



Curriculum Units by Fellows of the Yale-New Haven Teachers Institute
2008 Volume VI: Depicting and Analyzing Data: Enriching Science and Math Curricula through Graphical Displays and Mapping

The Mind-Body Connection

Curriculum Unit 08.06.05
by Larissa Giordano

Introduction

I teach second grade at Vincent E. Mauro Magnet School in New Haven, Connecticut. Vincent Mauro is an interdistrict elementary school with a Science, Mathematics and Technology focus. My second grade classroom is in an urban district and is composed of a diverse, multicultural community of learners that encompass a wide spectrum of achievements, interests, learning and social needs. Students come not only from New Haven but from surrounding suburban communities as well. Since this classroom is a part of a science, mathematics and technology magnet school the students are provided with the means to explore their multiple intelligences and interests and utilize different learning styles to strive to reach their goals.

As mentors and role models for children it is extremely important that we not only teach academics but help students understand who they are and why certain things happen to them. This unit is designed to help students piece together the fundamental elements of the human body and unleash the mysterious aspect of the brain as our body's navigator. Learning, thought, creativity and intelligence are not the sole process of the mind alone, but of the entire body. Human qualities that we often associate with our mind can not exist separate from our body. Our body plays an integral part in our body's intellectual processes through our senses which feed our brain information.

This unit will examine the relationship between mind and body using graphical displays to chart elements of daily life such as food intake, sleep, exercise and mood. The mathematics will be integrated with biology. Students will take a close look at our brain and how it guides human body functions as well as the reverse. Students will examine the skeletal, digestive, nervous and respiratory systems. Through a series of inquiry based investigations students will comprehend that everything we do affects our mental, physical and emotional well being. Therefore students will also brainstorm and explore healthy habits including the need for proper nutrition, exercise and sleep. This can help students develop a nutritional awareness as well as help students to be proactive about their health. Students will then see how being proactive can help ward off sickness as well as how making subtle changes to diet and nutrition may help. Students will begin to realize how positive lifestyle changes can lead to strong bodies and emotionally stable minds. We will look at what makes us happy and the cognitive skills to cope with the ups and downs in life in an effort to promote our "inner" well being.

Overview

Students will take pre and post assessments as well as complete learning journals that highlight “How my Body Works” through data collection, graphing, writing and artistic representations of their observations. Just as it is important for teachers to use graphical displays to understand and motivate their students, students should learn how to understand and use graphical displays for their personal and academic work. Students will be given alternate strategies to increase comprehension, motivate scientific thinking, and problem solve inquiry based math. This unit will allow for various interdisciplinary discussions and projects as well as support their preparation for taking the Connecticut Mastery Test in third grade which will include analyzing graphs, tables and maps. This unit will also touch upon the essential components of balanced nutrition. These basic facts will lead to how are people are structured to ensure efficiency and survival. All throughout, students will collect data in a journal that is divided into three parts: How My Body Works, How I am Feeling (lifestyle/ social stresses/ school) and Healthy Habits (nutrition, exercise, sleep, hygiene) journals. There will be a series of math lessons: “What is a graph? What features does every graph have to include? Why do we have graphs? What is the purpose of a graph? and How do you interpret graphs?” Students will analyze and graph their own data to compare/ contrast and make “The Body -- Mind Connection” (through analyzing the data, inferring and predicting.)

Implementing District and National Standards in the Unit

In accordance with the CT Science Curriculum standards it is vital that teachers promote scientific literacy. Students will comprehend fundamental concepts from life, physical and earth sciences through critical thinking and an infusion of inquiry based explorations and experiments. In this, students will be able to create, validate and communicate their scientific knowledge. Furthermore, students will transfer their learning to practical applications in the “real-world.” Students will be able to evaluate arguments based on evidence and formulate conclusions. Language Arts, Mathematics, Science and Technology will therefore be integrated throughout this unit while meeting the following state mandated and district standards. Science and Technology in Society -- How do science and technology affect the quality of our lives? Human beings, like all other living things, have special nutritional needs for survival. The essential components of balanced nutrition can be obtained from plant and animal sources. People eat different foods in order to satisfy nutritional needs for carbohydrates, proteins and fats. Identify the sources of common foods and classify them by their basic food groups. Describe how people in different cultures use different food sources to meet their nutritional needs.

6 Week Unit Overview

This 6 week unit will use graphing and diagrams to teach the human body and visually demonstrate how our mental and emotional health is tightly connected with our physical well being. Before beginning the unit, the teacher should give students a pre-assessment, to gauge what the students know and what the students need

to know. Students will also be expected to create their own “I am Special” book that will outline all that they learn about their magnificent brain and their body systems. It will be divided into subsections (the brain, human body systems, nutrition and exercise, mental and emotional health) where they can write and illustrate through diagrams and graphs what they learn after each lesson. This book will also contain a glossary at the end where they can add any important words and their “child friendly” definitions.

Following this assessment phase, the first two weeks will lay the foundation for the unit. The teacher will begin by using graphical displays of the human body systems and explain their functions in brief. The first two weeks will primarily focus on the brain and how it governs all the body systems and sends messages that keep us mentally and emotionally healthy too! In doing so, a diagram of the brain can be used to explain its parts and their importance. Simultaneously in math, the teacher will teach graphing and its importance. The students will be expected to be able to interpret and create a pictograph, a bar graph and a circle graph. Line graphs can also be introduced.

Weeks three and four will be devoted to an in depth look at the nervous, digestive, respiratory, circulatory and the musculoskeletal systems. The necessity for proper nutrition and regular sleep, water and exercise will also be emphasized and integrated throughout. The teacher can also use diagrams of the digestive or respiratory process, for example, to show the students how the process occurs. Students will be expected to keep nutrition and exercise journals. Students will also be assessed by how well they can label diagrams of the brain and the body systems and by how well they can explain their thinking to the class. As a part of the unit, the teacher can then also show what happens when there is a malfunction between the brain and the systems it controls. So, students will understand that the brain governs the systems and that sometimes their thoughts can affect them physically.

Week five will focus on mental and emotional health. Students will again keep journals on their states of mind and feelings. Students will also continue with their nutrition and exercise journals. By week six the students will compare their data and be able to share visually and orally with the class what patterns they see in their mental and emotional health when compared with how well they take care of their body physically, i.e. on days when they had enough sleep (8hrs) they performed better at school and were in a better mood. By the end of the unit students will be expected to explain and discuss the body systems and their connection with the brain. As a result, students will understand the importance of proper nutrition and its application to their daily lives. At the culmination of the six weeks, students will be given a post assessment where they have to explain in writing and in graphs how they might cope with some hypothetical situations. For example, students will be asked to plan a trip to Florida, and explain what they need to bring and do in order to ensure they have a great time, or answer the following question “You have a big test in two weeks, what can you do to help yourself do well on the exam?” The purpose of these questions is to have students apply their knowledge gained from this unit to daily life and to test whether they have learned enough about themselves to make informed decisions. Students will be graded according to a rubric that has already been reviewed with the class to allow them to take responsibility for their learning. In their assessment they are expected to apply what they know about the brain, the human body systems and its connection with mental and emotional health together with proper nutrition, students will represent their answers both pictorially and in writing.

