

Pathways To A Healthy Life

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Overview

This curriculum unit intended for 6th – 8th grade science or health students will focus on how nutrition affects student academic performance and behavior. Students will discover solutions to poor nutrition by comparing and contrasting the effects of a diet high in fat, sugar, and sodium opposed to a diet high in fruits, vegetables, whole grains, and minimum fats. Students will examine the U.S. Food and Drug Administration information on how to understand and use the nutrition fact labels. As a result, students will identify how much they should eat and how to recover from poor nutrition habits. Students will collect data and create graphs on the type of nutritional food items that are available in neighborhood grocery stores. Students will analyze multi media such as television, radio, print, and technology to determine the subtle stimuli that are unconsciously absorbed and impact food choice and consumption. Students will review basic research data to learn that “eating your way to intelligence” starts with a healthy breakfast and a healthy snack. Students will create a healthy snack policy to present to parents and the school for school-wide implementation. Students will utilize the Internet to investigate a selected health quest for their favorite healthy food. Finally, the unit should take approximately six 50-minute lessons to introduce each lesson. Additional time is necessary to plan for student research and follow-up.

Rationale

It is critical for students to become aware of the importance of healthful nutrition. Students know about healthy nutrition on a superficial level. Unfortunately I polled students and the results generated that typically they do not practice healthy eating. As students learn about proper nutrition they can influence their parents to purchase healthful

foods and adopt healthy eating practices. As a final point, the United States is often referred to as the fattest country in the world, therefore, if we can generate student application of a healthy lifestyle, this positive way of living may offset some of the diseases and illnesses that occur later in life. For that reason, I wholeheartedly agree with C.E.A. Winslow's statement regarding Public Health: "...the science and the art of preventing disease, prolonging life, and promoting physical health and mental health and efficiency through organized community efforts toward a sanitary environment...to ensure to **every individual** in the community a standard of living adequate for the maintenance of health (Winslow, 1920)."

Why is children's health at risk? Based on my observations, children frequently consume large amounts of food items that are loaded with a high sugar and salt content. These poor nutritional practices impact children in a detrimental way. Children are bombarded with advertisements that solicit them through sublime seduction, which creates the desire to eat junk foods. Children drink excessive quantities of beverages that are loaded with sugar. In addition, children are not aware of or have not been exposed to alternative foods that are just as savory to the palate. More importantly, children's nutrient deficient diet can affect cognitive development and future medical problems as they age (site: nutrition.about.com-Healthy Food and Learning).

Obstacles That Prevent A Healthy Diet

The above rationale is supported by statistics documented by the United States Department of Agriculture (USDA) and the Center for Disease Control & Prevention (CDC), which are noted on the following pages (site: cspinet.org). According to the USDA, healthier diets could prevent at least \$71 billion per year in medical costs, lost productivity, and lost lives. That is an underestimate because it accounts for only diet-related coronary heart disease, stroke, cancer, and diabetes and not other diet-related diseases. Obesity alone is estimated to cost \$117 billion, and osteoporosis costs \$14 billion in medical expenses.

According to the CDC (site: cspinet.org), state and federal governments spend one thousand times more to treat disease than to prevent it (\$1,390 vs. \$1.21 per person each year). Current investments to promote healthy eating and physical activity are insufficient. The federal government's largest nutrition education program for the general public (the 5 A Day program) has an annual communications budget of about \$3.6 million. Mars spends 68 times that to promote M&Ms candies. McDonald's spends 1000 times more than 5 A Day on advertising and promotions. The food industry spends on advertising and promotions: \$25 billion; funding for tobacco control at CDC: \$100 million; and funding for the Division of Nutrition and Physical Activity at CDC: \$45 million. The \$45 million annual budget of the CDC's Division of Nutrition and Physical

is less than half than that of the amount spent for programs to reduce the use of tobacco, which kills about the same number of people as poor nutrition and physical inactivity.

The CDC posed the following question and the documented response is noted on the following pages (site: cspinet.org): Why it's hard to eat well and be active in America today?

1. Restaurant portion sizes are huge—about 2 to 3 times larger than the food labels list as a serving. Even well trained nutrition professionals tend to underestimate the amount of fat and calories in restaurant foods.
2. Food is abundant in the United States. There are 3,800 calories available in the food supply for each person each day. However, the average American (over the age of 4) needs about 2,350 calories per day.
3. Food advertisements promote mostly foods high in calories, fat, or sugar. Only 2% of food advertising is for fruits, vegetables, grains, and beans, combined.
4. Food advertisements subtly (and not so subtly) encourage overeating and eating when you aren't hungry. For example, one ad from Quaker advises parents to feed their children chewy granola bars to keep them quiet. The text reads, "Kids talking too much? Give 'em a Chewy. Chewy stops the chatter." Other familiar lines brought to you by the food industry include, "don't just stand there—eat something," and "once you pop...you can't stop."
5. Modern conveniences like remote controls, elevators, car washes, washing machines, leaf blowers, and drive-through windows at fast-food restaurants all mean less physical activity. The Dallas Morning News tallied up the number of calories a person could burn if he replaced several "convenient" activities, such as driving through a "drive-through" window, with their more active counterparts, such as walking into the store. Together, they added up to 8,800 calories worth of missed physical activity opportunities each month, or the amount of activity needed to burn off 2.5 pounds of fat.
6. Americans are not getting the basic nutrition education they need to maintain a healthy diet and healthy weight. Funding for nutrition education pales in comparison to what the food industry spends advertising unhealthy foods. Federal funding to promote nutrition and physical activity also lags far behind funding to prevent tobacco use.

