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Fit for Our Future

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Introduction

In the past twenty years, the percentage of overweight children ranging from age 6 - 11 has more then doubled, from 7% in 1980 to 18.8% in 2004.1 In my opinion, a new responsibility of educators, especially those involved in the sciences, is to educate students on maintaining a healthy body. Making smart food choices, understanding nutrition labels, appreciating the importance of maintaining a healthy body, being aware of the consequences of choosing an unhealthy lifestyle, and incorporating physical fitness are just some of the components that will assist students in choosing a healthier lifestyle.

Both science and health can be taught in a variety of ways. This unit will use real world examples and application to promote student retention and real life application. According to current educational research connecting the science curriculum to the real world is essential for optimal understanding. When information is presented in the context of real world situations, students acquire and retain information most effectively.2 Through this project, students will make connections to the real world and be able to apply what they have learned to their lives outside of school.

Moreover, students will discover that there is a country-wide health crisis. In combination with their language arts unit on the effects of making poor health choices students will discover that there is a problem. ABC News reported in 2001 that the average middle school aged student watch TV, plays video games, or is on the computer up to 4.8 hours a day. In addition to the approximately 5 hours a day students spend sitting in school, young children are spending too much time being sedentary. 3 Studies have revealed that, "When science is presented as a solution for a societal problem, students begin to understand its true importance".2 When students understand its true importance they are motivated, dedicated, and intrigued. These qualities will make students want to learn.

Unit Goal

Four teachers will be working together as a team to prepare students to educate their peers through a school-wide health fair about the importance of living a healthy lifestyle. Using their knowledge of the material from both class discussion and independent research, the students will create a formal presentation and a display to teach peers about aspects of physical fitness in the form of a health fair. My class will work with the students from the three other classes to reach this goal.

My two participating classes are fifth grade students from Betsy Ross Arts Magnet School. While this unit is intended for fifth grade, it can be modified to encompass a variety of grade levels. The diverse population with in my class correlates to the 550 students who attend Betsy Ross. While half of the schools population is from New Haven, the remaining half is from various parts of New Haven County. According to STAR Math and Connecticut Mastery Test results, one of the participating classes will consist of students who test above the fifth grade level in mathematics. The other participating class is of average and below-average mathematics abilities. On account of their differences in ability, their mathematics curriculums differ, but their science curriculums are the same. Some modifications will be made in both classes for students with additional educational and social needs. Both classes are instructed based on the New Haven Public School Fifth Grade Science Curriculum. At Betsy Ross Arts Magnet School our mission is to fuse both the arts and academics together to build a richer and more meaningful education. This unit, in combination with the other three units, includes topics ranging from visual art, foreign language, language arts, and science. The unity of these topics meets the school expectations, as well as state and district requirements.

Objectives

The objectives for the unit are for students to understand the importance of physical fitness as part of their overall health and to prepare a display or presentation for their peers about what they have learned. Topics could include: the importance of physical activity, adequate forms of physical activity, the importance of physical activity for the muscles, the importance of physical activity for the mind, the importance of physical activity for the bones, how the respiratory system supports physical activity, how to improve student levels of physical activity, how to get family involved in physical activity, or consequences of physical inactivity.

Content Standards

One goal of all New Haven curriculums is to develop knowledgeable citizens. More specifically, becoming knowledgeable and responsible of one's self is an essential component to the district the science curriculum. To achieve this goal, content standards were developed to more specifically identify the key components. The curriculum identifies the following standards which are directly applicable to this unit on fitness:

3.1c. Students will learn the identification and function of the systems of the human organism including

digestion, respiration, reproduction circulation, excretion, movement and control, and protection from disease.

Performance Standard 6.1: Students will develop an understanding of the value and behaviors of good personal health.

6.1a. Students will identify the ways in which regular exercise contributes to the improvement and maintenance of their health.

6.1c. Students will learn personal responsibility for their own health and safety and identify those activities which positively or negatively affect their health and safety.