Purpose

This unit serves a dual purpose, one for the teacher and another for the student. For the teacher, we must understand that the physical, cognitive, language, social, psychological and ethical needs of the children. When his or her needs are met, the child is in their best state to learn. For students, it is vital to help them gain insight into themselves as a healthy being: mentally, emotionally and physically so that he or she can understand their needs and to ensure they are met. Armed with this knowledge a student will realize that if learning is not independently controlled by the brain, then they are able to take steps to positively enhance their own learning and improve their cognitive abilities. This unit helps give students ownership of their learning and makes them responsible for their own growth.

Developmental Pathways Required for Optimal Teaching and Learning

Physical

Sensations, movements, emotions and brain integrative functions are grounded in the body. ¹The human qualities we associate with our mind can not be separated from the body. The brain is housed in our skulls and is in constant communication with the rest of our body. Thinking and learning however are not only in our head. Our body plays an integral part in our intellectual processes, because it is our body's senses that feed our brain with environmental information from which we later form understandings of our world around us. Our movements help facilitate greater cognitive function. Intelligence therefore is not merely dependent on analytical ability. The sensations received through our ears, nose, eyes, tongue and skin help form the foundation of our knowledge. The body therefore is a vital part of learning. Movement is necessary for optimal thinking. Strong evidence supports the connection between movement and learning. Evidence from imaging sources, anatomical studies and clinical data shows that moderate exercise enhances cognitive processing. It also increases the number of brain cells in rodents. ²

Optimal thinking therefore occurs when the physical needs of the child are met. Children need proper nutrition, sufficient sleep, exercise, regular visits to the doctor and a safe, stress-free environment. Dehydration is a common problem linked to poor learning. Dehydration leads to a loss of attentiveness and lethargy. Research also suggests that children need to sleep longer (8-9 hours a day) to allow their bodies to prepare for the rapid growth spurts between ages 6 and 7 and 11 or 12. Nutritional deficits have been known to decrease test scores and nutritional supplementation has improved them. One study showed that children with low iron levels were twice as likely to score below average in math. Another study showed that children with a diet low in vitamin B-12 had a reduced learning ability while too much dietary fat also impaired cognition. ² In the same way that exercise strengthens the muscles, hearts, lungs and bones, it also strengthens all key areas of the brain. Exercise fuels the brain with oxygen and increases neurotrophin levels that enhance growth and connections between neurons. Exercise also supports success in school. Research has shown that it improves classroom behavior and academic performance. Social skills also were influenced by exercise. Students not only performed better cognitively but they had a better attitude toward school. Obesity in youth is also a challenge for the 21st century. Obese adolescents are more likely to have high blood pressure and type 2 diabetes. A stressful environment is also linked to student failure. Crowded conditions and

poor relationships can create stress for children. Chronic stress impairs a student's ability to sort out what's important and what's not. Thinking and memory are affected under stress because the brain's short term memory and ability to form long term memories are inhibited. Children that are stressed are also more likely to suffer from depression which can result in frequent absences from school, low energy, social isolation, poor communication and low self esteem. ²

Social

The brain is a social brain. Part of our identity depends on establishing community and finding ways to belong. Crisis from friendships or relationships can distract students from academics. Social neuroscience has revealed an astonishing array of influences that social contact has on the brain. For this reason it makes sense to consider the connection between school social climates and the people within the schools. Because school is a social environment it helps shape students brains. ²

Cognitive

Cognitive development can be described as one's ability to think, plan, solve problems and accomplish goals. Healthy brains are born with the capacity to learn skills such as maintaining focus and attention, reading and summarizing content, speaking, drawing and building non-linguistic representations as well as organizing information, showing persistence and setting goals. Development of these skills requires motivation, direct instruction, role modeling and time to try to strengthen and practice in multiple contexts. The development of thinking requires constant layering and scaffolding. Early exposure to quality thinking skills create the intercortical connections needed to develop much more sophisticated ways of thinking as we mature. ²

Language

Language is the capacity for receptive and expressive language in a variety of contexts. Children need to learn to speak effectively for a wide variety of audiences and contexts as well as be able to listen and learn effectively. They also need to express their thoughts and feelings appropriately. These skills may be developed in a variety of ways. Music and art education can enhance abilities of children who do not excel in the expression of verbal thinking. This development of language fosters positive attitudes toward school because it assists in general intellectual achievement, enhances creativity and helps social development. ²

Ethical and Psychological

Ethical development increases the capacity for behaving with justice and fairness toward others by showing respect and integrity for self and others. It also includes being able to see other people's perspectives and demonstrate empathy and sensitivity toward others. Psychological development is closely connected in that it helps children manage their own emotions and socially accepted ways because they feel safe, protected and loved. What we learn is influenced and organized by emotions and mindsets. An appropriate emotional climate is therefore indispensable to a sound education. ³

Using Graphs to Make the Mind-Body Connection

Why are they important?

You've heard the saying "A picture is worth 1000 words," well it's true! A graph can do this and so much more. Graphs are found everywhere, in magazines in newspapers and even seen on television because of their usefulness in helping to communicate information. Often times we do not have the time to read large amounts of text. Even then it is not certain that we will understand what we read. A graph can help us by presenting the information pictorially. Graphs are amazing tools that allow us to make information easy to look at. ⁴

What is a graph?

A graph is a visual representation of one or more variables. They can be quick and direct and highlight the most important facts. Graphs can facilitate understanding of data and are easily remembered. There are many different types of graphs that can be used to convey information, including pictographs, tally charts, bar graphs, histograms, line graphs and pie charts. Depending on the data being represented some graphs are better suited to use than others. One can select the most appropriate graph using but not limited to the following guidelines: a pie chart (description of components), horizontal bar graph (comparison of items and relationships), vertical bar graph (comparison of items and relationships, time series, frequency distribution), line graph (time series and frequency distribution), scatterplot (analysis of relationships).

Knowing how to convey information graphically is important in the presentation of statistics and therefore there are a few guidelines one needs to follow when preparing them; facts must be visually accurate and show data without altering it. The display must attract the reader's attention and compliment or demonstrate arguments presented in the text. Graphs must be correctly labeled and have a title.