The United States is experiencing a crisis that requires immediate attention. According to The Center for Science In The Public Interest (CSPI) there are numerous reasons that clearly identifies that a deficient nutritional crisis is happening in our county. CSPI reported the following statistics (site: cspinet.org):

1. Unhealthy eating and physical inactivity are leading causes of death in the U.S. According to the U.S. Department of Health and Human Services, unhealthy eating and inactivity cause 310,000-580,000 deaths every year—similar to the

- number of deaths caused by tobacco and 13 times more than are caused by guns and 20 times more than by drug use.
2. Diet- and inactivity-related diseases are expensive. Better nutrition could reduce the cost of heart disease, cancer, stroke, and diabetes by \$71 billion each year. Quality of life is reduced.
 3. Obesity rates are skyrocketing. Almost two-thirds (61%) of American adults are overweight or obese. Obesity rates in children have doubled in the last two decades, prompting concern about the rates of diet- and inactivity-related diseases that will occur as obese children age.
 4. The typical American diet is too high in saturated fat, sodium, and sugar and too low in fruits, vegetables, whole grains, calcium, and fiber. Such a diet contributes to four of the six leading causes of death and increases the risk of numerous diseases, including: heart disease, diabetes, obesity, hypertension, stroke, osteoporosis, and many cancers (colon, prostate, mouth, throat, esophagus, lung, and stomach).

Nutrition and Cognitive Development

According to the research, there is no conclusive evidence to state 100% that poor nutrition exclusively affects cognitive development. However, nutrition is one of the factors that affect cognitive development. A summary of information is noted below:

Breakfast, Blood Glucose and Cognition, (Parker, 1998)

“Failure to eat breakfast did not affect performance on an intelligence test. It was concluded that breakfast consumption preferentially influences tasks requiring aspects of memory.”

Good Nutrition: The First Step in Getting Kids Ready to Learn, (Dairy Council of California, 1997)

According to the article “good nutrition throughout childhood is critical to a child’s ability to learn. There is research supporting the premise that breakfast is the most important meal of the day. A nutritious breakfast provides approximately one-fourth of the recommended dietary allowances (RDA) for key nutrients such as protein, vitamin A, vitamin B6, calcium, magnesium, iron, and zinc. In addition, educators agree that hungry or undernourished children tend to be irritable, apathetic and lethargic, conditions that interfere with learning. Children's hunger has both physical and psychosocial symptoms.

In a 1990 Carnegie Foundation study, more than half of the teachers surveyed report that poor nourishment among students is a problem at their school. Recent research has shown that children who skip breakfast have trouble concentrating at school and become

inattentive and restless by late morning. A 1989 Tufts University study found that children who eat school breakfast perform better on standardized tests and are late or absent from school less often than children who do not eat breakfast at school. In addition, a 1996 Hebrew University study found that children who eat breakfast at school -- closer to class and test-taking time -- perform better on standardized tests than those who skip breakfast or eat at home much earlier. Other studies in children have shown that consumption of a nutritious breakfast results in:

- improved attention in late morning task performance
- quicker and more accurate retrieval of information (i.e. working memory),
- fewer errors made in problem solving activities, and
- better concentration and ability to perform complex tasks.

Nutritionally, children who eat breakfast are much better off than those who skip it. Studies have shown that children who eat breakfast have higher 24-hour nutrient intakes when compared to those who skip breakfast. Breakfast skippers do not make up for the lost nutrients later in the day, and average less than 2/3 of the RDA for many nutrients.

Nutrition and Learning: Eating Your Way to Intelligence, (The Endowment for Human Development, Inc., 2001-2007)

However, a new science lends validity to such links between nutrition and intelligence. In the early 1990s, increasing public interest in the relationship between food and the brain helped generate a new field called “nutritional neuroscience.” Although this developing field is still filled with inconsistencies, current research suggests connections between nutrition and learning.

Nutrition is only part of a complex interaction of factors influencing brain development. Even so, current findings show nutrition plays a part in affecting brain development and learning, though the extent is unknown.

Some studies suggest nutrition continues to affect learning. For example, “better nourished toddlers were found to be larger in size, more verbal, and more playful during bimonthly home observations during the period from 18 to 30 months.”

To date, the findings merely suggest possible links between nutrition and learning during childhood and adolescents. The implementation of more and better research is still needed before any definitive statements may be made.

The above research demonstrates nutrition is one of many important factors in cognitive development. While the debate continues on many particulars in this field, we can agree, “children who have responsive mothers, consistent care and organized environments, and adequate nutritional status tend to have high cognitive development scores.”

Nutrition Affects Children's Behavior and Ability to Learn, (Jeqtvig, 2007)

A study by Harvard University and Massachusetts General Hospital of children in Philadelphia and Baltimore showed that children who regularly ate breakfast had better standardized test scores, better behavior, and were less hyperactive than children who skipped breakfast.

Getting healthy nutrition at lunchtime will help keep your child's mind sharp and ready to learn all afternoon. Convincing schools to change their lunches might take a lot of effort, so what else can you do? Teach your kids the importance of eating nutritious foods and hopefully with your help they will choose healthier salads and vegetables over french fries and water over soda.

Solutions for a Healthier Diet

The solution includes a concerted effort that involves the government, parents, and children. The government has the responsibility to regulate the food industry through proper and accurate product labeling specifically with regards to content requirements. Also, there is a need to regulate the type of advertisement geared towards children especially in economic depressed communities. The parent has the responsibility to implement a healthy diet in the home through education and awareness. The children have the responsibility to apply the information taught in school through such programs as 5 A Day and incorporate these practices for future generations.

