				
How many times a month do you eat a healthy meal?				
	\$1 -\$5 dollars	\$6- \$20 dollars	\$21 - \$100 dollars	None
How much money do you spend on fast food a day?				
How much money do you spend on fast food a week?				
How much money do you spend on fast food a month?				
How much money do you spend on healthy meals a day?				
How much money do you spend on healthy meals a week?				
How much money do you spend on				

healthy meals a month?				
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APPENDIX D

Standards

This curriculum unit focused on the following Standards that are used by Pittsburgh Public Schools.

Science and Technology (ST)

1. All students explain how scientific principles of chemical, physical, and biological phenomena have developed and relate them to real world situations.
2. All students demonstrate knowledge of basic concepts and principles of physical, chemical and biological and earth sciences
4. All students explain the relationships among science technology and society.
5. All students construct and evaluate scientific and technological systems using models to explain or predict results.
6. All students develop and apply skills of observations, data collection, analysis, pattern recognition, prediction and scientific reasoning and conducting experiments in solving technological problems.
7. All students evaluate advantages, disadvantages and ethical implications associated with the impact of science and technology of current and future life.
8. All students evaluate the impact of current and future life of the development and use of varied energy forms, natural and synthetic materials, production and processing of food an other agricultural products.

Mathematics (MA)

1. All students use numbers, number systems, and equivalent forms to represent theoretical and practical situations.

2. All students compute, measure, and estimate to solve theoretical and practical problems using appropriate tools, including modern technology such as calculators and computers.
3. All students apply the concepts of patterns, functions and relations to solve theoretical and practical problems.
4. All students formulate and solve problems and communicate the mathematical processes used and the reasons for using them.
5. All students understand and apply basic concepts of algebra, geometry, probability and statistics to solve theoretical and practical problems.
6. All students evaluate, infer, and draw appropriate conclusions from charts, tables and graphs showing the relationship between data and real world situations.

APPENDIX D

(continued)

Standards

Communications (CO)

2. All students read and use a variety of methods to make sense of various kinds of complex texts.
3. All students respond orally and in writing to information and ideas gained by reading narrative and informational texts and use the information and ideas to make decisions and solve problems.
4. All students write for a variety of purposes, including to narrate, inform, and persuade, in all subject areas.
5. All students analyze and make critical judgements about forms of communication, separating fact from opinion, recognizing propaganda, stereotypes and statements of bias, recognizing inconsistencies and judging the validity of evidence.

6. All students exchange information orally, including understanding and giving spoken directions, asking and answering questions appropriately, and promoting effective group communications.