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The Little Engines That Can!

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Introduction

Wally Piper's *The Little Engine That Could* is one of the greatest tales of motivation and the power of positive thinking ever told. In this well-loved classic, a little train carrying toys to all of the good boys and girls is confronted with a towering, seemingly impassable mountain. This hard work does not go unrewarded, for the Little Engine does achieve its goal. My unit reaches out to students in this same positive way, first empowering them with knowledge of their bodies and biological systems and then positioning them as engineers who direct the movements their bodies make. Just as the Little Blue Engine's mantra "I think I can--I think I can" keeps him going, my second graders will "know they can!"

The human body are organs intricately connected and functioning in unison and harmony. The organs are made of even smaller units we call "cells". The cell is made from even smaller units called molecules and the molecules are made from the tiniest of all substances we call atoms and the breakdown into even smaller and smaller features continues from there and it does not cease till we are no longer able to observe those individual units. Thus, in a way, the smallest of all engines that we can observe, "the atom," manages to do some amazing things by working cooperatively and in unison with other atoms to build larger structures. So these little engines can and do by following the principles of cooperative behavior and it is a critical element that I would like to demonstrate in this unit through objective lessons and activities.

Rationale

Edgewood School is an arts-integrated magnet school with a focus on providing a positive learning environment that encourages inquiry, self-discovery, and independent thinking. This approach to learning inherently allows, supports and encourages cross-curricular teaching and embraces all types of learners. Our neighborhood/magnet school setting is a rewarding environment, with students coming to school each day from a variety of home circumstances and with differences in academic levels. As a result of these variables, the children have differing levels of background knowledge and life experiences. Reaching students through inquiry and discovery opens doors and minds to learning opportunities.

Concepts/Content

Our students are fortunate that New Haven Public Schools had mandated recess in our district. Each school day students from pre-school through eighth grade must have 20 minutes of physical activity in addition to Physical Education class. This additional time for focus on health and exercise will allow me to incorporate my curriculum unit seamlessly into our day. Many school days have inclement weather but students still need opportunities to be active during the day. This unit will help offer variety and fun as students learn physics and engineering through their own actions.

This curriculum unit integrates science and physical activity and blends with a current district requirement for second grade – *The Michigan Model for Health* . I intend to use my curriculum unit to introduce students to the basic structures and functions of the human body and how they relate to personal health. The instructional objectives are: students will learn the major organs in the body and their function; students will learn the major systems of the body; students will learn behaviors that will help protect the body structure. Students will learn that these systems work as a team to support each other to keep our bodies healthy and strong. Specifically, this unit will touch on the circulatory, digestive, immune and musculoskeletal systems to provide a framework for understanding that what we do with our body matters. The culmination of the unit includes projects on our human biology as well as a focus on specific physical activity to take place throughout the school year, using yoga, calisthenics, and aerobics to demonstrate some of the physics of the human body.

Biology Fundamentals

Circulation and the Heart (Pumps and Fluid flow)

The heart and circulatory system, called thecardiovascular system, make up the network that delivers blood to the body's tissues. With each heartbeat, blood is sent throughout our bodies, carrying oxygen and nutrients to all of our cells.

Every day the approximately 10 pints (5 liters) of blood in your body travel many times through about 60,000 miles (96,560 kilometers) of blood vessels that branch and cross, linking the cells of our organs and body parts. From the hard-working heart, to our thickest arteries, to capillaries so thin that they can only be seen through a microscope, the cardiovascular system is our body's lifeline.

The circulatory system is composed of the heart and blood vessels, including arteries, veins, and capillaries. Our bodies actually have two circulatory systems: the pulmonary circulation is a short loop from the heart to the lungs and back again, and the systemic circulation (the system we usually think of as our circulatory system) sends blood from the heart to all the other parts of our bodies and back again.