Therefore, Dr. Margo Wootan, Directory of Nutrition Policy, summarizes what I believe is the solution to help solve the United States nutritional crisis (site: cspinet.org). "Eating well and being physically active takes more than just willpower. We need programs and policies that make healthy food more available, that disclose the calorie content of restaurant foods, and that teach people how to make healthy eating easier. There are existing nutrition policies and programs, like nutrition facts labels on packaged foods, nutrition standards for school lunches, and regulation of food additives. But more needs to be done to help people who want to eat well and prevent diet-related disease."

My Approach

I want to teach lessons that have students utilize meta-cognitive skills (think about why you do what you do). I have included hands-on interactive lesson to reach all types of learners, which include visual, auditory, and kinesthetic learners. The approach was to develop interesting health and nutrition activities and help students become intrinsically motivated to read about healthful nutrition. Recently, I was reviewing health concepts

with sixth grade students. I was inspired by the quality of questions and genuine interest that students had regarding my decision to become a vegetarian. The experience is one of many that clearly demonstrate how educators can inspire student interest if lessons are presented in a thoughtful manner. Ultimately, I hope that students will apply the knowledge learned and become aware of the vast amount of choices to have a healthy diet. In addition, I hope that students make the connection that nutritional deficient food can have a negative impact on their academic performance.

Skills for Student Success

This curriculum unit intended for 6th – 8th grade science or health students will focus on how nutrition affects student academic performance. Students need to be able to understand graphs and charts. Students need to respond critically to advertisements and media marketing strategies. Students need to be able to write a persuasive essay to support their nutrition point of view.

SDP Core Curriculum

The unit encompasses skills in the Pennsylvania literacy and science standards: reading, writing, speaking, and listening. In particular, it will require students to learn and use types of writing (1.4.B.); research (1.8.A.B.C.); environmental health (4.3.7.A); humans and the environment (4.8). In addition, students are mandated to study health related topics to comply with curriculum requirements.

Objectives

Students will be able to gain insightful information and participate in nutritional activities that promote healthy food choice. Students will learn to analyze food-marketing advertisements geared towards encouraging children to participate in deficient eating habits. Students will become aware of alternative methods and resources to incorporate a healthy diet.

This unit is important to my classroom because it will expose students to information and activities that promote healthy food choices and how food processes inside the body. Also, students will have the opportunity to make connections to the environment as well as, stimulate student awareness regarding the quality of food and the types of food that do not provide nutritional benefits. Students will investigate how food affects the brain. Additionally, the unit will provide students with data they can analyze to show the connection between food advertisement and food selection. Finally, there will be a significant emphasis on the negative affects of sugar, fat, and sodium.

Strategies

Students will complete the following assignments, assessments and performance tasks in the course of this unit:

1. **Journal:** Students will maintain a food journal to track food consumption. Also, student will respond to journal prompts to reflect on their progress towards making healthy choices. Over a one to two week period, students will receive a worksheet to assist them in tracking all the foods they have eaten. Learning support students will receive a list of common foods that are generally consumed by adolescents. The learning support list has been modified to check off what they have eaten as opposed to documenting the food items. Student will be given assigned prompts and/or opportunities when students will have choice to select a topic.
2. **Glossary of health terms:** Students will maintain a glossary of nutritional terms and facts covered in the course of reading and analyzing nutritional information. Students may be required to complete activities to demonstrate their comprehension of terms. For example, students may develop a poster through out the unit of terms. Students will write the formal definition and then include a written definition or illustration to help them take ownership for the term.
3. **Healthy Snack Policy:** Students collect data to generate a healthy snack policy. Students can survey teachers and students to solicit feedback on what are the important components in this policy. Teachers will help students develop a list of essential questions.
4. **Web quest:** Students will research information regarding their favorite healthy food to develop a healthy web quest. A web quest provides links to websites that are specific to your topic. The web quest combines all the sites into a single location.
5. **Portfolio of Letters:** Students will write three letters to request the need for health awareness in their neighborhood. Students can write letters to their congressperson and local stores to request additional nutritional foods and snacks. Student can emphasize that they would like access to these nutritional options. Students could visit stores to determine if there are fruits, vegetables, 100% fruit juices, whole grain snacks, and other healthy foods in the local grocery store.
6. **Ad Campaign:** Students create an advertisement to promote healthy snacks. Create an ad that shows how learning can be affected by unhealthy snacks. To encourage the use of multimedia, students may create a simple 3-minute video or radio announcement.
7. **Interviews:** Student interview senior family members on nutritional practices that help them to maintain a healthy lifestyle. Student can analyze the data obtained

and complete a compare/contract chart regarding the nutritional choices that were available during prior years.

8. Trip/Guest Speaker: Students visit Whole Food markets and the Reading Terminal. Also, invite nutritional expert to discuss healthy nutrition and the effects on the brain.

Assessments

Students overall assessment will be based on the portfolio of the above assignments and lesson plans.

Rubrics

- 5- Outstanding!
- 4 - Very Good
- 3 - Good
- 2 - Making progress
- 1 - Needs Improvement

Following Directions

- 5 - I followed the directions, stayed on task and helped other students
- 4 - I followed the directions but I had to be reminded to stay on task.
- 3 - I was frequently off task.
- 2 - I did not follow the directions.
- 1 - I did not listen to the directions, so I did not know what to do.

Use of resources

- 5 - I was able to complete my work independently.
- 4 - I was able to complete the project with help from others.
- 3 - I was able to find most of the material I needed to work on the project.
- 2 - I was able to find some of the material I needed to work on the project.
- 1 - I was unable to find the information I was looking for.

Classroom Activities

The following two lessons have been obtained from discoveryschool.com:

Lesson: Eat Right, Stay Fit

Grade level: 6-8

Subject area: Health

Duration: Two one-hour class periods (students will need additional time to keep track of what they eat)

Objectives:

1. Students will learn what a healthful diet is.
2. Assess their eating habits to determine if they are getting the right foods to stay healthy.
3. Learn about the relationships among metabolism, calories, and diet.

