

Discover Magazine: Brainstormers: Teacher's Guide

Grade Level: 6-8

Curriculum Focus: Human Body

Lesson Duration: Two class periods

Program Description

Explore the new technology helping doctors and scientists understand how the brain works. Is there a connection between creativity and mental illness? What are the differences between men's and women's brains? How much brain do we really need? Find out!

Onscreen Questions and Activities

Segment 1, Discover Magazine: Brainstormers, Part One

- Why was Carly's age an important factor in the success of her operation and recovery? (*Young patients like Carly are more likely to make it through long operations and have a greater capacity to relearn tasks than older patients.*)
- How can scientists "watch" the brain at work? (*Scientists "watch" the brain at work by monitoring the blood flow through the brain while it performs different tasks.*)
- Discuss the pros and cons of using drug treatments like lithium carbonate to medicate people who suffer from manic depression. Use the testimony of people in the documentary to start the discussion.
- Activity: Create a psychological profile of an artist who was "touched with fire" using biographical or autobiographical information in your library. Also, study the artist's work to gain insights into his or her genius.

Segment 2, Discover Magazine: Brainstormers, Part Two

- How did Dr. Ramachandran's experiment confirm his theories about the interactions between different parts of the brain? (*Dr. Ramachandran's experiment found that the part of the brain controlling touch and the part processing vision interact to the extent that vision changed the pain sensations experienced in a phantom limb.*)
- What is the difference between the brain activity of men and women when they perform speech functions? (*According to some scientists, women use both sides of their brain while they talk while men use only one side.*)
- Discuss whether you think social or genetic influences create differences in play styles of boys and girls.

- Activity: Make a model of the human brain and indicate the functions performed in each section. Then find out what areas might be responsible for specific difficulties in learning, speech, and motor skills and report your findings to the class.
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Lesson Plan

Student Objectives

Students will understand:

- The brain is made up of different parts, each of which performs a different function.
- An injury to any one part of the brain will impede the function performed by that part.
- Safety precautions to prevent brain injuries are important.

Materials

- *Discover Magazine: Brainstormers* video and VCR, or DVD and DVD player
- Research materials on the human brain
- Computer with Internet access
- Materials to make diagrams or three-dimensional models of the brain

Procedures

1. Discuss with your students what they know about the brain. Make sure they understand that the brain is made up of different parts, each of which performs a different function.
2. Ask the class what kinds of injuries can occur that would impede the brain's functions. Students may mention car accidents, bike accidents, accidents in which a heavy object hits someone in the head or falls on someone's head. They might also mention illnesses and disorders such as brain tumors. Briefly discuss safety measures such as seat belts, bicycle helmets, and hard hats that people can use in order to prevent head injuries.
3. Tell students they are going to find out what the brain really looks like. They are going to make maps of the human brain, identifying each part and finding out what its function is. Have your students work in groups to research and map the brain.
4. After students have completed their research, have group members work together to create either a three-dimensional model or a diagram of the human brain. Each part of the brain should be labeled with its name and function.
5. Have each student, working individually, imagine an injury to one part of the brain and predict its impact on brain function. Each student should write a paragraph describing the injury and predicting its impact on brain function. For example: What effects might a strong blow to the occipital lobe have? A tumor in the parietal lobe?



6. Students may accompany their paragraphs with safety posters promoting the use of safety devices to prevent head injuries.

Discussion Questions

1. Why do scientists believe it is easier for young children to relearn functions that were lost due to brain damage than it is for older people who may have suffered brain damage due to a stroke?
2. How are men's and women's brains physically different?

Assessment

Use the following three-point rubric to evaluate students' work during this lesson.

- 3 points: Students' diagram or model correctly identifies the name and function for all the major parts of the brain; individual paragraph correctly identifies function of the chosen part of the brain; correctly predicts impact of injury on brain function; paragraph well organized with no errors in grammar, usage, and mechanics.
- 2 points: Students' diagram or model correctly identifies the name and function for most of the major parts of the brain; individual paragraph correctly identifies function of the chosen part of the brain; correctly predicts impact of injury on brain function; paragraph somewhat lacking in organization; several errors in grammar, usage, and mechanics.
- 1 point: Students' diagram or model identifies the name and function for some of the major parts of the brain, with some inaccuracies; individual paragraph includes some inaccuracies regarding the function of the chosen part of the brain; includes some errors in predicting impact of injury on brain function; paragraph poorly organized; many errors.

Vocabulary

dyslexia

Definition: A learning disorder marked by impairment of the ability to recognize and comprehend written words.

Context: The Shaywitz's were hunting for the part of the brain responsible for the reading disorder called dyslexia.

hemispherectomy

Definition: The surgical removal of either of the lateral halves of the cerebrum part of the brain.

Context: This procedure, called a hemispherectomy, is helping researchers understand some of the fundamental mysteries of the brain.

lithium carbonate

Definition: A white, granular powder, LiCO_3 , used in the manufacture of glass and ceramics and in the treatment of depression and manic-depressive illness.



Context: A chemical compound called lithium carbonate is the standard treatment for manic depression.

manic-depressive illness

Definition: A psychiatric affective disorder marked by alternating episodes of mania and depression. Also called bipolar disorder, bipolar illness.

Context: Manic-depressive illness is an illness of extreme moods and behavior and energy levels.

neurologist

Definition: A person who practices the medical science that deals with the nervous system and disorders affecting it.

Context: As a neurologist, Dr. Ramachandran knew that Derrick's pain was coming from his brain and not his missing limb.

neurons

Definition: Any of the impulse-conducting cells that constitute the brain, spinal column, and nerves, consisting of a nucleated cell body with one or more dendrites and a single axon. Also called nerve cell.

Context: The brain's remarkable powers are generated by 100 billion neurons.

nurture

Definition: The sum of environmental influences and conditions acting on an organism.

Context: In other words, is it nurture or nature that explains the differences between male and female brains?

seizure

Definition: A sudden attack, spasm, or convulsion, as in epilepsy or another disorder.

Context: Inside her skull the remaining left half of her brain has taken over most functions once performed by the right, and her crippling seizures are gone.

Academic Standards

National Academy of Sciences

The National Science Education Standards provide guidelines for teaching science as well as a coherent vision of what it means to be scientifically literate for students in grades K-12. To view the standards, visit <http://books.nap.edu>.

This lesson plan addresses the following science standards:

- Life Science: Structure and function in living systems

Mid-continent Research for Education and Learning (McREL)

McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit

<http://www.mcrel.org/compendium/browse.asp>.

This lesson plan addresses the following national standards:

- Science – Life Science: Understands the structure and function of cells and organisms.
 - Health: Knows how to maintain mental and emotional health.
 - Behavioral Studies: Understands that interactions among learning, inheritance, and physical development affect human behavior.
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Support Materials

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the Discoveryschool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- <http://school.discovery.com/teachingtools/teachingtools.html>
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