The Heart

The heart is the key organ in the circulatory system. As a hollow, muscular pump, its main function is to push blood throughout the body. It usually beats from 60 to 100 times per minute, but can go much faster when necessary. It beats about 100,000 times a day, more than 30 million times per year, and about 2.5 billion

times in a 70-year lifetime.

The heart gets messages from the body that tells it when to pump more or less blood depending on a person's needs. When we're sleeping, it pumps just enough to provide for the lower amounts of oxygen needed by our bodies at rest. When we're exercising or frightened, the heart pumps faster to get more oxygen to our bodies. Oxygen is carried by proteins called hemoglobin in the blood and give the blood its red color. These transport the oxygen to all parts of the body. When something goes wrong with these or when we lose blood we are unable to distribute the oxygen effectively.

The heart has four chambers that are enclosed by thick, muscular walls. It is positioned between the lungs and just to the left of the middle of the chest cavity. The bottom part of the heart is divided into two chambers called the right and left ventricles, which pump blood out of the heart. The upper part of the heart is made up of the other two chambers of the heart, the right and left atria, receive the blood entering the heart.

The Role of Blood Vessels

Blood vessels carrying blood away from the heart are calledarteries. They are the thickest blood vessels, with muscular walls that contract to keep the blood moving away from the heart and through the body. In the systemic circulation, oxygen-rich blood is pumped from the heart into the aorta. This large artery curves up and back from the left ventricle, then heads down in front of the spinal column into the abdomen.Two coronary arteries branch off at the beginning of the aorta and divide into a network of smaller arteries that provide oxygen and nourishment to the muscles of the heart.

Unlike the aorta, the body's other main artery, the pulmonary artery, carries oxygen-poor blood. From the right ventricle, the pulmonary artery divides into right and left branches, on the way to the lungs where blood picks up oxygen.

Arterial walls are composed of three layers: the endothelium is on the inside and provides a smooth lining for blood to flow over as it moves through the artery; the media is the middle part of the artery, made up of a layer of muscle and elastic tissue; the adventitia is the tough covering that protects the outside of the artery. As they get farther from the heart, the arteries branch out into arterioles, which are smaller and less flexible.

Blood vessels that carry blood back to the heart are called veins. They are not as muscular as arteries, but they contain valves that prevent blood from flowing backward. Veins have the same three layers that arteries do, but they are thinner and less flexible. The two largest veins are the superior and inferior vena cavae. The terms superior and inferior do not mean that one vein is better than the other, but that they are located above (superior) and below (inferior) the heart.

A network of tiny capillaries connects the arteries and veins. Even though they are tiny, the capillaries are one of the most important parts of the circulatory system because it is through them that nutrients and oxygen are delivered to the cells. In addition, waste products such as carbon dioxide are also removed by the capillaries. [1]

Musculoskeletal System (bridges and levers)

Every time you walk, sit into a chair, or pick up your cat, you are using your bones, muscles, and joints. All of these important body parts in collaboration allow us to stand, walk, run, exercise or just sit down.

Bones and What They Do

From our head to our toes, bones provide support for our bodies and help form our shape. The skull protects the brain and forms the shape of our face. The spinal cord is a passageway for messages between the brain and the body and protected by the backbone, or spinal column.

The ribs form a cage that shelters the heart, lungs, liver, and spleen, and the pelvis helps protect the bladder, intestines, and in women, the reproductive organs. Although they are very light, bones are strong enough to support our entire weight. The human skeleton has 206 bones, which begin to develop before birth. When the skeleton first forms, it is made of flexible cartilage, but within a few weeks it begins the process of ossification. Ossification is when the cartilage is replaced by hard deposits of calcium phosphate and stretchy collagen, the two main components of bone. It takes about 20 years for this process to be completed.