Materials:

1. Print resources, such as reference books and encyclopedias.
2. Internet access - food labels (optional but very helpful)

Procedures:

1. Explain that puberty is a time of fast growth, second only to infancy. For this reason, it is important to eat a healthful diet and exercise regularly.
2. Discuss with students that this is also the time in their lives that they should begin taking responsibility for their own eating habits.
3. To provide students with this necessary background information, take a few moments to discuss the following key terms with them.
 - A. Diet: Everything that someone consumes. A balanced diet is based on the scientific principles that healthful foods and appropriate nutrients must be consumed each day.
 - B. Calorie/Calorie: One calorie is the amount of energy needed to raise the temperature of 1 gram of water 1 degree Celsius.
 - C. Metabolism: The number of calories burned at any given moment.
5. Tell students to list what they eat over the course of three days. Make sure students include the amounts of each food, as in “two waffles” or “one cup of cereal with 1 cup of low-fat milk.”
6. After students have completed their lists, hand out copies of the Food Guide Pyramid from by the U.S. Department of Agriculture. The guide can be found on many products, such as cereal and cracker boxes, or at the following Website <<http://www.nal.usda.gov:8001/py/pmap.htm>>.
7. Have students take a few minutes to look over the Food Guide Pyramid and the recommended daily servings for each food group. Tell students that these servings

apply to all people, but as adolescents, they should make one adjustment. They should make sure to eat three or more servings every day from the milk, yogurt, and cheese group to get enough calcium.

8. To help students understand what a serving is, share with them the following equivalencies: See Appendix
9. Using the Food Guide Pyramid and the serving information as guides, ask students to compare what they eat in a typical day with what is considered a healthful, well-balanced diet. Then have them modify their diets by cutting out unhealthful foods, adding healthful foods, and if necessary, increasing or decreasing the number of servings in a particular food group. By making these changes, students will be working toward eating what nutritionists consider a healthful diet. Tell students that they should eat fats, oils, and sugars sparingly because these foods add calories but not nutrients.
10. Tell students that they should also consider metabolism when assessing their eating habits. Metabolism is defined as the number of calories your body needs while at rest. A more active individual will have a higher metabolism.
 - a. Explain to students that there are different ways to calculate metabolism, but all formulas give an approximate number of calories to be eaten each day. Counting calories is useful, but it is much more important to eat the right foods. Physical activity is equally important. See Appendix
11. Ask students what they learned about their eating habits and metabolism. Challenge students to eat according to the diet they devised based on the Food Guide Pyramid and basic serving information. After students do so for a few days, ask them if they feel any different. Do they have more energy? Are they less tired? Encourage students to continue to eat a well-balanced, healthful diet.

Discussion Questions:

1. Ask students to bring in food labels from home, or supply some from your own home. As a class, look at the labels.
2. What information do they give?
3. How can this information help people eat a healthful diet?
4. What is the biggest modification each student had to make to eat a more healthful diet?
5. Did students have to eliminate certain foods or add others?
6. Discuss how these differences have affected their daily lives.
7. What are proteins, carbohydrates, vitamins, minerals, and fiber? Why is it important to eat a balance of these substances in your diet?

Extensions:

Class Cookbook

Have each student bring in a recipe of a favorite food that is healthful and part of a well-balanced diet. With the help of the students, compile the recipes into a class cookbook. If possible, plan a class lunch, and have students bring in samples of their favorite foods. Then enjoy a healthful lunch together.

Lesson: Quests for Better Health

Duration: Two one-hour class periods (students will need additional time to keep track of what they eat)

Grade level: 6-8

Subject area: Health

Objectives:

1. Students will use the Internet to investigate a selected health quest for the perfect healthy food.
2. Students will research and discover insights about health.
3. Students will evaluate and apply the information they have gained to create a chart, solve a puzzle, or design an ad.

Materials:

1. Computer and Internet access
2. Other print resources related to health

Procedures:

1. In this activity, students use the Web to research and learn more about nutrition. You can assign a specific Web quest or have the students choose the one that interests them most. The quest provides links to appropriate sites on your topic, followed by questions for students to investigate. The final project for the quest is different. For the healthy foods quest, students will create an advertising campaign for their favorite healthy foods.
2. Establish a time frame for students to complete their Web quest and submit the related final project.
3. Assist students as needed to facilitate the completion of the quest.

Adaptations:

Challenge older students to create a word puzzle health quest of their own—like “No Sweat!” Their topics may include the dangers of obesity or eating disorders. Next, have them research the best sites on their topic. They could begin by browsing the suggested sites at B.J. Pinchbeck's Homework Helper. For each site they choose, ask students to write one or two questions. They can either provide a word jumble and riddle, as in “No Sweat!” or they can use their words to create their own crossword puzzle or word search using Puzzle maker.

Discussion Questions:

1. Why is good health so important?
2. What makes some foods more nutritional than others?
3. What foods and behaviors help promote good health?

Extension:

1. Invite your students to develop their own health quests (organize web sites related to their topic in a single location). First, generate a list of health-related topics students would like to learn more about, such as eating disorders or obesity. Then assign, or have students select, topics to research online. Working in groups, have them find the best Web sites on their topic. For each Web site, they should note the site name, URL, and a list of interesting facts for each site. Using the information they find online, challenge them to create a fun “health quest,” such as a fill-in-the-blank quiz, word find, or puzzle. (Discovery School's Puzzle maker is a great tool for creating word puzzles.)
2. Continue your class quest for helpful health information by creating a regular opportunity for students to share nutrition-related current articles that they have found in the newspaper, on the Internet, or in news and science magazines. A possible starting point is the Discovery Health Web site. This site offers daily highlights related to health issues. Have students regularly submit health-related articles they have found along with their sources, a three-to-five-sentence summary on the article, and a one-to-two-sentence personal reflection on why they chose the article they did. Students can share their information and hold related discussions as time permits. Although the discussion might occur as often as once a week, students may be assigned to collect and participate on a rotating basis once a month.