Students should have a base knowledge of bar graphs, pictographs and circle graphs prior to starting this unit. If not, you can integrate the content of these brain and body lessons to drive the introduction of graphing in your math lessons. In their "I am Special" books the students will use this knowledge to graph their emotions, diet and academic progress. ⁴

Graphing Lessons To Teach

The goal is to introduce the graphical representation of information. Graphing provides children with a powerful tool to make comparisons and represent numeric information extracted from a story problem. Students will be able to describe, organize and represent data in tables and graphs. The students will read and create picture graphs to record and analyze data. As students continue to collect data based on their healthy habits, daily nutrition and daily emotions they will create data tables, picture graphs and bar graphs to understand the data. Finally, students will be introduced to circle graphs and use this knowledge to explore comparison situations. Throughout, students will learn how to read picture graphs, tables and bar and circle graphs as they answer questions about them. Students will create tables and graphs while they consider the advantages and disadvantages of each form of data presentation. Objectives assessed will include reading and interpreting information from a table, picture graph, bar graph and circle graph, converting information from a table to a picture graph and a picture graph to a bar graph and solving comparison story problems. ⁵

Picture Graphs

Students begin learning how to make a picture graph by using one circle to represent each piece of fruit that two friends in a story problem ate. Students learn how to label their graphs with the names of each friend in the story problem and how to give a graph a title. Organizing information into a graph and describing the information are key processes in learning to work with data.

Story Problem: Carla and Peter are trying to be healthy eaters. They know that it is important to fuel their bodies with fruit in order to stay healthy physically and emotionally. They also know that eating a variety of fruits will help them to become better learners. This week Carla ate 8 pieces of fruit and Peter ate 5 pieces of fruit. Draw a picture graph to represent this data, and then answer the following questions.

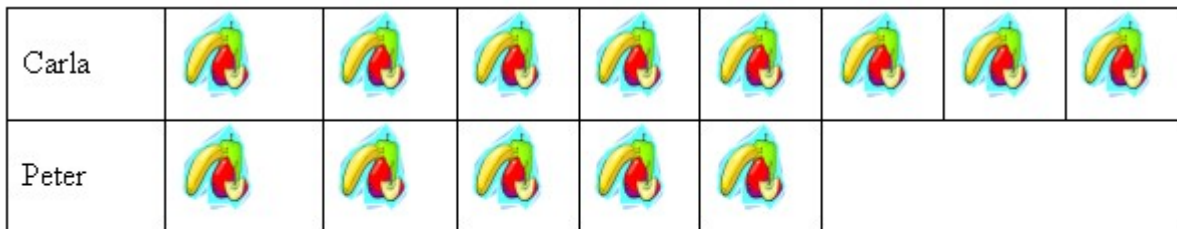


Figure 1: Clip art courtesy of www.barrysclipart.com

6

Carla ate more or fewer pieces of fruit than Peter?

How many fewer pieces of fruit did Peter eat than Carla?

Using Comparison Language

Students will solve comparison problems depicted in picture graphs. They use the comparative terms same, more and fewer as well as greater, less than and equal symbols to compare the information in the graphs. Since the pictures in the rows or columns of the picture graph are aligned they can be easily compared to find how many more or how many fewer items would equalize the groups.

Introducing Tables

Students will construct tables with rows, columns, headings and numbers. Students will see how they can easily compare information when it is organized into a table. Students will have the opportunity to convert tables to picture graphs and pose and answer questions about all of these data formats.

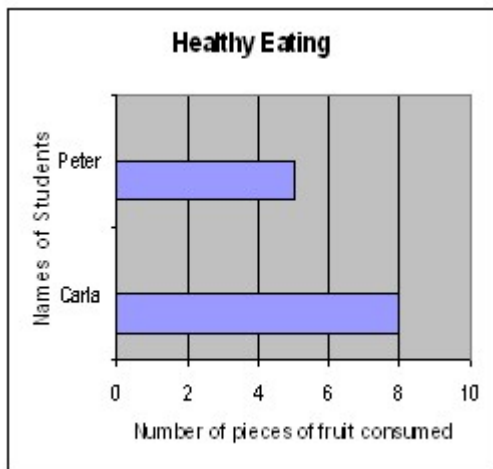
Fruits (Title)	
(Labels) Carla	
Peter	
(Number of fruits)	

Introducing Bar Graphs and Circle Graphs

Students will move from picture graphs to bar graphs as they learn to convert a picture graph to a bar graph by shading the squares that have pictures in them. They change the numerical scale to the number line length model with numbers at the end of each square telling how many so far.

Students will read information in bar graphs and pose and solve problems using information in the bar graphs. Students will read and create bar graphs in both horizontal and vertical form.

Students will learn how parts of a circle and the size of the parts can represent different information and values. They complete a circle graph using information from a bar graph. They compare bar graphs and circle graphs and find how each can be used for different purposes. ⁵



Students will use this basic understanding of graphs ⁷ to create their own tables and graphs in their “I am Special” book. They will chart their daily food intake and their daily emotions. They will record this data for four weeks. During that time the teacher will also supply them with test scores ie. weekly math and spelling tests as well as monthly running records and comprehension quizzes in reading. The students will then create pictographs or bar graphs to visually show what they ate, how they felt and their academic progress. Individually and as a class (names will be removed from the graphs), the students will analyze the total data and look for correlations between what they ate and how they performed in school.

Health Related Aspects of the System

Overview of Our Brain

The brain governs our body and its functions. Our brain controls everything we do whether asleep or awake as it has hundreds of different functions despite the fact that it weighs only about 3lbs. The brain has 5 important

parts; cerebrum, cerebellum, brain stem, pituitary gland and hypothalamus. ⁸

The cerebrum is the largest part of our brain and makes up about 85 percent of our brain's weight. The cortex is the outer layer of the cerebrum. It resembles a mushroom cap over a stalk and is the center where thinking and memories are stored. The cortex also controls the voluntary muscles. It also processes the senses touch, light and sound. The left side primarily governs logical, objective and analytical thinking like speaking, reading, writing and problem solving. The right side controls the abstract, intuitive and subjective functions, such as imagination, appreciation and creativity. These two halves however are connected by a band of nerve fibers known as the corpus callosum which allows the two halves to communicate to each other. The cerebrum contains the information that makes us "us". It houses our intelligence, personality, speech, emotion and memory in addition to our ability to think and move. ⁸

The cerebellum is the second largest part of the brain and is situated beneath the back of the cerebrum. The cerebellum receives impulses from the skeletal systems and joints which allows the brain to trace the body's positions. This allows us to move fluently while the body makes adjustments in order to keep us upright. Although it is only one eighth of the size of the cerebrum, the cerebellum controls our balance, movement and coordination. ⁸

The brain stem lies beneath the cerebrum but in front of the cerebellum and connects the rest of the brain to the spinal cord. The brain stem plays major roles in respiration, digestion and circulation. ⁸

The pituitary gland is attached to the base of the brain. This gland is so small that it measures about the size of a pea! Its' main function is to produce and release hormones into the body. This gland is especially at work during puberty. Additionally, the pituitary gland controls hormones that regulate the metabolism ⁸

