

YOU ARE WHAT YOU EAT- NUTRITION

MASTER TEACHER: Andrea Cantu

Grade Level: 6-8

Subject Matter: Science and Technology

Time allotment

Three 45-minute class periods.

Overview

Food is a necessary component to living systems. Food replaces energy that is used, and provides the fuel for growth. For proper maintenance of a living being, a variety of food groups should be eaten. The digestive system begins digestion with a mechanical breakdown and then a chemical breakdown. Nutrients are removed from the small intestine and undigested materials are processed and released through the large intestine.

Through the activities presented in this lesson, students will become familiar with human needs relating to nutrition (food groups) and the digestive process. Students will first sort food into the basic food groups and then later regroup into carbohydrates, proteins, and fats. Students will simulate peristalsis. Students will search a pre-selected web site to reinforce concepts presented in the video and to acquire further information on the subject. Experiments will be conducted to test for starch (carbohydrates), fat, and vitamin C.

Learning Objectives

Students will be able to

- List selected food items into nutritional groups
- Define the words ingestion and digestion
- Describe the functions of the 10 major organs of the digestive system
- Demonstrate peristalsis
- Gather further information on the digestive system via the internet
- Students will test for starch, fat, and vitamin C

Standards

From the National Science Education Standards, grades 5-8

- 1) The human organism has a system for digestion. (NSES C)
- 2) Food provides energy and nutrients for growth and development. Nutrition requirements vary with body weight, age, sex, activity, and body functioning. (NSES F)

KEDT EDUCATIONAL TELEVISION SERIES

Our Human Body From Science Source: #110 Nutrition

Web Sites

http://kidshealth.org/kid/htbw/digestive_system.html

This site describes the workings of the digestive system.

http://www.imcpl.lib.in.us/nov_dig.htm

This site has a labeled diagram and four facts about the digestive system

<http://www.mypyramid.gov/>

This site deals with food groups and gives a brief discussion on each group.

<http://www.infoplease.com/ce6/sci/A0844162.html>

This site is part of the kids' almanac of infoplease.com. This entry is the information provided by the online encyclopedia about scurvy.

Materials

For the class

- Ping-Pong ball

For each group of four students:

- Set of food cards
- Cracker
- Iodine
- Dropper
- Butter (regular and low fat)
- Brown paper bag or brown paper towel
- Lemon juice
- Indophenol (blue in color)

For each student:

- Nutrition worksheet packet
- Pen or pencil

Prep for Teachers

Prior to the teaching, bookmark all of the Web sites used in the lesson. Cue the videotape to the appropriate starting point. Prepare the handouts for each student. Prepare food cards for the group activity. Organize lab supplies.

Introductory Activity:

The following activity will prepare your students for the concepts of the basic food groups. Later the food cards will be sorted in different nutritional groupings, such as carbohydrates, fats, and protein.

Step 1: Preparation of the food cards

Glue five to six food pages containing the 25 food words onto a 8 $\frac{1}{2}$ " x 11" piece of poster board. Laminate the finished product and cut out into rectangles. For a simpler method copy the five to six food pages on different colored paper and cut out.

Step 2: Conduct the activity

Give each group a set of food cards. Ask the groups to organize their cards into categories. Students must explain their reasoning for their food card groupings.

Step 3: Analysis of the activity

Say, "Explain how you grouped your cards. (accept all reasonable answers) What are the four major food groups? (Dairy products, meats and nuts, grains and cereals, fruits and vegetables)

Learning Activities

Step 1: Focus for media interaction

To provide your students with a **Focus for Media Instruction**, say, "Later we will group the cards into another set of categories. Let's watch the video on nutrition to see into what new groupings we can place these cards."

Start the video, *OUR HUMAN BODY FROM SCIENCE SOURCE: NUTRITION*, where the words "Roots of Nutrition" appear on the left of the screen. A caterpillar is eating a leaf. The audio is music. **Pause**. Say, "Listen for the uses of food. Record your answer on question #1." **Resume** the tape when the audio is music and a parrotfish is swimming on the screen.

Step 2: Introduction to the Food Pyramids and Types of Consumers

Fast forward the video until the visual is a wildcat eating a rodent. The audio is "Different levels make up the food pyramid." **Pause** the tape. Say, "What are some uses for food? (stay alive, develop, and replace energy) For questions 2-5, listen for the groups of organisms that are producers and consumers." **Play** the tape to the section where the sound of typing is heard and the visual of the following words appear, "Which type of animal uses the food it eats most effectively?" **Pause** the tape. Say, "What is a primary producer? (plants) Name two primary consumers. (herbivores and omnivores) Name two types of secondary consumers. (carnivores and omnivores) What animal uses its food the most effectively? (omnivore) For answers to numbers 6-8, listen for the percentage of the food that is used and discarded, and the types of substances humans need to eat. **Play** the tape until a cartoon of a human body is surrounded by icons of nutritional substances. The audio is "Each of them is obtained from eating or ingestion." **Pause** the tape.