The following lesson has been obtained from dole5aday.com:

Lesson: Language Arts

Grade level: 3-8

Objective:

Students will write a letter to request nutritional information.

Material:

1. List of organizations
2. List of health agencies
3. List of publishers

Procedures:

1. Have students brainstorm questions about fruits and vegetables.
2. Review with students the correct format for a letter, and draft a class letter to a produce trade association.
3. Have students write to the organizations that can answer their questions about the particular fruits and vegetables. Many organizations offer free materials, posters and lesson plans for teachers!

Extensions:

1. Several of these organizations encourage students to write for information on buying and storing produce as well as recipes. Have the students bring in the prepared foods to share with the class! Put recipes together to create a class cookbook.
2. Have the students share orally the information they received from the various organizations.
3. Invite representatives from marketing boards to come in and talk with classes.
4. Set up displays in the cafeteria of the material that is received from the various marketing boards.
5. Ask local markets to donate sample for a fruits and vegetables tasting party.
6. Invite kids to participate in an original fruit and vegetable recipe contest. Try them out and display in the cafeteria.

Annotated Bibliography/Resources

Bibliography for teachers

Alaimo, K., Frongillo, Jr., E.A. & Olson, C.M., *Food insufficiency and American school-aged children's cognitive, academic, and psychosocial development*, Pediatrics, 108 (1): 44-53. 2001.

This study investigates associations between food insufficiency and cognitive, academic, and psychosocial outcomes for US children and teenagers ages 6 to 11 and 12 to 16 years.

Beard, J.L., Carlson, S., & Kretchmenr, N., *The role of nutrition in the development of normal cognition*, American Journal of Clinical Nutrition, 63(6): 997S 1001S. 1996.

The goal of this paper was to review the relation between nutrition and cognition. The topics selected for discussion included generalized malnutrition, iodine deficiency, iron metabolism, and the relation of fatty acids to the development of the nervous system.

Benton, D. & Parker, PY, *Breakfast, Blood Glucose, and Cognition*, American Journal of Clinical Nutrition, April, 1998.

This article compares the findings of three studies that explored the role of increased blood glucose in improving memory function for subject who ate breakfast.

Berenson, G.S., Nicklas, T.A., & O'Neil, G.E., *Nutrient contribution of breakfast, secular trends, and the role of ready to eat cereals: a review of data from the Bogalusa Heart Study*, American Journal of Clinical Nutrition, 67(4): 757S 763S. 1998.

Breakfast consumption has been identified as an important factor in the nutritional well being of children.

Bjertness, E., Heyerdahi, S., Lien, L., Lien, N., & Thoresen, M., *Consumption of soft drinks and hyperactivity, mental distress, and conduct problems among adolescents in oslo, Norway*, American Journal of Public Health, 96(10) 1815-1820. 2006.

The article examined whether high levels of consumption of sugar-containing soft drinks were associated with mental distress, hyperactivity, and conduct problems among adolescents.

Breakey, J. *The role of diet and behavior in childhood*, Journal of Pediatrics and Child Health, 33(3): 190 194. 1997

This short review summarizes the most import research particularly that from 1985 to 1995, on the relationship between diet and behavior.

Chang, S., Grantham, S.M., & Walker, S.P., *Nutritional deficiencies and later behavioral development*, Proceeding of the Nutrition Society, 59(1): 47-54. 2000.

The literature on the long-term effects of nutritional deficiencies in early life is reviewed.

Chitra, U. & Reddy, CR, *The role of breakfast in nutrient intake of urban school children*, Public Health Nutrition, 10(1): 55-8. 2007.

To ascertain the breakfast habits of 10-15 year old school children and to assess the quality of this meal as well as its relationship to the food consumption pattern for the full day.

Fernald, L., Grantham-McGregor, S., & Sethuraman, K., *Effects of health and nutrition on cognitive and behavioral development in children in the first three years of life. part 1: low birth weight, breastfeeding, and protein-energy malnutrition*, Food Nutrition Bulletin, 20:76-99. 1999.

Gibson, E.L., & Green, M.W., *Nutritional influences on cognitive function: mechanisms of susceptibility*, Nutrition Research Reviews, 15(1): 169-206. 2002
The impact of nutritional variation, within population not overtly malnourished, on cognitive function and arousal is considered. The emphasis is on susceptibility to acute effects of meals and glucose loads, and chronic effects of dieting, on mental performance, and effects of cholesterol and vitamin levels on cognitive impairment.

Hersey, Jane, *The Feingold solution: assessing the role of diet in children's behavior. (Health). An article from: Mothering*, May-June 2003.
A mother's description regarding the challenges faced by her son with regards to his diet.

Holk, Lisa E. & Minsky, Bonnie C., *Our Children's Health: America's Kids in Nutritional Crisis and What We Can Do to Help*, Vital Health Publishing, 2002.
Here is a book that forthrightly examines the problems from the perspective of an internationally renowned nutritionist and a holistically trained physician. The authors present a positive balanced approach to health and nutrition that address issues and offers hope to millions of undernourished overmedicated children and families.

Johnson, K. & Murphy, S., *The scientific basis of recent us guidance on sugars intake*, The American Journal of Clinical Nutrition, 78:827S-33S. 2003.
However concern has been expressed about the apparent increasing consumption of added sugars and their possible role in displacing or diluting nutrients in the diet and contributing to the epidemic of obesity in developed countries.