The hypothalamus controls the body's' temperature. The hypothalamus will regulate your body by causing it to sweat when it is too hot or shiver when it gets cold. It is also responsible for regulating our pulse, thirst appetite and sleep patterns. ⁸

Diet and the Brain

The brain is only about two percent of the total body weight in humans,, but it receives 15-20 percent of the body's blood supply. Brain cells will die if the supply of blood which carries oxygen is stopped. Even if other organs need blood, the body attempts to supply the brain with a constant flow of blood first. The blood brings many materials necessary for the brain to function properly like oxygen, carbohydrates, amino acids, fats, vitamins and hormones. It also removes materials from the brain such as carbon dioxide, hormones, lactate and ammonia. ⁹

Fatty acids from fats are what your brain uses to create specialized cells that allow the brain to function. About two thirds of the brain is composed of fats. To build brain cells, you need fatty acids. Two essential fatty acids that your body needs are alpha-linolenic acid (ALA) and linoleic acid (LA). Your body cannot manufacture these fatty acids so you need to get them through the food you eat Food sources containing ALA include flax seeds, walnuts and green leafy vegetables. The membranes of neurons, the specialized brain cells that

communicate with each other, are composed of a thin double-layer of fatty acid molecules. When you digest the fat in your food, it is broken down into fatty acid molecules of various lengths. Your brain uses these fatty acids to assemble the special types of fat it incorporates into its cell membranes. Myelin is the protective sheath that covers communicating neurons. It is composed of 30% protein and 70% fat. One of the most common fatty acids in myelin is oleic acid, which is the most abundant fatty acid in human milk and in our diet. Monosaturated oleic acid is the main component of olive oil as well as oils from almonds, pecans, macadamias, peanuts, and avocados. ⁹ These help your brain work. Food sources from LA include sunflower, safflower, corn and sesame oils. These oils, as well as walnuts help brain cells absorb oxygen and keep them healthy and happy which therefore makes your brain work better. ¹⁰

The number one ingredient for a healthy brain is water. Since the brain is 75 % water, low water content will affect cognitive function and neurotransmitter function. It is suggested to drink eight glasses of water a day. Electrolytes are also needed to balance the body's fluids as well as maintain heart rhythm, muscles contraction and brain function. These vital electrolytes also come from our diet. ¹⁰

There is a strong correlation between cognitive advantages of school age children and nutrition. Although good nutrition is important for everyone, this is especially true for children younger than five years because these years are demanding for the developing child. They are the years in which children acquire many of the physical attributes and the social and psychological structures needed in life and for learning. Since young children grow and learn at an astounding rate, they should be physically very active, because physical activity develops muscle tone and neural connections in the brain. In order to have the energy required to grow, move and learn, children need nourishing food and plenty of water. This requires a varied diet that provides a balance of proteins, carbohydrates, fats, vitamins and minerals. A good diet will not only improve concentration and energy levels but it will therefore increase a child's learning potential. A healthy diet in childhood will also help to prevent anemia, cancer, heart disease, diabetes, osteoporosis and obesity in later life.

Movement and the Brain

Research shows that thinking and physical education, movement, breaks, recess and energizing activities are an effective cognitive strategy to strengthen learning, improve memory and retrieval and enhance learner motivation and morale. ²

As explained earlier, we know that the brain is divided into two halves. If we want the brain to run at full speed it's important that we keep the right and left sides connected. To enhance this right-left, the child must perform many movements where the midline is crossed. The midline is the line dividing the body in half from the chin to the belly button. An exercise called the cross crawl helps coordinate the right and left brain by exercising the information flow between the two halves. It is useful for spelling, writing, listening, reading and comprehension. First, while standing or sitting, put the right hand across the body to the left knee as you raise it and then do the same thing for the left hand on the right knee just as if you are marching. Do this for 2 minutes. ¹⁰

In the student's "I am Special" books, have them track their progress on a chart like this one below:

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
I fed my brain							
Nuts							
Protein							
Grains							
Flax and Oils							
Eight glasses of H ₂ O							
How many minutes did I exercise?							
How many times did I cross my midline?							

Nervous System

The peripheral nervous system consists of all the nervous tissue outside of the central nervous system. Peripheral nerves innervate the muscles and organs. Part of the peripheral nervous system called the autonomic nervous system is responsible for controlling body processes like breathing, digestion, sweating, and shivering. The autonomic nervous system has two parts: the sympathetic and the parasympathetic nervous systems. The sympathetic nervous system prepares the body for sudden stress, as when you see something catch fire or witness violence. As something frightening happens, the sympathetic nervous system makes the heart beat faster which sends blood more quickly to body parts that might need it. The sympathetic nervous system also causes adrenal glands located at the top of the kidneys to release adrenaline. Adrenaline is a hormone that gives extra power to the body for quick action otherwise known as the body's "fight or flight" response. The parasympathetic nervous system is opposite in function: It prepares the body for rest and also helps the digestive tract move along so our bodies can efficiently take in nutrients from the food we eat. ¹¹

Digestive System

The digestive system is a series of tubelike organs from the mouth to the anus. The digestive tract includes your mouth, throat, esophagus, stomach, small intestine, large intestine or colon, rectum and anus. ¹⁰ The nervous system plays an important part in digestion as well. Two types of nerves help control digestion. Extrinsic nerves come to the digestive organs from the brain or the spinal cord and release two chemicals: acetylcholine and adrenaline. Acetylcholine causes the muscle layer of the digestive organs to squeeze with more force and push the food and juice through the digestive tract. It also causes the stomach and pancreas to produce more juice. Adrenaline relaxes the muscle of the stomach and intestine and decreases the flow of blood to these organs, slowing or stopping digestion. ¹²

The intrinsic nerves are embedded in the walls of the esophagus, stomach, small intestine, and colon and are triggered to act when the walls of the hollow organs are stretched by food. They release substances that speed up or delay the movement of food and the production of juices by the digestive organs. Together the nerves, hormones, blood and organs work together to digest and absorb nutrients from all the food and liquids consumed each day in order to give the body energy. ¹²

A powerful connection lies between the digestive system and the brain. Psychological factors influence contractions of the intestine, secretion of digestive enzymes, and other functions of the digestive system. Susceptibility to infection, which leads to various digestive system disorders, is strongly influenced by the brain. In turn, the digestive system influences the brain. For example, long-standing or recurring diseases such as irritable bowel syndrome, ulcerative colitis, and other painful diseases affect emotions, behaviors, and daily functioning. This two-way association has been called the brain-gut axis. ¹³

Respiratory and Circulatory System

The respiratory and circulatory systems work together in order to deliver oxygen and nutrients to the cells in our bodies. All of our body cells need oxygen to conduct cellular respiration. The primary responsibility of the respiratory system is to bring oxygen into the body and remove waste gases like carbon dioxide. The respiratory system is made up of the lungs, trachea, bronchi and diaphragm. The main organ is the lungs. In the lungs oxygen is taken into the body and carbon dioxide is released from the body.