Unit Overview

This unit will address the following: why physical activity is so important for today's youth, what are considered to be adequate forms of physical activity, how the human body supports physical activity, benefits of regular physical activity for mind and body, a brief explanation for the consequences of physical inactivity (this is a component of another team members unit), and suggestions on how to improve the inactivity of students. Students will participate in classroom daily exercise, maintain daily nutrition and exercise logs, create pictorial representations of the human body systems, and work in small groups to develop and carry out final project ideas. Each of these components will contribute to the students' general knowledge of physical fitness and responsibility.

This unit, in combination with the other proposed units, meets and exceeds the school and district recommendations. Our school asked that teachers work collaboratively, especially with the arts teachers, to enrich students' experiences. Not only does this lesson meet the recommendation, but will involve the entire student body. This unit also meets the needs of the district by incorporating numerous content strands and applying the learned knowledge to the outside world. While this unit is intended for the New Haven Public School System, any group of students or adults could benefit from learning about what constitutes a healthy lifestyle.

Unit

Fit for Our Future will begin with a brainstorming activity. A question will be proposed, "What is healthy?" Students will work in small groups to create a list of ideas or a definition of what healthy means. We will come together as a class and students will report their answers to the class. I will record their ideas on a piece of chart paper and begin a discussion about how and why certain responses were made. The list of responses will be displayed in the classroom and referred back to at the end of the unit.

Next, I will explain to the students that they are going to participate in a school-wide health fair to educate their peers on one of these health components, physical fitness or exercise. An explanation of the collaborative effort of other classes will be presented. Students will learn that they are one of four classes

participating in the school-wide health fair. They will be focusing on health related issues in their four main content areas along with another fifth grade class. Students from a French class and art class will also participate in the fair. Within the next week students will select a group and a topic that they will be presenting. (Appendix A) Students will begin collecting information on their topic through class discussion, in-school research, and research completed at home. The final project will be an interactive station including a poster board at the scheduled fair.

Students will receive health journals they will record their daily food consumption, daily physical activity, changes made to be healthier, effects of health changes, possible solutions, and feelings about health. Students will include class notes and recommended diagrams. This journal will also be used in their language arts and social studies class to record information throughout the unit. An opportunity will be provided for students to share their responses, but it is not required.

The students will be learning about the importance of a healthy body in preparation for their final project, and they will be incorporating what they have learned into their everyday classes. During a presentation at the 2001 Society for Neuroscience conference, it was discussed that, ". . .following a 12 week regimen of jogging for 30 minutes two to three times a week, young adults significantly improved their performance on a number of cognitive tests".4 While as a classroom educator I cannot dedicate a half-hour of continuous physical activity every day, I can contribute by having students participate in David Katz's ABC for Fitness or Activity Bursts in the Classroom. Katz's created this program with the understanding that school systems across the country have reduced physical activity time to make way for more academic learning. By reducing or eliminating recess and gym, students are getting less time for physical activity. The ABC for Fitness is a manual for teachers, which includes step-by-step instructions for numerous 5 minute activity bursts that could be used before each class. The 5 minute activity burst is not to replace a students workout, but contribute to a students overall health. If a 5 minute burst is done before or during each class an average student will get an additional 30 minute of daily exercise, half of the daily recommended amount.

The Importance of Physical Activity

Before teaching students about physical fitness I believe it is important for the students to have a purpose, that is, to understand why physical fitness is an important concept. I would begin listing three statements on the chalkboard. As a class we would read and discuss the first statement. According to the Eric Clearinghouse on teaching and teacher education, ". . .regular physical activity has significant health benefits, and even modest increases in energy expenditure can have health enhancing effects. . ."5 We would need to define what words such as modest and expenditure means, but then a discussion on what health benefits they believe would result from increased exercise and make connections to self about what effects that they have experienced. A discussion on how they will be participating in increasing their physical activity both in-schools, through the ABC for Fitness Program, and at home will occur. Students will record their increases in their journal. Students will participate in increasing their physical activity both in school, through the ABC for Fitness program, and at home and record their increases in their journal. A significant focus needs to be put on physical activity because most fifth grade students do not consciously incorporate it into their day.