Kleinman, et al, *Diet, breakfast, and academic performance in children*, et al. Annals of Nutrition Metabolism, 46(1): 24-30. 2002.
The objective of this study is to determine whether nutrient intake and academic and psychosocial functioning improve after the start of a universal-free school breakfast program (USBP). Information was gathered from 97 inner city students prior to the start of a USBP and again after the program had been in place for 6 months.

Story, M., & Sztainer, D. Neumark, *Diet and adolescent behavior: is there a relationship?*, Adolescent Medicine, 9(2): 283-98. 1998.

Behavioral problems such as hyperactivity, learning disabilities, mental illness, aggressive and antisocial behavior, and juvenile delinquency have been purportedly linked to the potential influence of foods or nutrients.

Tinsley, Barbara J., *How Children Learn to be Healthy (Cambridge Studies on Child and Adolescent Health)*, Cambridge University Press, 2002.

Exploring the ways in which children learn to be healthy, this book examines children's understanding of health, from early childhood through adolescence, and how it affects their behavior and actual physical health. The study scrutinizes the ways in which parents, other children, schools, media, and children's home and neighborhood influence children's health, attitudes and behavior.

Wade, W., Wilson, D., & Wolraich, M.L., *The effect of sugar on behavior on cognition in children: a meta-analysis*, *Journal of the American Medical Association*, 274(20): 1617-1621. 1995.

The objective of this paper was to examine the effects of sugar on the behavior or cognition of children by using meta-analytic techniques on reported studies. Studies were identified through a literature search of the MEDLINE and PsychINFO databases and the authors' files using sugar, sucrose, and attention deficit disorder as the search terms.

Winslow, C.E.A., *The untilled field of public health*, *Modern Medicine*, Vol. 2: 183-191. 1920.

Another enduring definition of public health—widely accepted and quoted today—was published 87 years ago by C.E.A. Winslow.

Worraich, M. L., et al., *Effects of diets high in sucrose or aspartame on the behavior and cognitive performance of children*, *The New England Journal of Medicine*, 330(5): 301-307. 1994. NAL Call Number: 448.8-N442

The objective of this paper was to examine the effects of sugar on the behavior or cognition of children my using meta-analytic techniques on reported studies.

Bibliography for students

The following articles are from “TeensHealth” website: www.kidshealth.org

- Energy Drinks And Food Bars: Power or Hype?
- Smart Snacking
- Soy Foods and Health
- Your Secrets to Healthy Snacking
- How Much Food Should I Eat?

Nutritional Programs For Adolescence Elson M. Haas M.D. Available at www.health.net

Websites

Center for Science in the Public Interest. Washington, D.C. Food Advertising Available at http://www.cspinet.org/nutritionpolicy/food_advertising.html.

This site provides extensive information about health and nutrition. The format is easy to understand. Since 1971, the Center for Science in Public Interest has been a strong advocate for nutrition and health, food safety, alcohol policy, and sound science.

Center for Science in the Public Interest. Washington, D.C. Guidelines for Responsible Food Marketing to Children: 2006. Available at www.cspinet.org/marketingguidelines.pdf.

This site provides extensive information about health and nutrition. The format is easy to understand. Since 1971, the Center for Science in Public Interest has been a strong advocate for nutrition and health, food safety, alcohol policy, and sound science.

Center for Science in the Public Interest. Washington, D.C. Policy Options Available at <http://www.cspinet.org/nutritionpolicy/index.html>.

This site provides extensive information about health and nutrition. The format is easy to understand. Since 1971, the Center for Science in Public Interest has been a strong advocate for nutrition and health, food safety, alcohol policy, and sound science.

Center for Science in the Public Interest. Washington, D.C. What Danger Lurks in the School Cafeteria? Available at <http://www.cspinet.org/new/200701301.html>.

This site provides extensive information about health and nutrition. The format is easy to understand. Since 1971, the Center for Science in Public Interest has been a strong advocate for nutrition and health, food safety, alcohol policy, and sound science.

Food and Nutrition Information Center. Beltsville, MD. Nutrition, Learning and Behavior in Children: A Resource List for Professionals: 2004; Available at <http://www.nal.usda.gov/fnic/service/learnpub.html>.

This website consolidated the many of the resources, I utilized for this curriculum unit. Food and Nutrition Information Center (FNIC) Resource List is a quick guide designed to help professionals find information related to nutrition, learning and behavior in children. Opinions expressed in the publications do not necessarily reflect the views of the U.S. Department of Agriculture.

Food insufficiency and american school-aged children's cognitive, academic, and psychosocial development. K. Alaimo, C. Olson, and E. Frongillo, Jr. *Journal of the American Academy of Pediatrics*, 108; 44-53. 2001. Available at

<http://www.pediatrics.org/cgi/content/full/108/1/44>.

This study investigates associations between food insufficiency and cognitive, academic, and psychosocial outcomes for US children and teenagers ages 6 to 11 and 12 to 16 years.

Good Nutrition: The First Step in Getting Kids Ready to Learn. Available at

http://www.dairycouncilofca.org/ED_ProgramsBHMBreakfast.aspx.

Since 1919, Dairy Council of California has been an innovator in nutrition education. The Dairy Council of California's vision driving our efforts into the 21st century is to be recognized as the premier nutrition education organization and as a catalyst for expanding the acceptance of dairy's health assets. Our mission is to advance the benefits of dairy foods as part of optimal health that best meet the needs of our customers through innovative learning programs, research and communications. We strive to enhance the health and well being of children and adults by enabling individuals to make healthful food and lifestyle choices.