The three main parts of the circulatory system are the heart, blood vessels and blood. The heart is about the size of your clenched fist. This muscle contracts and relaxes roughly 70 times a minute at rest or during exercise. The greater the activity or stress level of the body, the faster the heart must beat. ¹⁴

The brain consumes twenty percent of the body's oxygen supply. When the brain doesn't get enough oxygen this deficit can lead to issues such as sleep apnea, poor concentration, forgetfulness, mood swings, restlessness, depressive thoughts and decreased motivation. Unlike muscles, your brain cannot store much material to produce energy. It needs a steady flow of nutrients and oxygen to function normally. Oxygen deficiency can decrease your alertness, memory and judgment. Conditions that will reduce blood oxygen levels include air pollution, smoking, emphysema, asthma, chronic stress, sedentary life style and living or

traveling to higher elevations. As we age, our capacity to utilize oxygen dramatically declines.

Fatigue has also been reported by several studies as one of the most common symptoms experienced by people. Human cells use the nutrients from food and oxygen to create Adenosine tri-phosphate (ATP), the energy source that fuels cell function. If cells receive too little oxygen, they produce less energy. If cells need more energy, they use more oxygen . That's why your breathing rate increases when you exercise. ¹⁵

A sedentary lifestyle is one of the top risk factors for heart disease. Regular exercise, especially aerobic exercise, has many benefits. It can strengthen your heart and cardiovascular system, improve your circulation and help your body use oxygen better, increase energy levels so you can do more activities without becoming tired or short of breathe, lower blood pressure, improve muscle tone and strength, improve balance and joint flexibility and strengthen bones. It also helps reduce stress, tension, anxiety and depression and improves sleep. ¹⁵

Cardiovascular or aerobic exercise is steady physical activity that uses large muscle groups. This type of exercise strengthens the heart and lungs and improves the body's ability to use oxygen. Aerobic exercise has the most benefits for your heart. Over time, aerobic exercise can help decrease your heart rate and blood pressure at rest and improve your breathing. ¹⁵

Our blood is made primarily of a yellowish colored liquid called plasma. Plasma is ninety percent water and dissolved proteins, vitamins and minerals, like salts. The rest is made up of red blood cells, white blood cells and platelets. Red blood cells make the blood red and deliver oxygen to the cells in the body and carry back waste gasses in exchange. The white blood cells are part of your body's defense against disease and attack any intruders that may invade our body. Platelets are other cells that help the body repair itself after it has been injured. In a single drop of blood, there are about five million red cells, eight thousand white cells and two-hundred fifty thousand platelets. Red blood cells are made in our bone marrow and contain a protein called hemoglobin. Hemoglobin is a protein carried by the red blood cells that contains iron. When the oxygen attaches to the hemoglobin, these blood cells appear bright red. ¹⁶

Iron is essential to optimal brain function. Iron is necessary in building the proteins of red blood cells and is required for producing energy from food. It is an important factor in every activity the body performs including the ability to hold attention for longer periods of time. Research has shown connections between iron deficiencies and children with attention deficit hyperactivity disorder (ADHD). ¹⁰

Respiratory System Lesson Plan

Materials: Respiratory system visual aid, Glue, Scissors, Colored Construction Paper, Yarn, Beans, Macaroni Noodles, Sponges, Straws, Cotton Balls, Small Balloons, Crayons

Instructional Strategies: 1) The teacher will introduce the respiratory system and display a visual aid of their respiratory system. 2) The teacher will begin the lesson by taking a balloon and blowing it up. The teacher will ask the class if they have an idea what organ might be similar to the balloon and the way it was inflated. The students should arrive at the answer: the lungs. 3) The teacher will present information on the respiratory system. The students will take notes of the material in an outline form. The information that the teacher

should include is: the organs that work together in the respiratory system are: the lungs, the nose, the trachea, the bronchi. Everybody has a set of two lungs. The lungs are similar to balloons. When we breathe in our lungs fill with air. When we breathe out, we are breathing out carbon dioxide. Our lungs work together with our heart to carry oxygen all over our body. The air first enters our body through the nose. The trachea is a tube that allows the air to go to the lungs. 4) The teacher will discuss the effects that pollution and smoking has on the lungs. 5) The students will brainstorm additional areas of the body pollution and smoking can effect. 6) The student will create a diagram of the respiratory system using above materials. The teacher may want to add small balloons to the available supplies to depict the lungs. If students create a similar construction of all the body systems and/ or individual organs, they can be used in the “Human Body” culminating activity listed after the description of the musculoskeletal system. ¹⁷

Circulatory System Lesson Plan

Instructional Objectives: The student will identify features of the circulatory system. Explore the needs of the human body by explaining the importance of good health in relationship to the body. Understand the functions and care of the human body and its organs.

Materials: Heart visual aid; circulatory system visual aid ,Stopwatch ,Scrap paper, cut into half sheets, Rope, clothespins, index cards, Construction paper, scissors, glue and crayons.

Instructional Strategies: 1) The teacher will introduce the circulatory system. Begin discussion about the heart. Review that the heart is one of the involuntary muscles discussed in the last class. 2) The teacher will hand out a piece of scrap paper to each student. The student will crumple it into a ball and hold it in his hand. The teacher will watch the clock and count to 90 in one minute. The teacher will instruct the students to squeeze the paper ball each time a number is said. This demonstrates how strong the heart is and how hard it works. 3) Begin discussion covering the following information: The heart is a hollow muscle that has 2 pumps. The beating sound is made by the valves closing as the heart allows blood to pass in and out of the chambers. Use a visual aid (chart) to show students how blood passes through the right side of the heart, to the lungs, to the left side of the heart and out to the body. The teacher will present information about veins and arteries. 4) The teacher will show students where they can locate their pulse (neck or wrist) as they stand beside their desks. 5) The students will run in place for one minute. 6) The teacher will have the students stop running and feel their pulses. The students will describe how their pulses feel. 7) The teacher and the students will brainstorm ideas on keeping hearts healthy. 8) Using a rope tied to 2 stationary objects in the front of the classroom, the teacher will hand out index cards to student volunteers, programmed with the sequence of steps describing the blood’s passage through the heart (one step per card). The students will attach their card to the rope with a clothespin. 9) When all the students have finished placing their cards, the teacher will check the order. The students will read the card they hung aloud to the class. The student will work independently to sequence the order of the blood flow process. ¹⁷