The bones of children are smaller than those of adults and contain "growing zones" called growth plates. These plates consist of columns of multiplying cartilage cells that grow in length, and then change into hard, mineralized bone. Because girls mature at an earlier age than boys, this process is completed at an earlier age. [2]

Growing Bones

Bone-building continues throughout life, as the body constantly renews and reshapes the bones' living tissue. Bone contains three types of cells: osteoblasts, which make new bone and help repair damage; osteocytes, mature bone cells which help continue new born formation; and osteoclasts, which break down bone and help to sculpt and shape it. Osteoclasts are very active in kids and teens, working on bone as it is remodeled during growth. They also play an important role in the repair of fractures.

Bones are made up of calcium, phosphorus, sodium, and other minerals, as well as the protein collagen. Calcium is needed to make bones hard, which allows them to support body weight. Bones also store calcium and release some into the bloodstream when it's needed by other parts of the body. The amount of certain vitamins and minerals that you eat, especially vitamin D and calcium, directly affects how much calcium is stored in the bones.

The soft bone marrow inside many of the bones is where most of the blood cells are made. The bone marrow contains stem cells, which produce the body's red blood cells and platelets, and some types of white blood cells. Red blood cells carry oxygen to the body's tissues, and platelets help with blood clotting when someone has a cut or wound. White blood cells help the body fight infection.

Bones are made up of two types of bone tissues: compact bone is the solid, hard, outside part of the bone. This type of bone makes up the most of the human skeleton. It looks like ivory and is extremely strong. Holes and channels run through it, carrying blood vessels and nerves from the periosteum, the bone's outer membrane covering; cancellous bone, which looks like a sponge, is inside the compact bone. It is made up of a mesh-like network of tiny pieces of bone called trabeculae. This is where red and white blood cells are formed in the marrow.

Bones are fastened to other bones by long, fibrous straps called ligaments. Cartilage, a flexible, rubbery substance in our joints, supports bones and protects them where they rub against each other.

Muscles and What They Do

Bones don't work alone — they need help from the muscles and joints. Muscles pull on the joints, allowing us

to move. They also help your body perform other functions so we can grow and remain strong, such as chewing food and then moving it through the digestive system.

The human body has more than 650 muscles, which make up half of a person's body weight. They are connected to bones by tough, cord-like tissues called tendons, which allow the muscles to pull on bones. If you wiggle your fingers, you can see the tendons on the back of your hand move as they do their work.

Humans have three different kinds of muscle:

Skeletal muscle is attached to bone, mostly in the legs, arms, abdomen, chest, neck, and face. Skeletal muscles are called striated because they are made up of fibers that have horizontal stripes when viewed under a microscope. These muscles hold the skeleton together, give the body shape, and help it with everyday movements (known as voluntary muscles because you can control their movement). They can contract (shorten or tighten) quickly and powerfully, but they tire easily and have to rest between workouts.

Smooth, or involuntary, muscle is also made of fibers, but this type of muscle looks smooth, not striated. Generally, we can't consciously control our smooth muscles; rather, they are controlled by the nervous system automatically, the reason they are called involuntary. Examples of smooth muscles are the walls of the stomach and intestines, which help break up food and move it through the digestive system. Smooth muscle is also found in the walls of blood vessels, where it squeezes the stream of blood flowing through the vessels to help maintain blood pressure. Smooth muscles take longer to contract than skeletal muscles do, but they can stay contracted for a long time because they don't tire easily.

Cardiac muscle is found in the heart. The walls of the heart's chambers are composed almost entirely of muscle fibers. Cardiac muscle is also an involuntary type of muscle. Its rhythmic, powerful contractions force blood out of the heart as it beats.

Our Nonstop Muscles

Even as we sit perfectly still, muscles throughout our bodies are constantly moving. Muscles enable the heart to beat, the chest to rise and fall during breathing, and blood vessels to help regulate the pressure and flow of blood through the body. When we smile and talk, muscles help us communicate, and when we exercise, they help us stay physically fit and healthy.

The movements our muscles make are coordinated and controlled by the brain and nervous system. The involuntary muscles are controlled by structures deep within the brain and the upper part of the spinal cord called the brain stem. The voluntary muscles are regulated by the parts of the brain known as the cerebral motor cortex and the cerebellum.