Healthy Foods and Learning: Nutrition Affects Children's Behavior and Ability to Learn. Available at

<http://nutrition.about.com/od/nutritionforchildren/a/dietandlearning.htm>.

This site provides basic factual information about any topic. The information obtained is concise, yet comprehensive.

Learn More About Eggs- Basic Eggs Facts. Available at <http://www.aeb.org/LearnMore/>.

Find out virtually everything there is to know about eggs! Whether it is egg safety, nutritional information or egg trivia, you can click on the topics on the left for answers to everything that you have wanted to know about eggs.

Learn More About Eggs – Egg Safety. Available at <http://www.aeb.org/LearnMore/>.

Find out virtually everything there is to know about eggs! Whether it is egg safety, nutritional information or egg trivia, you can click on the topics on the left for answers to everything that you have wanted to know about eggs.

Manitowoc Public School District. Manitowoc, WI. Nutrition And Student Performance and Behavior: An Annotated Bibliography: 2003: Available at

<http://mantlyhotlunch.org/Nutrition-annotated-bib.html>.

This website consolidated the many of the resources, I utilized for this curriculum unit.

National Institute of Health: The NIH Almanac – Historical Data

Available at <http://www.nih.gov/about/almanac/historical/dhhs.htm>.

The National Institutes of Health (NIH), a part of the U.S. Department of Health and Human Services, is the primary Federal agency for conducting and supporting medical research.

Helping to lead the way toward [important medical discoveries](#) that [improve people's health](#) and save lives, NIH scientists investigate ways to prevent disease as well as the causes, treatments, and even cures for common and rare diseases. NIH research impacts: [child and teen health](#), [men's health](#), [minority health](#), [seniors' health](#), [women's health](#), and [wellness and lifestyle](#) issues.

New Dietary Guidelines Will Help American Make Better Food Choice, Live Healthier Lives. 2005. Available at <http://www.healthierus.gov/dietaryguidelines/>. *Dietary Guidelines for Americans* is published jointly every 5 years by the Department of Health and Human Services (HHS) and the Department of Agriculture (USDA). The *Guidelines* provide authoritative advice for people two years and older about how good dietary habits can promote health and reduce risk for major chronic diseases.

Nutrition: A Quest for the Perfect Food. Available at <http://school.discovery.com/lessonplans/worksheets/questsforbetterhealth/worksheet2.html>.

This website consolidated the many of the resources, I utilized for this curriculum unit.

Nutrition and Learning: Eating Your Way to Intelligence. Available at http://www.ehd.org/resources_learning_nutrition.php.

The above research demonstrates nutrition is one of many important factors in cognitive development. While the debate continues on many particulars in this field, we can agree, “children who have responsive mothers, consistent care and organized environments, and adequate nutritional status tend to have high cognitive development scores.” Isolating the influence of nutrition alone remains the challenge for nutritional neuroscientists...and perhaps the concern of those overeager parents.

U.S. Food and Drug Administration- Center for Food Safety And Applied Nutrition: How to Understand and Use the Nutrition Facts Label. 2004. Available at <http://www.cfsan.fda.gov/~dms/foodlab.html>.

These FDA Food Labeling web pages address the labeling requirements for foods under the Federal Food Drug and Cosmetic Act and its amendments. Food labeling is required for most prepared foods, such as breads, cereals, canned and frozen foods, snacks, desserts, drinks, etc. Nutrition labeling for raw produce (fruits and vegetables) and fish is voluntary.

Appendix: Pennsylvania literacy and science standards met by this unit

1.2 A Read and understand essential content of informational texts and documents in all academic areas.

1.3.F Read and respond to nonfiction and fiction including poetry and drama.

1.4.B Write multi-paragraph information pieces (e.g., descriptions, letters, reports, instructions, essays, newspaper articles, and interviews).

1.4.C Write persuasive pieces.

1.5.A Write with a sharp, distinct focus.

1.5. B Write using well-developed content appropriate for the topic.

1.8.A. Formulate questions to refine a topic.

1.8.B. Locate and examine information using multiple appropriate sources and strategies.

1.8.C. Restate and present the ideas from research.

4.3.7.A Identify environmental health issues.

4.3.7.B. Describe how human actions affect the health of the environment.

4.4.A. Know the importance of agriculture to humans (double check)

4.4.7.A. Explain society's standard of living in relation to agriculture.

4.4.7.C. Explain agricultural systems' use of natural and human resources.

4.8.7.B. Explain how people use natural resources.

4.8.7.C. Explain how human activities may affect local, regional, and national environments.

4.9 Environmental laws and regulations.

Appendix: Nutrition terms and calculations

To provide students with this necessary background information, take a few moments to discuss the following key terms with them.

- A. Diet: Everything that someone consumes. A balanced diet is based on the scientific principles that healthful foods and appropriate nutrients must be consumed each day.

- B. Calorie/Calorie: One calorie is the amount of energy needed to raise the temperature of 1 gram of water 1 degree Celsius. One Calorie, or kcal, is equal to 1,000 calories, the amount of energy required to raise 1 kilogram of water (about 2.2 pounds) 1 degree Celsius. Nutrition is measured in Calories.
- C. Metabolism: The number of calories burned at any given moment. An individual's basal metabolic rate (BMR) is a measure of the number of calories burned to keep the person's heart, lungs, and a muscle working while the body is at rest. An individual's actual metabolism is higher when the person is active than it is when the person is at rest.
- D. Nutrients: Substances found in foods that people need to stay healthy. Proteins, carbohydrates, vitamins, minerals, and fiber are essential elements of a nutritious diet. Proteins make the cells, while carbohydrates provide energy. Vitamins regulate chemical processes in which the body converts food into energy and tissues. Minerals such as calcium are essential for building strong bones and teeth. Fiber helps keep the digestive system functioning smoothly.