The second statement listed on the board will read: As access to technology increases students are spending more time using computers, playing video games, and watching television and less time participating in

physical activity.6 According to the Kaiser Family Foundation, the average family spends 5 ½ hours on all media combined.7 As a result, obesity is on the rise and children are not building a healthy foundation. Students will discuss this statement in their small groups and report to the class. I will add that habitually incorporating physical activity into a daily schedule at a young age could continue into adulthood. The final statement reads, "Studies have also shown that physical activity can benefit a person physically, emotionally, and mentally." Students will discuss the meaning of each key word, physically, emotionally, and mentally. Students will classify their predictions and suggestions from the first statement into one of each of the categories listed above. This list can be added to as learning takes place.

The Benefits of Physical Activity

It is widely accepted by researchers and scientists alike that exercise has numerous benefits in childhood and adulthood. According to Katz, physical activity in both adults and children can reduce stress, stimulate brain activity, and help in concentration.8 While there is still a lot of information that needs to be discovered due to the complexities of the brain, researchers are currently developing and executing new studies to determine the effects that exercise has on the brain. According to the American Psychological Association some researchers have found evidence to suggest that exercise positively stimulates the hippocampus, the part of the brain that controls learning and memory. The Society of Neuroscience reported on a study in which researchers found that adult mice doubled their number of new brain cells in the hippocampus when they had access to running wheels.9

Another study compared the effects of anti-depressants to exercise. They found that "unforced exercise provided more benefits than either impramine (an anti-depressant) or forced exercise."9 Exercise was found to increases the release of norepinephrine activating the body's stress response. After learning this materials students will write in their journal about how these findings could affect them academically.9

Not only does physical activity help students academically but can also reduce the risk of hypertension, type 2 diabetes, high blood lipids, cardiovascular disease, lower risk of cancer, increase bone density, obesity,10 develop stronger muscles and bones, develop a leaner body, lower blood pressure, and cholesterol.8 To address the fact that most of the words stated above (students will not know the meaning of). I will have students participate in an internet scavenger hunt using student friendly search engines to determine the meaning of each words. Students compare their finding with another group. While in small groups comparing their findings, students will be asked to determine why this is important information for both children and adults to know.

The Effects of Inactivity

The effects of inactivity will be covered more specifically in the students' language arts class with the unit entitled, *Adolescent Obesity and Susceptibility to Disease.* However an overview will be provided to students in this unit. Type 2 diabetes and obesity are both effects of inactivity and are on the rise. Over 85% of the over 20.8 million people who over weight suffer from diabetes.7 Students will report to me what they have learned

in their language arts class about type 2 diabetes and its connection to physical activity.

Acceptable Exercise

The age of a child determines the amount of total daily physical activity a child should participate in. According to the National Association for Sports and Physical Education, school age children should have a minimum daily activity of 1 hour or more that is broken up into bouts of 15 minutes or more.7 They also state that students should not be sedentary for more than 2 hours. In a classroom setting this can be difficult but can be addressed and remedied by using the recommended ABC for Fitness daily before each class.

Students should focus on the three elements of fitness: endurance, strength, and flexibility. By differentiating activities students can be sure to address all three. After learning and recording information about the three elements of exercise students will classify the type of exercise they do in their health journals.7 Students will begin by running in place for 3 minutes. Upon completion I will ask for students to vote on which of the three elements that they think running should be classified as. I will explain that endurance is an aerobic activity, that is, an activity needing additional air. When the heart beats faster and a person breathes harder over a period of time they are increasing their endurance strengthening the heart and improving oxidization of cells (as discussed in language arts class). Students will make a list of endurance building activities, such as jogging, basketball, swimming, etc.

Students will do ten push ups or sit-ups. Upon completion students will decide which of the remaining two elements the activity is. Strength will be discussed and how it can build muscle. With only one element remaining, students will reach to the ceiling and touch their toes and roll their head in a circle. I will discuss the meaning of flexibility, such as allowing the joints and bones to extend in a full range of motion. In pairs students will create their own exercise and have the class announce whether it is an example of endurance, strength, or flexibility. Also determine an activity, such as gymnastics, basketball, or create their own that includes all three forms of physical activity.

How the Body Supports Physical Activity

Students will enhance their understanding of fitness by focusing on the body systems that support physical activity. The system addressed will include the skeletal system, the muscular system, and the respiratory system. The cardiovascular system will be addressed in languages arts class, see unit entitled *Adolescent Obesity and Susceptibility to Disease.* Students will continue to record their notes, questions, diagrams, and information in their journal.

