Nutrient Tally

Subjects Taught: Language Arts, Physical Education (Nutrition), Health (Nutrition), Mathematics, Science

Grade Levels: 3rd-5th Grade

Brief Description: Using the U.S. Department of Agriculture's "Nutrient Database," the students will compete to predict which vegetables or fruits grown in the school garden contain the highest levels of specific nutrients, graph the results and research the value of those nutrients to their growth and health.

Objectives: Students will:

1. Identify and quantify their nutritional needs using the electronic calculator indicated.
2. Define what various nutrients are, what they are needed for and identify the sources of the nutrients.
3. Use the U.S. Department of Agriculture's "Nutrient Database" to determine how much of specific nutrients are in produce from the school garden.
4. Compete to predict which vegetables or fruits grown in the school garden contain the highest levels of specific nutrients.
5. Graph the results of their findings.
6. Research the value of those nutrients to their growth and health.
7. Describe fat-soluble and water-soluble vitamins and make a list of which vitamins fall into each category.

Life Skills: Analyzing, assessing, comparing, compiling, evaluating, researching

Materials Needed:

- Computers with Internet access
- Copies of student handouts *What is a Nutrient?, Vitamins and Minerals,* and *It's My Choice* — one per student
- Poster board or flip chart paper
- Art supplies
- Seed catalogs, seed packets and/or grocery store flyers that can be cut apart for images of produce
- Scissors and paste or tape
- Empty vitamin and mineral containers

Time:

Introduction: 45 minutes
Activity One: 45 minutes
Activity Two: 45 minutes to research and create posters
45 minutes to view posters and complete handouts
Activity Three: one hour
Activity Four: one hour
Activity Five: 45 minutes

Preparation:

1. Ensure access to computers for students to conduct Internet research.
2. Collect and save grocery store flyers, seed catalogs and seed packets.
3. Assemble or have students bring in empty vitamin and mineral supplement containers.

Vocabulary: Carbohydrates, database, lipids, minerals, nutrients, protein, vitamins

Background Information:

The U.S. Department of Agriculture (USDA) has a science-based listing of the nutritional composition of foods in one

Florida Standards Met At-A-Glance

English/Language Arts	4.RI.2.4, 4.RI.4.10, 5.RI.4.10, 3.W.1.2, 3.W.3.7, 3.W.3.8, 4.W.1.2, 4.W.3.7, 4.W.3.8, 5.W.1.2, 5.W.3.7, 5.W.3.8
Mathematics	3.MD.2.3
Physical Education	PE.3.L.2.5
Health	HE.3.B.1.4, HE.3.B.4.2, HE.4.B.1.4, HE.4.C.1.1, HE.5.B.1.4, HE.5.B.4.2, HE.5.C.1.1

centralized location in USDA's "Nutrient Database" available at www.ndb.nal.usda.gov/. The database is searchable, contains both raw foods and processed foods, continues to expand as foods are created or altered and even has foods from specific restaurant chains. Foods are given in portion sizes but vary between grams, cups, whole vegetables, other raw forms and restaurant servings. Few students ever learn what specific nutrients a food source provides because we fail to teach them. Limiting knowledge to food groups and portion sizes handicaps students and limits their understanding of proper nutrition. The major focus of this lesson is to help students understand that there is a wealth of science-based information available from an easily accessible, up-to-date, credible source.

Introduction:

1. Make a list of all the fruits and vegetables being grown in the school garden. Ask the students to add their favorite foods to this list. Post the list in a visible place.
2. Review serving sizes for various foods on page 38 of this book or at the Food and Nutrition Service of the USDA at www.fns.usda.gov/tn/healthy/portions_kit/serving_size.pdf or in the appendices of *Project Food, Land & People's Resources for Learning*.
3. Add the size of one serving to each of the foods listed on the posted summary.
4. Ask students if they know what vitamins are. Ask them to tell you what they are and where we get them from. *(Many students may suggest that we get them by taking a vitamin pill, but beyond that may not realize what they are, how important they are or how we obtain them.)*
5. If the students do not state that we get vitamins from the foods we eat and drink, lead them in that direction. Share with them that the vitamin and mineral supplements in a pill, that are manufactured in a laboratory, originate from a food source. Assure them that all nutrients come from food. Explain that this lesson will help them understand which foods provide specific nutrients and why students need those nutrients.

