

The Brain & Skull: “*The Magic Wand*”

GOAL

The goal of this lesson is for the students to understand that there is localization of function in the human brain. The students will learn the location of the primary motor, somatosensory, sight, and hearing cortices, and predict the proper response of a simulated stimulation of these areas.



Set-up:

- Brain model
- Giant functional brain
- Poster of the cross-sectional view of the brain with cortices highlighted
- Student worksheets
- Colored pencils
- ”Magic Wand”



PROCEDURE

Engage (5 minutes)

- Review brain anatomy terms (brain stem, cerebellum, corpus callosum, cortex, hemisphere) and the function of these structures.
- Write information gleaned from the students on the board. Students may ask other students for help if needed.

Explore (10 minutes)

- Introduce the concept of localization of function by asking students if different parts of the brain are responsible for seeing, moving, feeling, and hearing. Have students hypothesize where these functions occur in the brain.
- Display a brain model, and have students point out where they think these functions occur. Remind students that each hemisphere controls the opposite side of the body (right hemisphere controls left side, left hemisphere controls right.)



PROCEDURE

Explain (15 minutes)

- Display a large poster of the brain, highlighting the primary motor and somatosensory cortices, the visual cortex, and the hearing cortex. These cortices are numbered 1 through 6, with two points marked on the motor and somatosensory cortices. Explain to the students the functions of these cortices.
- The two numbered areas on the motor and somatosensory cortices correspond to the points where external stimulation would produce motor and sensory responses in the hand and mouth area. Briefly describe the studies of Dr. Wilder Penfield, and explain how he used electric current to stimulate different areas in the brains of conscious patients.
- Discuss the difficulties of doing brain research without the benefit of modern technology.
- Pass out a student worksheet depicting a large cross-section of the brain, with the cortices under discussion clearly marked.

Expand (10 minutes)

- Pass out colored pencils, and ask the students to write the appropriate number on the marked cortices.
- After this is completed, the students are asked to color each cortex a different color. Discourage the use of one color for all of the cortices, as this does not reinforce the concept of the lesson.

Evaluate (15 minutes)

- Display a ‘magic wand’. (The one we used was painted gold and had a star on the end of it.) Explain to the students that this magic wand can stimulate the areas of the brain that we have been discussing.
- Point to the numbered area on the large brain poster, and then ‘stimulate’ the same area on the brain of a volunteer student.
- The appropriate responses are:

Point 1: Involuntary movement of the hand on the side opposite the point on the hemisphere stimulated;

Point 2: Involuntary mouth movement;

Point 3: Sensory sensation in the opposing hand;

Point 4: Sensory sensation in the mouth area;

Point 5: Flashes of light seen, though eyes are closed;

Point 6: Sound detected in the ear opposite the stimulated point.

- Repeat this activity with numerous volunteer students, varying the number and hemisphere sequences. Ask the class if the student is correctly responding to the stimulation. The volunteer student may ask a fellow



PROCEDURE

student for the correct response.

- If time allows, a volunteer student may stimulate the various points on the staff member, and ask what the appropriate response would be. Alternatively, a volunteer student may use the 'magic wand' to stimulate the various points on another volunteer student, and hopefully elicit the proper responses. This portion of the lesson proved to be quite popular with the students.
- Pass out the Brain Explorer folders and have the students place their worksheets inside. Collect the folders.
- It is a good idea to practice the proper responses before class, because a mistake by the instructor can be somewhat embarrassing.



- **Key Cognitive Skills:**
Observing, Classifying, Describing, Collecting and Recording Data
- **Vocabulary Terms:**
Primary Motor Cortex
Primary Sensory Cortex
Visual Cortex
Hearing Cortex
Stimulation
- **Specific Outcomes:**
 - Students will be introduced to the localization of function concept and given some historical background concerning early neurosurgery techniques that provided the basis of our present understanding.
 - Students will hypothesize possible areas of localization, and learn the correct locations of these areas through the use of simulated stimulation and a reinforcing art activity.

PROJECT 2061 BENCHMARKS FOR SCIENTIFIC LITERACY

6 C Basic Functions

-children can begin to view the body as a system, in which parts do things for other parts and for the organism as a whole.:

The brain gets signals from all parts of the body telling what is going on there. The brain also sends signals to parts of the body to influence what they do.

11A Systems:

In something that consists of many parts (in this case, the brain) the parts usually influence one another.

11 B Models:

..diagrams, sketches, ..maps, and stories can be used to represent objects..and processes in the real world, although such representations can never be exact in every detail.

12 D Communication Skills:

.. make sketches to aid in explaining procedures or ideas. Use.. data in describing and comparing objects and events.