Skeletal System

Often people overlook the importance of exercise for bone health. Bone health is important to prevent fractures, breaks, and eventually osteoporosis. The goal of this section is for students to understand the

structure of the skeletal system, why a dense bone is a healthy bone, and what exercise strengthens bones. Students will be asked if the have ever fractured or broken a bone. We will discuss their stories and the commonalities. I will inform the students that when they are born they have 300 bones in their body. When they are young, their bones are made mostly of cartilage, a soft, flexible material. By the age of 25, some bones fuse together resulting in 206 bones. Calcium and exercise with help harden the bones and facilitate this process.11

Students will learn that, "like muscle, bone is a living tissue that responds to exercise by becoming stronger."12 Bones will grow and change with your body. To build stronger bones it is necessary to participate in weight-bearing exercise. Weight bearing exercise supports your weight or lifts weights.13 This type of exercise includes lifting weights, walking, dancing, tennis, and skiing. Weight bearing exercise not only strengthens bones, but also contributes to weight loss and increasing blood flow. A diet rich in calcium is also imperative to building strong and healthy bones.14 While athletics such as swimming and skiing have many health benefits, they will not improve bone health, for they do not require supporting body weight or lifting weights. According to the American Journal of Public Health, 30 year old men who jog at least 9 times a month have an 8% higher bone density than men who do not, which could reduce their risk of fractures and breaks.15

While some students might take on a challenge of trying to learn the names of all the bones in the body, my goal is to introduce the name and location of twenty bones in the body. A blank diagram of the body will be distributed. I will begin by naming the bones that I think students will know, such as the ribs, spine, and skull (cranium), and have them label it on their diagram. Some of the students may know less common ones such as the sternum, vertebra, or pelvis. Finally I will provide the location of the remaining bones: mandible, clavicle, humorous, radius, ulna, carpals, metacarpals, phalanges (in hand), femur, patella, tibia, fibula, tarsals, metatarsals, and the phalanges (in foot).

Once students have identified all the bones all the bones we will play a game of "Simon Says" where students will point to or move a specific bone. Not only does "Simon Says" provide a fun way to practice educational material, but also allows students to be active. Once students have become acclimated with the material, I will have them play "Simon Says" without the help of their notes.

Respiratory System

The goal for this section is for students to understand the structure of the lungs, how the lungs work, and the importance of having healthy lungs. The structure and function of the lungs will first be simulated by creating an artificial lung. Students will work in small groups while I lead them in the development of their lung and explain the process of breathing. Students will be provided materials to make an artificial lung which can be found at http://www.adprima.com/sci-respsystem.htm. (Appendix B)

Groups of four students will be provided with the necessary materials, but will begin by closing their eyes and concentrating on breathing in and out. Students will make an observation and record what is happening to their body in their journal. I will have the students make predictions of what they think is occurring to their body while breathing. We will begin the lung replica by using the straw to represent the nose and mouth. I will explain that air travels into the nose and mouth. Hairs in the nose will protect you from bacteria and dust particles. If these particles travel past the nose they will be trapped in mucus. The breath will then pass to the back of the throat to the larynx and through the trachea. The larynx is used in speaking and the trachea, which is also called the windpipe, is an air tube connecting the mouth to the lungs. This is represented by the base of the straw. Students will feel their own trachea. We will discuss that the trachea feels bumpy and that it

is made out of cartilage. The cartilage forms bumpy rings that keep the shape of the trachea.16

Students will then tape the balloon to the bottom of the straw and place it in the modified bottle. This balloon will represent the lungs which is the next step in the respiratory system. Students will breathe in and out once again to observe the chest raising. This will help students understand where the lungs are located.17

The plastic bags affixed to the bottom of the bottles represent the diaphragm. While air does not travel through the diaphragm, it is used to provide the lungs with the necessary space for air to pass. Inhalation causes the muscles to tighten pulling the chest out. The diaphragm also tightens allowing space for the lungs. Air is then able to fill the lungs. Exhalation begins when the diaphragm moves up and the rib muscles relax. Air is forced out of the lungs and out through the nose or mouth. Students will replicate this process with their team's respiratory model.17