Activity One:

1. Explain to students that all foods have varying nutritional values. We are constantly being told to eat more fruits and vegetables but not being told why that is so important.
2. Have students research what the major nutrients are, describe why we need them and complete the *What is a Nutrient? Student Handout* using the National Library of Medicine at the National Institutes of Health Web site at www.nlm.nih.gov/medlineplus/encyclopedia.html. For younger students, you may wish to assign this as a small group activity with one group of five students completing a single handout as a group effort.

Activity Two:

1. Assign students in groups of twos or threes to research a single vitamin or mineral needed by the body and create a poster project about that vitamin or mineral using the same website and a second science-based website such as the Vitamin and Mineral Fact Sheets at the National Institutes of Health at www.ods.od.nih.gov/factsheets/list-VitaminsMinerals/ or Vitamins and Minerals at Nutrition.Gov at www.nutrition.gov/whats-food/vitamins-minerals.
2. Display the completed posters around the classroom.
3. Have the class members view the posters and complete the *Vitamins and Minerals* handouts. Make sure the class covers all the vitamins and minerals and reports on each to the class.
4. Review what the nutrients are, why we need each and what foods contain those nutrients.

Activity Three:

1. Using the seed catalogs, seed packets, and/or store flyers, have the students select a vegetable ***not*** grown in the garden and walk the students through using the "USDA Nutrient Database" at www.ndb.nal.usda.gov/.
2. Explain to students that now they will put what they have learned to work in a competition.
   a. Referring to the list of produce from the garden (developed in the introduction), ask the students to select one produce item that contains the greatest

number of nutrients overall. Now select a specific nutrient and a second item that contains the greatest amount of that nutrient.

   b. Indicate that these are their choices for the competition to see whose choices have the greatest number of nutrients and the greatest amount of nutrients total.
   c. Enter those selections on the *It's My Choice Student Handout*.

3. Have students use the USDA Nutrient Database at www.ndb.nal.usda.gov to assess their selections and list results on the *It's My Choice Student Handout*.
4. Have the students graph their results and post the graphs.
   a. Students should produce two graphs for each food choice. One graph should include carbohydrates, protein, and lipids (fats and oils). These are the macronutrients.
   b. The second graph for each food choice should include vitamins and minerals. These are the micronutrients.
5. Give each nutrient one point and add up the number of points for the variety of nutrients. The food that has the highest number of points is the winner of the category for most number of different nutrients.
6. Give each nutrient a point for the amount of that nutrient in whatever measure it is given in (it will vary based on recommended amounts and whether it is a macronutrient or a micronutrient).
   a. For example: a carbohydrate may have 4 grams in a vegetable while the vitamin amount may be 7 micrograms in the same vegetable. Each amount receives 1 point so the total for that vegetable is 4 points +7 points =11 points.
   b. While this may seem like comparing apples and oranges, we need macronutrients in large amounts, and micronutrients in very tiny amounts. But both are essential to our well being and should be given equal importance.
   c. The food that has the highest number of points is the winner of the category for most total nutrients.
7. Compare the results for both categories, and select the winner.

Activity Four:

1. Using the "Interactive Daily Nutrient Recommendations" for dietary planning at the Food and Nutrition Information Center of the USDA at www.fnic.nal.usda.gov/fnic/interactiveDRI/ have students submit their information and calculate their nutritional requirements for all categories possible. Make sure they check all of the individual nutrient boxes.
2. Have students either print off the information for their own personal use or copy and paste the information into their own document to save for future reference in their own electronic file. This will be used for several lessons.
3. Make a list of five fruits and five vegetables that will meet some of the needs you may have for vitamins and minerals.

Activity Five:

1. Have students examine the labels of various vitamin and mineral supplement labels to assess the amount of various nutrients in each. Compare multivitamin brands.
2. Ask students:
   "Why are multivitamins taken? What do they provide or ensure?" *(If nutrients are not consumed in foods, they can be provided by vitamin and mineral supplements.)*
3. Have students research the difference between fat-soluble vitamins and water-soluble vitamins and make a list of which vitamins fall into each category.
4. Ask the students if it is possible to have too little or too much of a nutrient such as a vitamin. Explain that yes it is. Both too little and too much of certain nutrients can be a health problem. Too little of nutrients can cause deficiency disorders. Too much of some nutrients can be toxic. For example, too much of the water-soluble vitamins will be excreted in the body's urine. Fat-soluble vitamins are retained by the body and can become toxic.
5. Discuss with students whether or not they need vitamin and mineral supplements if they do not eat a well balanced diet. If so, how much? If they eat a balanced diet, do they need vitamin and mineral supplements? *(Answers will vary, and the questions are just posed to be thought provoking.)* Explain that foods contain more than nutrients and that when eaten provide phytonutrients. Much of this is still being researched and it is best to get nutrients from foods rather than supplements to ensure that the body obtains everything good in foods which may be missing in supplements.