When we decide to move, the motor cortex sends an electrical signal through the spinal cord and peripheral nerves to the muscles, causing them to contract. The motor cortex on the right side of the brain controls the muscles on the left side of the body and vice versa.

The cerebellum coordinates the muscle movements ordered by the motor cortex. Sensors in the muscles and joints send messages back through peripheral nerves to tell the cerebellum and other parts of the brain where and how the arm or leg is moving and what position it is in. This feedback results in smooth, coordinated motion. If you want to lift your arm, your brain will send a message to the muscles in your arm and you then move it. When you run, the messages to the brain are more involved, because many muscles have to work

together in rhythm.

Muscles move body parts by contracting and then relaxing. Muscles can pull bones, but they can't push them back to the original position so they work in pairs of flexors and extensors. The flexor contracts to bend a limb at a joint. When the movement is completed, the flexor relaxes and the extensor contracts to extend or straighten the limb at the same joint. For example, the biceps muscle, in the front of the upper arm, is a flexor, and the triceps, at the back of the upper arm, is an extensor. When you bend at your elbow, the bicep contracts. Then the biceps relaxes and the triceps contracts to straighten the elbow.

Joints and What They Do

Joints occur where two bones meet. They make the skeleton flexible — without them, movement would be impossible. Joints allow our bodies to move in many ways. Some joints open and close like a hinge (such as knees and elbows), whereas others allow for more complicated movement — a shoulder or hip joint, for example, allows for backward, forward, sideways, and rotating movement.

Joints are classified by their range of movement. Immovable, or fibrous, joints don't move. The dome of the skull, for example, is made of bony plates, which must be immovable to protect the brain. Between the edges of these plates are links, or joints, of fibrous tissue. Fibrous joints also hold the teeth in the jawbone.

Partially movable, or cartilaginous, joints move a little. They are linked by cartilage, as in the spine. Each of the vertebrae in the spine moves in relation to the one above and below it, and together these movements give the spine its flexibility.

Freely movable, or synovial, joints move in many directions. The main joints of the body — found at the hip, shoulders, elbows, knees, wrists, and ankles — are freely movable. They are filled with synovial fluid, which acts as a lubricant to help the joints move easily. Three kinds of freely movable joints play a big part in voluntary movement:

hinge joints allow movement in one direction, as seen in the knees and elbows; pivot joints allow a rotating or twisting motion, like that of the head moving from side to side; ball-and-socket joints allow the greatest freedom of movement. The hips and shoulders have this type of joint, in which the round end of a long bone fits into the hollow of another bone. [3]

Immune System (The defense system: army navy marines)

The immune system, which is made up of special cells, proteins, tissues, and organs, defends people against germs and microorganisms every day. Generally, the immune system does a great job of keeping people healthy and preventing infections, but sometimes there are problems with the immune system that can lead to illness and infection. [4]

The immune system is the body's defense against infectious organisms and other invaders. Through a series of steps called the immune response, the immune system attacks organisms and substances that invade body systems and cause disease.

The immune system is made up of a network of cells, tissues, and organs that work together to protect the body. The cells involved are white blood cells, or leukocytes, which come in two basic types that come together to seek out and destroy disease-causing organisms or substances.

Leukocytes are produced or stored in many locations in the body, including the thymus, spleen, and bone marrow. For this reason, they're called the lymphoid organs. There are also clumps of lymphoid tissue throughout the body, primarily as lymph nodes, that house the leukocytes. The leukocytes circulate through the body between the organs and nodes via lymphatic vessels and blood vessels. In this way, the immune system works in a coordinated manner to monitor the body for germs or substances that might cause problems.