Students will then take a closer look at the gas exchange that takes place inside the lungs. As air enters the trachea it splits off into either of the lungs. Inside the lungs are bronchial tubes that branch out into even smaller tubes. I will show an example of a tiny tree branch so students can compare this to the bronchial tubes. The branches lead to the millions of alveoli which are 1/10 of a millimeter. On the most basic level, the alveoli, or air sacs, transfer the air inhaled into the blood. Each individual aveolus has thin walls that lead to the body's blood vessels. Oxygen inhaled is picked up by the blood and carried into the blood stream. Carbon dioxide is exchanged in the air sacs and exhaled travels back through the lungs, trachea, larynx, and then out the nose or mouth. Students will draw diagrams in their journal and describe what occurs. Students will also write a first person narrative as if they were a breath of fresh air passing in and out of the lungs.17

Students will also create a life-size diagram of their respiratory system. Using the overhead projector students will trace their silhouette onto a large white piece of paper then cut it out. Next, students will draw a diagram of the respiratory system on the silhouette, labeling and describing the function of the parts. This project can also be done for another body system, for example black paper with white chalk can be used for the skeletal system.

While one of the unit goals in not about smoking, this is a good time to discuss with students how smoking can effect their ability to participate in physical activities. First students will discuss what they know about the effects of smoking. I will then show the students the list of ingredients that is approved for cigarettes, from the website http://quitsmoking.about.com/cs/nicotineinhaler/a/cigingredients.htm. After what I am sure will be a very interesting discussion I will provide small groups with different reports on how smoking effects physical activity. Students will create a no smoking poster displaying what they have learned from their particular article. The students will report their findings to the class.

Articles about smoking connected to physical activity:

http://www.actcancer.org/Resources/smoking_and_fitness.pdf
http://www.clevelandclinic.org/health/health-info/docs/2900/2942.asp?index=10643
http://www.free-online-health.com/smoking-health.htm
http://www.thedietchannel.com/Why-Smoking-And-Exercise-Dont-Mix.htm

Upon completion students will work together to create a definition for the respiratory system. Students will draw a diagram of the lungs and label it main parts or fold a piece of paper in half and draw a tree with branches on one side and the alveoli on the other side to present a visual representation between the two.. Early finishers will do research on hiccupping, burping, smoking, and coughing.

Muscular System

Teaching about the muscular system begins with asking the students to do three jumping jacks, turn in place, blink your eyes, and smile. I will ask the students, "What is one thing you need to have in order to be able to do all those things?" The 630 muscles in the body all work together to make these actions possible. The muscular system primary function is the contraction of muscle fibers. Most of the body's movement and 85% of its heat are generated from muscle contraction. Because 40% of our weight is muscle, students will determine how much of their actual weight is muscle. For example, if a students weights 85 pounds they will multiply 85 x 40% (or .40) to determine that 34 pounds of their weight is all muscle.17

The students will then view a power point presentation of clip art images, real life photos, and scientific photos of muscles. I will begin with a little humor by showing students a clip art picture of a body builder. After a number of photos (from the websites listed below) students will complete a tree diagram. This diagram will be used as a graphic organizer for students to focus on key words and guide them on how to organize their information. The first tier of the tree simply states muscle. As a class using the LCD projector we will research the definition of a muscle. We will compile information from a few different sites to create what they think is the most accurate information. My intention is for it to state: Muscles are masses of tough, elastic tissue that pull our bodies and joints allowing us to move. The next tier of the graphic organizer is voluntary and involuntary muscle. Under involuntary reads smooth and cardiac muscle and under voluntary reads skeletal muscle. Students will also have to provide an example for each. Students can work independently or in pairs to research the information needed to complete the graphic organizer using designated internet sites. Once the information is completed students will report their data and once a full explanation is given I will show a picture of the muscle on the LCD projector.

Power Point Websites:

http://www.musclehelp.com/initiatives/education/musclesedu
http://www.sport-fitness-advisor.com/muscle-anatomy.html
www.yorku.ca/earmstro/journey/images/facial.gif
http://www.mayoclinicproceedings.com/inside.asp?AID=2564&UID=
www.cytochemistry.net/.../muscle/muscle12.jpg
images.encarta.msn.com/.../pho/t790/T790539A.jpg

Vocabulary: Your body's major muscles

Students will be provided with a blank diagram of the human body and asked to label the body's major muscles using the clues below:

Frontalis - One of the thirty muscles in your face that help you create expressions, such as smiling and frowning.