Evaluation Options:

1. Assess student performance in completing the assigned research and cooperation in completing the group

work, including accuracy and completeness on the three handouts.

2. Assess the small-group work on creating the poster project for accuracy, completeness, participation of all students, creativity in presenting the information and ability to clearly understand the presentation.
3. Assess student work and graphs for accuracy and completion.
4. Have students use their nutritional requirements (found in activity four) and the USDA Nutritional Database to create a week-long menu of healthy meals that will incorporate produce from the garden to meet their nutritional and serving size requirements identified in the introduction activity.
5. Have students write an essay on why they need to consume a wide variety of foods that include fruits and vegetables including a creative way to include a vegetable that they selected in the competition.
6. Have students select a color of vegetable. Make a list of the vegetables in that color and research nutrients found in the category to evaluate similarities.

Extensions or Variations:

1. Have the school cafeteria manager speak to the class about incorporating fruits and vegetables into the school lunch program.
2. Give students that selected the produce item with the most nutrients and most of a single nutrient an A + or 100 percent score for the activity.
3. Have students select a nutrient found in a supplement, identify the foods that provide that nutrient and identify what other nutrients are provided by that food.
4. Have students research and write about supplements.
5. Have students research the statement, "The dose makes the poison," and write an essay explaining it.

Resources:

Food and Nutrition Service, United States Department of Agriculture. www.fns.usda.gov/tn/healthy/portions_kit/serving_size.pdf

"Interactive Daily Nutrient Recommendations", Food and Nutrition Information Center of the United States Department of Agriculture. www.fnic.nal.usda.gov/fnic/interactiveDRI

National Library of Medicine, National Institutes of Health. www.nlm.nih.gov/medlineplus/encyclopedia.html

Nutrient Data Laboratory, United States Department of Agriculture. www.ars.usda.gov/main/site_main.htm?modecode=12-35-45-00

USDA Nutrient Database, United States Department of Agriculture. www.ndb.nal.usda.gov

Vitamin and Mineral Fact Sheets, National Institutes of Health. www.ods.od.nih.gov/factsheets/list-VitaminsMinerals

Vitamins and Minerals, Nutrition.Gov. www.nutrition.gov/whats-food/vitamins-minerals

Nutrient Tally

Sample Pre-Post Assessment

1. What are five nutrients needed by the human body?

2. List one vegetable or fruit that is high in vitamin A.

3. List one fruit or vegetable that is high in vitamin C.

4. Give one reason why getting your nutrients by eating fruits and vegetables is important to your health.

What is a Nutrient? Student Handout

Name _____

Using the National Library of Medicine searchable website at http://www.nlm.nih.gov/medlineplus/encyclopedia.html, search for each nutrient and find this information:

Nutrient	Needed For	Deficiencies Result in	Sources
Protein			
Carbohydrates			
Vitamins: A, D, E, K, C and the B Vitamins			
Minerals: Calcium, Phosphorus, Iron, Magnesium, Sodium, Potassium, Chloride, Iodine, Zinc			
Fats and Oils (Lipids)			

Vitamins and Minerals

Nutrient		Needed For	Deficiencies Result in	Sources
Vitamins	A			
	D			
	E			
	K			
	C			
B Vitamins:	Thiamin			
B Vitamins:	Riboflavin			

Vitamins and Minerals

Continued

Nutrient		Needed For	Deficiencies Result in	Sources
B Vitamins:	Niacin			
B Vitamins:	B-6			
B Vitamins:	Folate			
B Vitamins:	Pantothenic Acid			
B Vitamins:	Biotin			
B Vitamins:	B-12			

Vitamins and Minerals
Continued

Nutrient		Needed For	Deficiencies Result in	Sources
Minerals	Calcium			
	Phosphorus			
	Magnesium			
	Sodium			
	Potassium			

Vitamins and Minerals
Continued

Nutrient		Needed For	Deficiencies Result in	Sources
Minerals	Chloride			
	Iron			
	Iodine			
	Zinc			

It's My Choice

Name _____

1. Identify the garden produce that you believe contains the greatest number of total nutrients:

_____

2. List the nutrients found in this fruit or vegetable:

3. The Total Number of Nutrients= _____

4. Select one fruit or vegetable that contains the most of a single nutrient and identify the nutrient.

Fruit or Vegetable Selected	Nutrient Selected	Amount of the Selected Nutrient