The two basic types of leukocytes are: phagocytes, cells that chew up invading organisms; and lymphocytes, cells that allow the body to remember and recognize previous invaders and help the body destroy them. A number of different cells are considered phagocytes. The most common type is the neutrophil, which primarily fights bacteria. If doctors are worried about a bacterial infection, they might order a blood test to see if a patient has an increased number of neutrophils triggered by the infection. Other types of phagocytes have their own jobs to make sure that the body responds appropriately to a specific type of invader.

The two kinds of lymphocytes are B lymphocytes and T lymphocytes. Lymphocytes start out in the bone marrow and either stay there and mature into B cells, or they leave for the thymus gland, where they mature into T cells. B lymphocytes and T lymphocytes have separate functions: B lymphocytes are like the body's military intelligence system, seeking out their targets and sending defenses to lock onto them. T cells are like the soldiers, destroying the invaders that the intelligence system has identified. [5]

When antigens, foreign substances that invade the body, are detected, several types of cells work together to recognize them and respond to them. These cells trigger the B lymphocytes to produce antibodies, specialized proteins that lock onto specific antigens.

Once produced, these antibodies continue to exist in a person's body, so that if the same antigen is presented to the immune system again, the antibodies are already there to do their job. So if someone gets sick with a certain disease, like chickenpox, that person typically doesn't get sick from it again. [6]

This is how immunizations prevent certain diseases. An immunization introduces the body to an antigen in a way that doesn't make someone sick, but does allow the body to produce antibodies that will then protect the person from future attack by the germ or substance that produces that particular disease.

Although antibodies can recognize an antigen and lock onto it, they are not capable of destroying it without help. That's the job of the T cells, which are part of the system that destroys antigens that have been tagged by antibodies or cells that have been infected or somehow changed. Some T cells are actually called "killer cells." T cells also are involved in helping signal other cells, like phagocytes, to do their jobs. [7]

Antibodies also can neutralize toxins (poisonous or damaging substances) produced by different organisms. Lastly, antibodies can activate a group of proteins, called complement, that are also part of the immune system. Complement assists in killing bacteria, viruses, or infected cells. All of these specialized cells and parts of the immune system offer the body protection against disease. This protection is called immunity. [8]

Proteins and Enzymes (cars and engines)

At any given moment, all of the work being done inside any cell is being done by enzymes or proteins. Enzymes have extremely interesting properties that make them little chemical-reaction machines. The purpose of an enzyme in a cell is to allow the cell to carry out chemical reactions very quickly. They do this by bringing two molecules that need to react in very close proximity so they shorten the time it takes for two or

more reactants to find each other and form a product. Enzymes are therefore catalysts of change in the body which is why they are extremely important. These reactions allow the cell to build things or take things apart as needed. This is how a cell grows and reproduces. At the most basic level, a cell is really a little container full of chemical reactions that are made possible by enzymes.

Enzymes are made from amino acids, and they are proteins. When an enzyme is formed, it is made by stringing together between 100 and 1,000 amino acids in a very specific and unique order. The chain of amino acids then folds into a unique shape. That shape allows the enzyme to carry out specific chemical reactions -- an enzyme acts as a very efficient catalyst for a specific chemical reaction. The enzyme speeds that reaction up tremendously. [9]

Engineering and Movement

Yoga

Yoga has been around for thousands of years. Yoga is a practice that started in India and is now very popular in the United States and around the world. The work yoga means *union* in Sanskrit, the ancient language of India. Quite simply, yoga is the *union* , or coming together of mind (thoughts and feelings) and physical body. Many people feel an overall sense of well-being when they practice yoga.

There are many aspects to yoga. In short, yoga is a system of physical exercises or postures called asanas. These asanas build strength, flexibility and confidence. Yoga is also about breathing, called pranayama, which helps calm and refresh the body and mind. [10]

The practice of yoga often include a spiritual or religious connection. For the purposes of this unit, yoga will be experienced only as physical exercise to benefit the body and to experience fun and enjoyment.