Step 3: Human Needs and Composition

Say, "What percentage of our ingested food is used? (10%) discarded? (90%) What food substances do humans need? (water, carbohydrates, fat, protein, minerals and vitamins) What does ingestion mean? (to eat) In this next segment questions 10-12 will be addressed. Listen for the percentage of water of which the body is composed and the substance that is a primary building block for the human body. **Play** the tape until the video shows icons of nutritional substances. The audio is "The remainder must be obtained through our diet." **Pause** the tape. Say, "What percentage of the human's body weight is water? (70%) What substance is the building block for muscles? (protein) What two life stages need more protein?" (before birth & childhood)

Step 4: Nutrition

Say, "In this next clip you will listen for the composition of protein and how many amino acids the body manufactures naturally. (questions 13 and 14) For questions 15 - 18 record the foods that contain protein, fat, and carbohydrates. **Play** the tape until the screen shows people surrounding a campfire. The audio is, "In order to stay alive humans need minerals." **Pause** the tape. Say, "What substance make up proteins? (amino acids) How many amino acids does the body manufacture naturally? (10) What foods contain protein? (milk, cheese, meat, poultry, fruit,

vegetables, and cereal) **Fats?** (butter, nuts, oil, meat, and cream) **Carbohydrates?** (potatoes, cereal, noodles, and sugar) **What two substances provide the body with fuel?** (carbohydrates and fats) **For 19 and 21, listen for the uses of calcium and iron, and what materials the human body absorbs rapidly. Record the answer to 20 when you hear what vitamin deficiency causes scurvy. For 22, define digestion.** **Play** the tape until music is heard and a visual with a split screen appears. On the left side of the screen there is a cartoon human body and on the right side is a cartoon human head. **Pause** the tape. Say, "**Why does the human body need calcium?** (bones) **Iron?** (blood) **What materials does the human body absorb rapidly?** (mineral salts, water, vitamins, and glucose.) **Define digestion.** (food is broken down into its basic components) At this point in the lesson students may get back into their groups with the food cards. Have students reorganize their cards into food groups relating to protein, carbohydrates, and fats.

Step 6: Digestive Process

Say, "In this next segment record in #23 the length of the esophagus, small intestine, and large intestine. For #24, write down the length of time that food is stored in the stomach. Listen for #25, the amount of gastric juice that the stomach produces. **Play** the tape to the section where the sound of typing is heard and the visual of the following words appear, "**How much gastric juice does the human stomach produce?**" **Pause** the tape. Say, " **What is the length of the esophagus?** (6 inches) **Small intestine?** (12 feet) **Large intestine?** (6 feet) **How long does food stay in the stomach?** (1 hour) **How much gastric juice is produced in the stomach?** (1 pint) Listen for the function of the small and large intestine. Record your answers on 26 and 27. Give the answer to #28 as to the number of bacteria in the body." **Play** the tape to the section where the sound of typing is heard and the visual of the following words appear, "**How many bacteria does a human body carry?**" **Pause** the tape. Say, " **What is the function of the small intestine?** (absorb nutrients) **Large intestine?** (absorb water) **How many bacteria are in the human body?** (billions) This next clip describes the kind of consumer a human is and what factors determines man's diet. **Stop** the tape when music is playing and the screen displays the words "**Instant Replay**". Say, " **What type of consumer is a human?** (omnivore) **Explain.** (Humans can eat both plants and animals.) **What factors determines a human's diet?** (climate, cultural/ religious, and fertility of the soil)

Culminating Activity

The following simulation will help students to understand the concept of peristalsis.

Say, "We have seen in the video how food moves along the digestive system. In this activity we are going to simulate the squeezing process in the intestine or esophagus. The squeezing action is called peristalsis."

Step 1: Beginning the Peristalsis Simulation

Have a Ping-Pong ball or another small smooth surfaced object to pass through students' hands. Have students line up in front of the classroom in an alternating pattern. The alternating pattern is one student is facing the front of the classroom while the adjacent student is facing the back of the classroom. This pattern is repeated down the line. Students will outstretch arms, keeping fists together, and their fists touch the students' fists on either side. The person at the beginning of the line will be given an object to pass through his/her own hands as well as manipulating the object into the next person's hand. The students must not drop the object. They can only use the squeezing action of the hands to push the object down the line.

Step 2: Wrapping up the Simulation

Say, "What is the squeezing action of the intestine or esophagus called? (peristalsis) How difficult was it to move the object through your hands? (accept all reasonable answers) It takes food eight hours for food to digest. What causes your stomach to growl? (peristalsis) Is your stomach the organ that is making the noise? Explain. (The squeezing or peristalsis in the intestine makes the growling noise.) If you school has a stethoscope have students listen to sounds of lower abdomen.

Step 3: Web Search

Bookmark the website titled "The Digestive System. Have students answer the web questions on their nutrition worksheet.