Deltoid - Throwing a baseball? You will need you will need this muscle which is located in your shoulder.

Pectorialis - Remember when we saw the picture of the body builder and he had a large chest. This is because he has very defined pectorial muscles, sometimes referred to as "pecs".

Bicep - Showing off your arm muscles? This is your bicep which is defined when you contract the muscle in the arm.

Triceps - On the back of the arm is the tricep muscle, which can also be contracted.

Abdominal - Strong stomach from doing all those sit-ups. Your abdominals, or "abs", are your stomach muscles.

Gluteus Maximus - You are sitting on it. While your rear end stores fat, underneath you can find this muscle.

Quadriceps - Strong legs? Runners often have strong "quads" that can be felt when flexing your legs.

Internet research options:

http://vilenski.org/science/humanbody/hb_html/muscles.html
http://www.imcpl.org/kids/guides/health/muscularsystem.html
http://yucky.discovery.com/flash/body/pg000123.html
http://www.kidshealth.org/kid/body/muscles_noSW.html
http://training.seer.cancer.gov/module_anatomy/unit4_3_muscle_types.html

Students are fascinated by the human body and teachers can use their innate interest as a vehicle to teach about a healthier lifestyle. Hopefully, their interest will transpire to their parents, siblings, and families as they will share what they have leaned about the muscular system in a letter to an adult. The letter will be to their parent or guardian about the function of a muscle how exercise builds muscles, and will include a picture.

Solutions

Upon completion of the unit students will hopefully understand the severity of the issue at hand, as well as become intrigued by it. I hope to use their interest to begin constructing solutions. Throughout this unit students will be encouraged to document solutions they theorize. As a class students will report their ideas by listing them in three separate categories: solutions for students, solutions for parents, and solutions for teachers. I would begin by putting one suggestion on each list to encourage involvement. Some ideas are listed below.

Solutions for Students:

1 Play outdoors every day!
2 Join a sports team. Have good sportsmanship; don't discourage others from playing by being negative.
3 Take your pet, sibling, or parent for a walk.
4 Encourage recess as a classroom reward.

Solutions for Parents:

1 Help your children get involved in an age appropriate physical activity.8
2 Remember, for children, physical activity is normal.1
3 Create a regular schedule for physical activities.
4 Model healthy behaviors by including exercise into your life everyday.
5 Use various forms of activities so everyone does not get bored.
6 Include your whole family in outdoor games.
7 Play!

Solutions for Teachers:

1 Include physical activity into your lesson plans as much as possible. For example, outdoor

review - students can listen to a question and in order to be the first to answer they have to race to a certain spot.
2 Discuss with students your physical routine.
3 Add physical activity to your daily movements. For example, multiplication jumping jacks.
4 Be a physically active role model.

After students have written their suggestions on the board, we will review them as a class to edit for spelling and clarity. The students will be split into three groups. Each group will be responsible for one category of solutions. Each group must create a final project as a whole group or in smaller sub-groups to meet the goal of educating their particular population on solutions to the nationwide health problem. Students have the option to create posters, create a newsletter, create flyers, or create a video. This video can be played on the school televisions or at the health fair.

The project will begin by students creating a name for their team, for example, The Council for Healthy Teachers. Next the students will determine which project they are going to complete, if they will do it as a whole group or as individual groups, and begin planning their project. Because Betsy Ross is a magnet school some students travel over an hour to attend. As a result, many of the students would be unable to meet outside of school hours. So students will work in school on their project. The students must plan their project, and then it must be approved by me. Once the project has been approved students may begin working. A rubric will be provided to the students in the planning stage to encourage that all expectations are met.