Calisthenics

Calisthenics are a form of exercise that increases body strength and flexibility using your own body weight for resistance, with movements such as bending, jumping, swinging, twisting. The word Calisthenics comes from the ancient Greek *kallos* , which means beauty, and *sthenos* meaning strength. Some of the more common calisthenic exercises include lunges, jumping jacks, sit-ups, push-ups, pull-ups and squats. [11]

Aerobic Exercise

Aerobic exercise is movement that gets the blood pumping faster around the whole body. It makes the heart beat faster and requires the lungs take in more oxygen, causing a faster rate of breathing during the exercise. The U.S. Department of Health and Human Services recommends that children get 60 minutes or more of physical activity each day. They advise that aerobic activity should make up most of those 60 minutes. Research shows that children who exercise tend to have better heart and lung fitness, lower levels of body fat, stronger bones and muscles, fewer symptoms of depression and better chances of being healthy adults without chronic disease. [12]

Strategies/Methods

This curriculum unit will vary to reflect the learning styles of all students. Included will be:

Experiential Learning: The major strategy for this unit is to engage the students in hands-on learning. I want them to be actively participating as scientists. The biology activities will be designed to be exploratory for the students so they are engaged in the enjoyment of the process as well as the products, visuals and charts for our classroom. Certainly the physical activity component of this unit will be focused in the arena of learning.

Differentiated Instruction: The students will use a variety of approaches, working sometimes individually and sometimes in small groups, determined by the complexity of the activity. Because these are young children with variance in levels and background, guidance and pacing will need to be closely monitored, particularly moving about and learning new exercises. Students will have opportunities teach others, either as individuals or in groups, leading a class as the exercise instructor.

Cooperative Learning: The students will be given opportunities to work as cooperative groups to complete assignments and activities. This strategy will allow students to work collaboratively taking on various roles necessary to complete the work, with a focus on success for all. A culminating activity will include groups creating body system posters and demonstrating yoga stretches, strength building exercises, and endurance and aerobic movements.

Classroom Activities

The classroom activities are designed to be taught over many days. Although they are separated into specific sessions, each session may actually take several days to complete.

Session One – Unit Introduction - Read-Aloud *Me and My Amazing Body* by Joan Sweeney

This fundamental and comprehensive introductory text will prepare the students with a foundation of human anatomy vocabulary. After reading and discussing the book, create a chart that includes the new information and vocabulary for students to refer back to as they begin their work. In small groups, students will make a body tracing on large butcher paper, white and/or brown. Students can then begin to label parts of the body that they can see: head, arm, leg, knee, elbow, hand, foot, etc. These large charts are the beginning of what will become the anchor charts for reference as the students learn the systems of the body and the engineering that allows their bodies to work.

Session Two – Students will use construction paper cutouts add the skeleton and muscles to the interior of the body tracing as they start to build the engines that allow their bodies to work. Using the charts from *Me and My Amazing Body* , the students, in their groups, will cut white construction paper to the approximate size and shape of the major bones of the body. After gluing them into place on their body tracing charts, the students will add pink construction paper cutouts of the major muscles in the body. Students should pay attention to the location of major joints – hips, knees, elbows and shoulders, wrists, ankles – and label them as the construct their musculoskeletal systems.

Session Three – Yoga Poses and Practicing on the Mats

This session is the beginning of the actual physical fitness and exercise portion of the unit which will be the foundation of options during the indoor recess component of the school day. Because this is an open-ended activity, with continued learning occurring, there is no definite time frame to this session, meaning it may be repeated several times throughout the year to introduce new poses and review previously learned ones.

To prepare for the yoga lessons, students will need to have a mat, either their own from home or possibly purchased through donations from the school or parent committee. The mats stay at school and should be labeled with the students' names. Mats are helpful not only as support during exercises, but they define the space that each student has as their own, an important part of helping them maintain control.

Beginning on Page 70 of the text *Once Upon a Pose,* read the basic training section to prepare for the fundamentals for teaching the poses, including strategies for breathing and for counting while holding poses. With the idea of mastery, each session should focus on five poses at most. The initial choices are as follows: mountain, tree, child, cat, and warrior. The session will end with the peaceful pose, with students initially lying still for one minute, but ultimately building that time to as much as five minutes.