Step 4: Setting up the Labs

Each group member has a specific job. (Materials gatherer, Investigator, Reporter, Clean Up) These jobs rotate every lab. After the material gatherer has

collected materials, (cracker, lemon juice, butter (both types), test tube, dropper, brown paper towel or bag, iodine, and indophenol) the investigator will conduct the experiments.

Step 5: Starch Experiment

Have investigator place a drop of iodine on the cracker. Food that contains starch will turn blue-black. Have student record their data on their worksheets.

Step 6: Fat Experiment

Have investigator rub a small amount of butter on the brown paper towel or bag. Repeat this process with the other type of butter. Fat or oil makes a spot on the paper. Light can pass through the paper at that spot. Have student record their data on their worksheets.

Step 7: Vitamin C Experiment

Have investigator fill one test tube with 15 ml of indophenol. Add a few drops of lemon juice. Shake the test tube once and then shake it again. Vitamin C makes indophenol lose its color. Have student record their data on their worksheets.

Cross-Curricular Extensions

LANGUAGE ARTS

Write a story about a journey through the digestive system.

Write a story in a digestive organ's point of view.

ART

Make a guts T-shirt. (Draw the digestive system on the outside of a T-shirt.)

HISTORY

Have students research vitamin deficiency diseases that effected sailors a century ago.

Have students research the origin of the term "scurvy dogs".

COMMUNITY CONNECTIONS

- Have the school nurse talk to students about proper nutrition.
- Have a local nutritionist talk about preparing well-balanced meals.

Student Materials

Each student will have one Nutrition worksheet packet.

NUTRITION WORKSHEET

- 1) Why do we need food? _____, _____, _____
- 2) Primary producers are _____
- 3) Primary consumers are _____ or _____
- 4) Secondary consumers are _____ or _____
- 5) Which type of animal uses the food it eats most effectively? _____
- 6) What percent of the food we ingest is used? _____
- 7) What percent of the food we ingest is discarded? _____
- 8) What substances do humans need to eat? _____, _____,
_____, _____, _____.
- 9) Define the word ingestion. _____
- 10) What percentage of a human's body weight is water? _____
- 11) What substance is the building block for muscles?
and chemical reactions? _____
- 12) What life stages need more protein? _____ & _____
- 13) Protein is made up of _____
- 14) The body manufactures _____ amino acids and the rest we must obtain from
the food we eat.
- 15) What foods contain protein? _____
- 16) What substances provide the body with fuel? _____
- 17) What foods contain fat? _____

18) What foods contain carbohydrates? _____

19) Tell what part of the body the following minerals are used.

Calcium _____ and Iron _____

20) What vitamin deficiency causes scurvy? _____.

21) What materials are absorbed rapidly by the human body? _____,
_____, _____, _____.

22) Define digestion. _____

23) What is the length of each of the following organs.

a) esophagus _____ c) small intestine _____

b) large intestine _____

24) How long does food stay in the stomach? _____

25) How much gastric juice does the stomach produce? _____

26) What is the function of the small intestine? _____

27) What is the function of the large intestine? _____

28) How many bacteria does a human body carry? _____

29) What type of consumer is a human? _____

30) Name the three things that determine a human's diet.
_____, _____, _____.

Digestive System Web Search

Search the following site for links to the answers to the questions below:

http://www.kidinfo.com/health/human_body.html

1. Food substances are changed into forms that can be _____.

2. Name the 10 major organs of the digestive system.

- | | |
|----------|----------|
| a. _____ | f. _____ |
| b. _____ | g. _____ |
| c. _____ | h. _____ |
| d. _____ | i. _____ |
| e. _____ | j. _____ |

3-5. Where does digestion begin? _____ and its two functions are _____ and _____.

6-8. Name three functions of the stomach. _____, _____ and _____.

9. What is the function of pepsin? _____

10. What is chyme? _____

11-12. What two organs secrete substances into the small intestine? _____ and _____

13-15. Name three functions of the large intestine. _____, _____ and _____

16. Does the liver alter the composition of toxic substances? _____

17-18. Bile salts enhance the absorption properties of _____ and _____ (A, D, E, K)

19-20. Name 4 substances the pancreas breaks down. _____, _____, _____ and _____.

STARCH EXPERIMENT

1. What substance did you use to test for starch? _____
2. Did the cracker the turn blue-black? _____
3. Does the cracker have starch? _____

FAT EXPERIMENT

1. Did the butter make a spot on the paper? _____
2. Which type of butter made a larger spot? _____

VITAMIN C EXPERIMENT

1. What substance did you use to test for starch? _____
2. Did the indophenol lose its color? _____
3. Does lemon juice have vitamin C? _____

SWISS CHEESE	WHITE SUGAR	BROWN SUGAR	OAT CEREAL
WHITE FLOUR	WHEAT FLOUR	CORN FLAKES	BRAN CEREAL
RICE	APPLES	ORANGES	GRAPES
LETTUCE	CARROTS	HAM	TURKEY
CHICKEN	FLOUNDER	BEEF	SALMON
AMERICAN CHEESE	CHOCOLATE MILK	WHITE MILK	BUTTER