Musculoskeletal System

The musculoskeletal system consists of the skeletal system the bones and joints and the skeletal muscles that move them. The musculoskeletal system provides protection for the brain and internal organs and support for our bones by maintaining upright posture. It also assists in blood cell formation called hematopoiesis, maintains mineral homeostasis and stores fats and minerals. In movement it also acts as a lever which is a simple machine that magnifies speed and provides strength. The levers are mainly the long bones in our body and the axes are the joints where the bones meet. ¹⁸

The basic element of the skeleton is bone tissue. Bone tissue is a special connective tissue that is supportive but is also flexible enough to allow for growth. When you look inside a bone you will notice that there are two different kinds of bone tissue. If the tissue does not have any open spaces it is known as compact bone. Bone tissue that has many open spaces is known as spongy bone. Spongy bone provides most of the strength and support for a bone. Bones contain a soft tissue known as marrow. Red marrow produces red blood cells and is sometimes found in spongy bone. Yellow marrow stores fat and is found in the central cavity of the long bones. In children red marrow fills the inside of long bones like the femur but is replaced by yellow marrow by adulthood. ¹⁸

Most of our skeleton starts out as a soft and flexible tissue called cartilage but as we grow the cartilage is replaced by bone. There are some areas that never become bone, like the top part of your ear or the tip of your nose. Cartilage consists of relatively hard, whitish material rich in elastin and collagen fibers. Cartilage is considerably flexible. ¹⁸

Bone health is important. Strong bones help prevent osteoporosis, a disease in which bones become fragile and break easily. Osteoporosis prevention begins at an early age and continues throughout your lifetime. Bone mass develops rapidly between the ages of 10 and 20 and peaks at age 30. Building and maintaining strong bones depends on calcium, vitamin D, and physical activity. ¹⁹

Calcium is an important nutrient for your body and for your health. Calcium helps your heart, muscles, and nerves function. It is also important for bone health. Ninety-nine percent of your body's calcium is stored in your bones. Children and teenagers need adequate calcium in their diets so they can maximize the calcium storage in their bones. In later years, adequate dietary calcium helps minimize calcium loss from the bones. The best sources of calcium are dairy products. ¹⁹

Your body also uses vitamin D to help transport calcium to your bones. Foods such as milk and eggs contain vitamin D. Your body also makes its own vitamin D when you are exposed to sunlight.

Weight-bearing exercise helps keep bones strong and prevents calcium loss. Calcium loss can take place at any age, even during childhood. For example, astronauts (weightlessness in space) and sedentary people are at risk for losing calcium from their bones. Weight-bearing exercise includes walking, jogging, weight lifting, dancing, and soccer. ¹⁹

Lesson: Bones Support and help move the Body

Use a bean bag animal to represent a body with no bones. In groups of four or five have the students work together to try to figure out how to make the bean bag animal stand on its own. If a student uses something to prop the bean bag, explain that the bean bag is not standing on its own. Have students explain why the animal keeps falling over. (It is too soft. There is nothing to hold it up.)

Tell the class, "You are all sitting up. What keeps you from falling over like the bean bag animal? (We have bones inside.) Have students demonstrate what they would look like if they had nothing inside to hold them up. After they collapse in their chairs, ask them to try to move around without using their bones.

Ask students to name some ways we use our bones and chart their responses. Have students feel their bones giving directions like: Feel your fingers and hand. Do you feel a few bones or a lot of bones? Touch the top and the back of your head. Now touch your chin as you move your jaw. Touch your chest. Can you feel your rib bones?

Next read a book such as *The Skeleton Inside You* by Philip Balestrino.

Ask the students what they learned and chart the student response. Using a model of a skeleton or transparency, name common bones and have the students point to where that bone is found on their own body. ²⁰

The Human Body Lesson Plan

Objective: To introduce students to their bodies, their parts, their functions, and their location. Materials: Roll of newsprint from your local newspaper office. A detailed book on the human body that can give you pictures of the body parts. Crayons, Markers, Pencils, Glue. Teacher Preparation: You can draw whatever body parts you want to learn ahead of time, copy how many you need, and cut them out ahead of time, then have the kids color them in class. Or you can let the kids cut and color them in class.

Procedure: Provide a book that illustrates the human body with explanation on different organs. Focus on the basic organs: heart, stomach, intestines, liver, brain, esophagus, lungs, and bladder. Before making our 'bodies' teach these organs individually. Explain what each one is, what it does, and how we can take care of it. For example, the liver: to have a healthy liver it's important to drink enough water. The teacher can then give a copy of each organ for each child. Whatever organ students learned on that day, can be cut out and colored and kept in their folder. Students can work with a partner. Each partner takes a turn 'tracing' their partner's body outline onto a long piece of newsprint paper with a pencil. Then each student gets their 'body parts' out and glues them onto their body in the proper places. Once this is done, I let them decorate their bodies with hair, eyes, mouth, nose, nails, ect. They name their 'person' and we tape them on the walls around the room. ²¹

Mind Over Matter

Our mental health can be described as what our brain needs to keep it running smoothly so that our physical and emotional needs will also be met so that we can be healthy. Mental health is the emotional and spiritual resilience which allows us to survive pain and still enjoy life. It emphasizes social and personal resources as well as physical capabilities and can be defined as a positive sense of well being rather than the opposite of mental illness. Our mental health influences how we think and feel about ourselves, about our future and about others and how we interpret events. It affects our capacity to learn and communicate as well as sustain relationships. Mental health influences our ability to cope with change, transition and life events. Knowing the “triggers” that may alter your mental health will help your body cope with situations as they happen. This proactive step can help sustain a positive mentality before it causes physical ailments. According to a recent government survey, nearly half of all Americans used mind-body medicine interventions such as deep breathing relaxation, meditation and guided imagery. Wellness centers, hospitals and luxury spas are giving more emphasis to mind-body clinics and presenting ways to reduce stress through such things as yoga classes and healthy eating seminars. These healthy mind-body connections are gaining respect as an antidote for everything from type A stress to chronic pain, depression, heart disease, compromised immune function, infertility and overeating, as well as improving side effects of cancer treatment. ²²

Researchers have confirmed the negative health effects of depression and hostility. There is mounting evidence that suggests that positive emotional experiences can improve our physical health and lay an important foundation for better and quicker healing responses. Researchers at UCLA have found that optimism is associated with stronger immune cell function. Harvard researchers found that deep relaxation, as achieved by yoga or deep breathing exercises, can help counter the effects of chronic stress. Relaxation exercises and stress management have also been found to be an important factor in blood glucose control for individuals with Type II diabetes. ²³

Emotional Health and its Effects on our Physical Health

Human emotion and behavior are deeply rooted in biology. Emotions such as anxiety, alienation, hopelessness, love, serenity, and optimism are not just feelings, they are physiological states which affect health just as obesity or physical fitness can affect health. Emotions are linked to medical conditions via a neurological pathway. The effect of emotions and diet is an important link in the prescription for well-being of the body and its brain. ¹¹