As students master the initial poses, they can begin to include any new poses from the 28 choices taught in the text. Each new pose should be learned with a partner (either of their choice or teacher choice) and then taught to two other students to ensure understanding and a beginning of expertise. During the group sessions, the students who have mastered a new pose may teach it to the group.

Keeping reference books in the classroom for students to use as they practice teaching each other and working on poses themselves will encourage correct poses but also inform students of other options they might like to try. Continue to encourage the strategies of counting through the poses and focusing on their breathing.

Session Four – Calisthenics and Aerobics Lesson

This session is intended as a review of what most students have learned in their Physical Education classes. An opening lesson for the students could be a brainstorming chart of what movements might be included in this category. Ideas they may easily come up with could be jumping jacks, sit-ups, and push-ups. As they learn more throughout this session, this chart can be enhanced and more defined, such as what parts of the body are you using for each exercise, how many times can you repeat the movements before tiring. Include the students in generating characteristics of the exercises.

This session is should include the objectives of building appropriate vocabulary, rules about spacing in the classroom, maintaining control of body and voice and doing your best. Remind students may not choose to do this as their indoor choice but it is important that they are introduced to the process and understand the rules. This will ensure everyone has equal choice.

As the students are practicing their movements, have them feel their hearts beating and notice their breathing rates. They will like notice that that these exercises are more about getting blood pumping than flexibility.

Create a Venn diagram or similarities and difference chart as students learn the movements and actions. This too will remain as reference and interactive as the unit continues, student may add new information as they

gather it.

Session Five – Work out with combination of all three exercise categories

This portion of the unit begins the gradual release of the activities to now becoming the students' choice. The goal of the last three sessions was to build knowledge and skill in the three areas of exercise. At this point, now during the recess portion of the day, the students will act as instructors and lead small groups in exercise routines as they make the decisions on poses or movements. With a 20-minute block of time, students may lead a session and "attend" a second session. Each day can be identified as the Yoga Day, the Aerobics Day or the Calisthenics Day to help with any space issues that might occur if all three are happening at once. One common activity will always be the cool down or peaceful pose to help students transition from recess to the next part of their day. As an additional component of the session, there may be quiet classical music or nature sounds or classical music playing as the students relax for the last five minutes on their mats.

Resources

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Weissman, Irving L., and Max D. Cooper. "How the Immune System Develops." Scientific American 269, no. 3 (1993): 64-71.

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Appendix

In this unit, I will be using the Engineering, Technology, and Application of Science (ETS), Next Generation Science Standards that our students must meet.

The first set of standards focus on asking questions and defining problems in K–2 that build on prior experiences and progress to simple descriptive questions. The students will meet the following specific standards as the unit progresses through presentations on the human anatomy systems as students discover, though questioning and inquiry, how our bodies are engineered.

K-2-ETS1-1: Ask questions based on observations to find more information about the natural and/or designed world(s).

K-2-ETS1-1: Define a simple problem that can be solved through the development of a new or improved object or tool.

Students will also meet the standards on modeling in K–2. This standard builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions. As the students build their own anchor charts that represent their learning, they are creating a model of their own bodies, what they can see and what they cannot see (internal systems).

K-2-ETS1-2: Develop a simple model based on evidence to represent a proposed object or tool.

Notes

1 htttp://kidshealth.org

2 htttp://kidshealth.org

3 htttp://kidshealth.org

4 Marack and Kappler, 81

5 Weissmann and Cooper, 65

6 htttp://kidshealth.org

7 Weissmann and Cooper, 66

8 htttp://kidshealth.org

9 http://science.howstuffworks.com/dictionary/chemistry-terms/enzymes-info.htm

10 Freeman, 1

11 www.oxforddictionaries.com

12 https://www.cdc.gov