1 Does the project meet the goal? Goal: Educate _____ on possible solutions to unhealthy behaviors of children. (30 pts)
2 Students offer multiple solutions. (15pts)
3 Students work as a whole group to not replicate solutions. (15pts)
4 All students participate in the project in a positive manner. (15 pts)
5 Final project is both creative and professional. (15pts)

Appendix A

School-Wide Health Fair

The school health fair will be a one day event in which the students present their information in an interactive format, as well as display their information on a poster board. The students will chose from the following topics:

Why should there be recess?

Why should you exercise?

What are the effects of no exercise?

What are the elements of exercise?

How does the skeletal system support physical activity?

How does the muscular system support physical activity?

How does the respiratory system support physical activity?

How can families contribute to the solution?

How can parents contribute to the solution?

How can students contribute to the solution?

Other topics may be suggested.

Appendix B

I. Content: The respiratory system is one of many working systems in the human body and is composed of various parts and organs, each with its own function.

II. Instructional Objective: Given an unlabeled diagram of the respiratory system, the student will:

1. Label parts of the human respiratory system to include the trachea, bronchi, lungs, thoracic cavity, and diaphragm.

2. Explain the function of the diaphragm in respiration in a paragraph of no less than 4 complete sentences to include the terms "expand", "contract", "inhale", and "exhale" as they relate to the diaphragm and the lungs during respiration.

III. Prerequisite: Students should be able to explain that the human body contains many "systems" that carry out unique functions necessary to sustain life, that the respiratory system is one of them, and that its function is that of breathing.

IV. Instructional Procedure:

Step 1. Teacher presents model or transparency of the human respiratory system and explains that it is just one of many working systems in the human body.
Step 2. Follow the route of air as it enters and travels through the respiratory system, naming the parts and organs as well as their functions as the air passes through them. For example, teacher points to the trachea, names it, and says, "The trachea serves as the principal passage for conveying air to and from the lungs. Branching out from the trachea are the bronchi, which serve to carry the air to and from the individual lungs."
Step 3. Once the route of air is sufficiently traced and parts are named and defined, teacher recaps by retracing the route from start to finish uninterrupted.
Step 4. Once again, teacher points to parts and calls on individual students to name each part as the route is traced. Each time a part is named, teacher writes name on board.
Step 5. Teacher explains that students will now make their own models of the respiratory system and materials are distributed. Teacher may opt to display a previously made model as an example to which students may refer.
Step 6. Insert straws into balloons and tape together at top. These are bronchi and lungs.
Step 7. Insert these through open bottom of modified 2-liter soda bottle straw end first and bring ends of straws up through the neck of the bottle.
Step 8. Stuff neck of soda bottle with cotton balls around straws until spaces are plugged.
Step 9. Roll construction paper into a tube just round enough to fit over the tops of the straws. Tape closed and place over tops of two straws. This will be the trachea.
Step 10. Place plastic bag over bottom end of bottle and use the rubber band to hold it in place. This will serve as the diaphragm.
Step 11. Grasp bottom of plastic bag and pull down and push up. Watch as the "lungs" expand and contract as you do this. Students may even bend "trachea" and "bronchi" over so that the air supply is cut off and watch as nothing happens when the "diaphragm" is manipulated.

V. Materials: (specified colors are optional)

overhead transparency or plastic model of the human respiratory system

6"x 4.5" (¼ sheet) piece of pink or gray construction paper (trachea)

plastic 2-liter soda bottle with black bottom cut off (thoracic cavity)

two round 9" or 12" pink balloons (lungs)

two drinking straws (bronchi)

medium-sized plastic bag large enough to fit over bottom end of bottle (diaphragm)

3 or 4 cotton balls

transparent tape

medium-size, thin rubber band

Notes

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1 http://www.cdc.gov/HealthyYouth /PhysicalActivity.html

2 http://www.glencoe.com/sec/teachingtoday/subject/finding_science.phtml

3 http://www.fi.edu/brain/exercise.htm#physicalexercise

4 http://nootropics.com/exercise/index.html

5 http://www.kidsource.com/kidsource/content4/promote.phyed.html.

6 www.dhhs.yas.gov.au/healthyliving/exercise/exforchild.php.

7 www.kidshealth.org/parent/nutrition_fit/fitness/exercise.html

8 http://www.davidkatzmd.com/abcforfitness.aspx.

9 http://serendip.brynmawr.edu/bb/neuro/neuro02/web1/rroth.html

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