High tech CT scanning conducted by the University of Utah shows that hostility and stress in individuals has been linked to tiny calcium deposits in the coronary arteries. The higher the degree of stress, the more severe this silent form atherosclerosis tended to be. Studies have also confirmed that social isolation, depression and poor marital relations contribute to heart disease. Patients who are depressed at the time of bypass surgery are more than twice as likely to die in the next five years as patients without clinical depression. In a major study published in the Lancet in 2004, researchers surveyed more than 11,000 heart attack sufferers from 52 countries and found that in the year before their heart attacks, the patients had been under significantly more

stress and depression. The risk degree of stress was concluded to be comparable to risk factors of hypertension and abdominal obesity, a degree far greater than what would have been previously imagined. Psychological traits could affect blood vessel function via several pathways. Anger, hostility and depression combined with unhealthy fats, smoking and a lack of exercise affect the nervous system which in turn controls blood vessel function. ¹¹

Relaxation is only one way to treat stress and its negative effects on health. Regular exercise can strengthen the mind, mood and body. Regular exercise is essential for weight loss, improving heart disease and diabetes risk factors, as well as other metabolic diseases. Exercise not only improves the body's circulation and oxygen delivery throughout the body, but it alters a wide variety of chemical changes in the brain. The major effect is to boost the activity of mood enhancing neurotransmitters such as dopamine and serotonin. Exercise also triggers the release of endorphins, which are responsible for relaxation and "feeling good." ¹¹

Health, hygiene and nutrition are a vital component in maintaining stable mental and emotional health. This all helps your brain to function properly as it governs the physical body. Now that we are comfortable with the systems of the Human Body and its governance by our mind, we have to learn healthy habits that will keep them all running smoothly. Because the brain is the main controller of our body, Nutrition and the brain is essential so that you can have a balance of physical, mental, and emotional health which are indeed connected. Nutrition and exercise keep your brain healthy which then improves emotional and physical health.

Nutrition and Our Body Systems

Benefits of Good Nutrition

There are multiple benefits of good nutrition. Good nutrition will not only help you maintain a healthy weight, but it is essential for the body and all its systems to function optimally for a lifetime. Since a healthy diet provides energy, promotes good sleep, and gives the body what it needs to stay healthy, the benefits of good nutrition are found in physical (brain, heart, bones) and mental health (emotions, self-confidence).

What you eat can affect how you think and how you act. The activity of the brain can be influenced by the food that we eat. Research suggests that it might be good to eat a diet rich in carbohydrates when you want to relax or have a high protein snack if you need to be alert. Changes in your diet can produce changes in your brain chemistry and function. ²⁴

Protein in the foods you eat is broken down into individual amino acids. Your body uses the amino acids to build and repair the various parts of your body.

Another raw material your body needs is calcium. Calcium has several functions in your body, but its best known as the mineral that is stored in your bones and teeth. You need calcium from your diet to keep your bones and teeth strong. ²⁸

The heart is an essential core of our bodies. Eating heart healthy foods involves avoiding foods high in unsaturated fats and cholesterol that can lead to heart disease and possible failure later in life. Foods that increase the risk for heart disease include a direct link to unsaturated fats and cholesterol.

The foods you eat provide the energy your body needs to function. The main form of energy for your body is carbohydrates. Your body has the easiest time digesting carbohydrates like sugar and starch. Carbohydrates are broken down into individual glucose, fructose or galactose units. Glucose is your body's favorite form of energy. If you don't get enough carbohydrates, your body can make glucose from protein or fat. If you get too many carbohydrates, your body stores them as fat. Foods that are excessively sugary create fluctuations in blood sugar levels which may cause us to feel tired very shortly after eating. By eating a healthy diet, we maintain constant energy levels throughout the day. ⁸

Importance of Reading Nutrition Labels Lesson Plan

Most of the food that people in the U.S. eat today is obtained from the local grocery store in attractive convenient packaging. The attractive packaging can often mislead or confuse the consumer as to the true nutritive value of the contents found within. Students need to be aware of the nutritional value of the food products to make intelligent dietary choices for the rest of their lives. Be sure to check out Kidshealth.org for a thorough account of information on how to read a food label and how the nutrients are measured and listed.

Objectives: Students should be aware of all the nutritional information found on food labels, be familiar with the basic dietary needs of the human body, understand that food companies want their product to sell and package and label their product to attract the consumer know where and how to write a letter to a food company found on the label.

Materials: food labels brought in by students

Activities: 1) Each student should have several food labels. The students need to read thoroughly all information given on packaging; write down complete ingredients (these are sometimes surprising) and grams of protein, carbohydrates and fat per serving. 2) Using current health references (text, brochures, charts) review the six basic dietary requirements for maintaining a healthy body (carbohydrates, protein, fat, vitamins, minerals, water) and look for these on the labels 3) Create a classroom list of packaging and labeling techniques meant to attract the consumer; classify these appeals into categories such as good taste, low cost, convenience, health, etc; under the health category determine which health factors are being considered (low in calories, no cholesterol, fiber, no additives). 4) Emphasize the importance of analyzing food nutrition labels before purchasing the food in order to make healthy food choices which in turn will make us stronger physically and better learners! ⁸

Lesson Plan: Who Eats Breakfast?

Objectives: The students will conduct a classroom survey to see if children eat breakfast. The students will identify the reasons why eating breakfast is a smart choice. The students will identify different ways to encourage themselves and others to eat breakfast every morning. Students will understand that eating breakfast gives them energy and nutrition to think, learn and play.

Materials: Poster Board, Chart Paper, Crayons and Markers, Masking Tape, Breakfast Eating Form (follows lesson.)

Preparation: Set up a tally chart by drawing two columns labeled Yes and No. Draw an outline of a child on a piece of chart paper and hang it in the classroom. Make one copy of the Breakfast Eating Form for each child.