To help students understand what a serving is, share with them the following equivalencies:

- A. Milk, Yogurt, and Cheese 1 serving = 1 cup of milk or yogurt 1 serving = 1_ ounces of natural cheese, or 2 ounces of processed cheese
- B. Meat, Poultry, Fish, Dry Beans, Eggs, and Nuts 1 serving = 2–3 ounces of cooked lean meat, poultry, or fish (2 tablespoons of peanut butter count as 1 ounce of lean meat) 1 serving = _ cup of cooked dry beans 1 serving = 1 egg (2 tablespoons of peanut butter and 1/2 cup of peanuts is equivalent to 1 oz. of meat.
- C. Because nuts are high in fat, they must be eaten sparingly. Two tablespoons of peanut butter is about 1/2 of a serving, as is 1/2 cup of peanuts.
- D. Rather than eat a complete serving of these foods, it may be wise to supplement these portions with other foods from that food group.
- E. Vegetables 1 serving = 1 cup of raw leafy vegetables 1 serving = _ cup of other vegetables, cooked or raw 1 serving = _ cups of vegetable juice
- F. Fruits 1 serving = 1 medium apple, banana, or orange 1 serving = _ cup of chopped, cooked, or canned fruit 1 serving = _ cup of fruit juice
- G. Bread, Cereal, Rice, and Pasta 1 serving = 1 slice of bread 1 serving = 1 ounce of ready-to-eat cereal 1 serving = _ cup of cooked cereal, rice, or pasta

Explain to students that there are different ways to calculate metabolism, but all formulas give an approximate number of calories to be eaten each day.

- A. Counting calories is useful, but it is much more important to eat the right foods.
- B. Physical activity is equally important.
- C. If you feel that providing formulas for students to determine their basal metabolic rate would give them useful information, suggest that they follow these steps:
- D. Women: $661 + (4.38 \times \text{weight in pounds}) + (4.33 \times \text{height in inches}) - (4.7 \times \text{age}) = \text{BMR}$
- E. Men: $67 + (6.24 \times \text{weight in pounds}) + (12.7 \times \text{height in inches}) - (6.9 \times \text{age}) = \text{BMR}$
- F. To estimate the total number of calories your body needs each day, multiply your BMR by the appropriate number given below:
 - 1.2 for people who get little exercise
 - 1.3 for people who get a moderate amount of exercise
 - 1.7 for people who are very active
 - 1.9 for people who are extremely active

Appendix: Where to go for more information to write letters for lesson #3 language arts

American School Health Association

P.O. Box 708
Kent, OH 44240
(330) 678-1601

CA Artichoke Advisory Board

P.O. Box 747
10719 Merritt Street
Castroville, CA 95012
(831) 633-4411

CA Avocado Commission

1251 Dyer Road, Suite 200
Santa Ana, Ca 92705
CA Certified Organic Farms
1115 Mission Street
Santa Cruz, CA 95060
(831) 423-2263

CA Date Commission

P.O. Box 1736
Indio, CA 92202-4510
(760) 347-4510

CA Foundation for Agriculture in the Classroom

P.O. Box 15949
Sacramento, CA 95852
(916) 561-5625

CA Kiwifruit Commission

9845 Horn Road, Suite 160
Sacramento, CA 95827
(916) 362-7490

CA Pear Advisory Board

1521 I Street
Sacramento, CA 95814
(916) 441-0432
CA Prune Board
P.O. Box 10157
Pleasanton, CA 94588-0157
(925) 734-0150

CA Strawberry Advisory Board

P.O. Box 269
Watsonville, CA 95077-0269
(831) 724-1301

CA Table Grape Commission

P.O. Box 27320
Fresno, CA 93729-7320
(559) 447-8350

CA Tomato Board

1625 E. Shaw Avenue, Suite 122
Fresno, CA 93710
(559) 230-0116

Citrus Research Board

323 W. Oak
Visalia, CA 93291
(559) 738-0246

Florida Department of Citrus

P.O. Box 148
Lakeland, FL 33802-0148
(914) 499-2500

International Banana Association

1929 39th Street N.W.
Washington, DC 20007
(202) 223-1183

Leafy Greens Council

33 Pleasant Lane
St. Paul, MN 55127
(651) 484-3321

Michigan Cherry Committee

12800 Escanaba Drive, Suite A
Dewitt, MI 48820
(517) 669-4264

Mushroom Council

11875 Dublin Blvd., Suite D262
Dublin, CA 94568
(925) 556-5970

National Cancer Institute

5 A Day—for Better Health! Campaign
6130 Executive Blvd., EPN232
Bethesda, MD 20892-7332
(310) 496-8520

National Watermelon Promotion Board

P.O. Box 140065
Orlando, FL 32814-0065
(407) 895-5100

North American Blueberry Council

P.O. Box 1036
Folsom, CA 95763
(916) 933-9399

North Carolina Sweet Potato Commission

1327 North Bright Leaf Blvd., Suite H
Smithfield, NC 989-7323

Pear Bureau Northwest

4382 SE International Way, Ste A

Milwaukee, OR 97222
(503) 652-9720

Produce for Better Health Foundation

5301 Limestone Road, Suite 101
Wilmington, DE 19808-1249
(302) 235-ADAY

Raisin Administrative Committee

3445 N. 1st. Street, Suite 101
Fresno, CA 93726
(559) 248-0287

Washington Apple Commission

P.O. Box 9024
Wenatchee, WA 98807
(509) 663-9600

Wild Blueberry Commission of Maine

5715 Coburn Hall
Orono, ME 04469-5715
(207) 581-1475