Procedure: 1) Use children's breakfast habits to introduce basic graphing. Start by surveying the class to collect data. Ask the students, "Did you eat breakfast this morning? Have the children place a tally mark in the column that represents their answer. 2) Then, gather the children around the graph and ask them questions like: What information does this graph tell us? What would be a good title for this graph? How many students ate breakfast this morning? How many students did not eat breakfast this morning? Did more students eat breakfast than not eat breakfast? 3) Now have the children who did eat breakfast, give examples of the food they ate. The teacher can also use the examples to classify the foods into the food group that they belong. 4) Talk with the students about the importance of eating breakfast every morning. Using the outline on the chart paper, discuss and record the following benefits of eating breakfast: helps brain grow and think, helps the body grow, makes bones strong, helps legs run and jump, provides minerals and vitamins. Explain to the students that when they do not eat breakfast, they can feel tired and grouchy. Explain that they will not have the energy to think about our school work or answer questions in class effectively. Tell them that without breakfast they will not have the energy to play. 5) Give each child a breakfast food chart for them to fill out and return the following week. Discuss how the keeping the chart will help them learn about their breakfast habits. 6) You can also have the students chart their daily activities, academic progress and emotions on a similar chart. 7) Discuss children's breakfast eating habits and reasons for not being able to eat breakfast. Brainstorm with the children ways they can remember to eat breakfast, (i.e. get up earlier, plan ahead by leaving the bowl and cereal box on the table the night before). 8) To have the students apply what they have learned they can then survey another classroom in the school about their breakfast eating habits and graph their data. Students should also take some time to teach them about what they learned about the importance of eating breakfast by presenting their own breakfast eating charts as well as their daily activity energy level, emotions and academic progress. 9) In groups of five students can create posters about the importance of eating breakfast that can be displayed in a hallway bulletin board or hung in the cafeteria. ²⁵

My Breakfast Habits

Day	Did I eat Breakfast? Yes or No	Grains	Vegetables	Fruit	Dairy	Meat / Beans	Other Foods
Sunday							
Monday							
Tuesday							
Wednesday							
Thursday							
Friday							
Saturday							

Notes

1. Hannaford, Carla. Smart Moves: Why Learning is Not all in your Head. Utah: Great River Books.2005. This book gives a very thorough look at the brain and body connection. It provides the research that explains why learning is a cumulative act, dependent upon nutrition, exercise, movement and emotional well being.
2. Jenson, Eric. Teaching with the Brain in Mind. Virginia: Association for Supervision and Curriculum Development. 2005. A teacher resource that provides insight on how to teach children based on their needs. It gives many differentiated approaches to teaching the same concept in order to meet the needs of the varied learners in your classroom.
3. Caine, Geoffrey and Renate. What Whole Brain Means: Why Wholeness Matters. New Horizons for Learning. 1997. These excellent authors provide detailed research about how to teach to the whole brain as well as the 6 developmental pathways.
4. Canada's National Statistical Information. "Using Graphs." 2006.
<http://www.statcan.ca/english/edu/power/ch9/using/using.htm#link5>>
A teacher website that outlines the importance of using and teaching graphs.
5. National Science Foundation. Math Expressions. Boston: Houghton Mifflin. 2006. This is a textbook for both teachers and students that covers the CT math standards..
6. Free Clip Art <http://www.barrysclipart.com>> Website with free clip art.
7. Excel Graphing Program
8. Nemours Foundation. "Kids Health" 2008. <http://www.kidshealth.org>> This is a student website with information about physical, mental and emotional health.
9. Resources for Science Learning. "The Human Brain." 2004.
<http://www.fi.edu/learn/brain/fats.html#fatsbuild>> This is a great teacher website that outlines proper

nutrition for cognitive function. It provides a detailed analysis of what the brain is composed of and what nutrients are needed to help the body think, play and learn.

10. Anderson, Nina and Meiser, Frances. *The Smart Brain Train*. Massachusetts: Safe Goods. 2007. This book is both student and teacher friendly. It provides activities designed to improve brain function. It also looks at what foods, exercises and mental activities that keeps the brain in proper shape.

11. Educational Broadcasting Association. "The Secret Life of the Brain." 2001

<http://www.pbs.org/wnet/brain/>> This is another teacher website that discusses the anatomy of the human brain from youth through adulthood.

12. National Digestive Diseases Clearinghouse. "Your Digestive System and How it Works" 2008.

<http://digestive.niddk.nih.gov/ddiseases/pubs/yrdd/>> This website provides a through account of the digestive system including step by step procedure and diagrams. Middle and High school students could also use this as a research tool.

13. Merck Manuals. "Biology of the Digestive System" 2008.

<http://www.merck.com/mmhe/sec09/ch118/ch118a.html>> This is a teacher website that outlines the basic components and operation of the digestive system.

14. Discovery Communications Inc. "The Circulatory System." 2000. <http://yucky.discovery.com/> > This is a terrific comprehensive website for children that outlines the functions of our human body systems and anything science related.

15. Dr. Peter Zeischegg. "Oxygen, The Missing Link." 2007.

http://www.drz.org/asp/conditions/oxygen_deficiency.asp#3> This website explains the importance of oxygen for proper brain function. It provides great graphics of the human body and visually shows how it is all connected.

16. Arco editorial Team. *The Human Body*. Cambridge, UK.: Konemann. This is a reference book that teaches the biology of the human body and its systems.

17. Instructor Web. "The Circulatory System." 2007

<http://www.instructorweb.com/lesson/circulatorysystem.asp>>This is a teacher resource that provides sample lesson plans on all subject areas for grades K -- 12.

18. Partners in Assistive Technology Training and Services. "The Muscular System." 2001

<http://webschoolsolutions.com/patts/systems/muscles.htm>> This is a comprehensive look at our muscular system. The diagrams and graphs are great for any age group but the reading is written at middle school level. It also gives reference to alternate resources as well as links to human body online activities.

19. Virginia Cooperative Extension. "Calcium Builds Strong Bones. 1999.

<http://www.ext.vt.edu/pubs/nutrition/348-019/348-019.html>> This website takes a look at the food pyramid and how nutrients like calcium and vitamin D help support our bones.

20. Moore, Joan. *How Your Body Works*. California: Evan Moore Corp. 1998.

This is a great teacher resource that gives sample activities and background information about the human body.

21. Teachnet. "The Human Body" 2008. www.teachnet.com> This is an educational teacher website that gives background research and suggested lesson plans for all subjects

22. Promislow, Sharon. *Making the Brain Body Connection*. Vancouver: Enhanced Learning and Integration Inc. 2005. This is a teacher and student friendly resource that answers many questions like "What is stress?" or "What part of my brain is dominant?"

It provides daily activities to enhance student learning based on the cognitive connection with the body systems.

23. The Scottish Government Publications. "Defining Mental Health and Well Being." 2005

<http://www.scotland.gov.uk/Publications/2005/11/04145113/51151>> This article explains some risk factors

that effect our mental health. It also shows how mental health is not its own entity but is connected with physical and social well being.

24. Edelson, Edward. Nutrition and the Brain. New York: Chelsea House Publishers. 1988.

This book outlines the link between what we eat and our cognitive function. This is a great resource for teachers to research the basic components of common foods and how they interact with the body's chemistry, mood and behavior.

25. Campbell's labels For Education. "Reading Food Nutrition Labels." 2006.

<http://www.labelsforeducation.com/default.aspx>> This is a general website that provides information about Campbell's soup labels and how they can benefit education. It also, however gives sample nutrition based lesson plans for teachers.

<https://teachersinstitute.yale.edu>

©2019 by the Yale-New Haven Teachers Institute, Yale University

For terms of use visit <https://teachersinstitute.yale.edu/terms>