Your Brain: Memory and Multitasking

In the workshop *Your Brain: Memory and Multitasking*, your students will be challenged to think about how they think—from paying attention to remembering information to doing two things at once—and consider ways in which a better understanding of these brain processes can help them to be more successful in a learning environment. Prepare your students for the workshop and the *Your Brain* exhibit with these activities that engage their thinking about the brain and the complexity of the tasks it performs.

**Discussion 1:** What do you know about your brain?

**Time:** 15 minutes

**Goal:** Activate students’ prior knowledge about the brain and engage their curiosity about the brain’s structure and function.

- Challenge students to think of things they know about the brain. Make a class list of facts they know (or believe to be true) about the brain.

- What things do they wonder or want to know more about? Make another list of questions they have about the brain.

- Before visiting the museum, encourage each student to choose a question from the list about which they’d like to find more information during the visit. Save the lists of facts and questions and revisit them after the field trip.
Pre-visit Resources

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**DISCUSSION 2:** WHAT DOES YOUR BRAIN DO?

**TIME:** 15 minutes

**GOAL:** Highlight the variety of functions in the human brain and consider possible ways those functions could be organized.

- Brainstorm as a class the different tasks for which the human brain is responsible and record the group’s responses. Encourage students to be specific—what different types of “thinking” are there? What different steps might be involved in the act of catching a ball? What specific things does your body need to do to stay alive?

- Ask the group to look for patterns; can the tasks be organized into larger groups of similar function? Which tasks would they group together, and why? Is there another way to group them? How do they think these tasks might be organized in the brain itself?

- There is no right or wrong way to group the tasks; the goal is not to correctly guess how they are organized in the human brain, but rather to think analytically about the different types of processing the brain engages in. One possible organization:
  - Basic life functions: heart rate, breathing, digestion, hunger/sleep signals, etc.
  - Sensory input: sight, sound, touch, taste, smell
  - Movement: controlling muscles, “how to” memory, body awareness
  - Thinking: memory/recognition, decision-making, attention/focus, language

**ACTIVITY:** PROGRAM YOUR PARTNER

**TIME:** 20–45 minutes

**GOAL:** Illustrate the detail and complexity of the messages the brain receives, coordinates, and sends during everyday tasks.

**MATERIALS:**
- Pencils
- Paper
- Blindfolds or other means of obscuring vision

**PROCEDURE:**

1. Divide the class into groups of three. One student from each pair will be the “body,” one student will be the “brain,” and one student will be the data recorder.

2. The goal is for the “brain” to direct the “body” to bend over, pick up a pencil from the floor, and stand back up. However, the body will be blindfolded, and can only do exactly what the brain says, no more and no less. The brain must give very specific instructions—which body part to move, how far, in what direction, etc.—or else the body cannot respond.
3. Instruct each group to find a space clear of obstacles. The “body” should stand in the center of the space and be blindfolded. The data recorder should place the pencil on the floor within comfortable reach of the “body.”

4. As the “brain” gives directions to the “body,” the data recorder writes down the commands given.

5. If time allows, encourage students to switch roles and try again.

**REFLECTION:**
- How many commands did it take to complete the task of picking up a pencil? How many mistakes/corrections were there? What were the hardest parts of the task?

*Even simple movement tasks require complicated sequences of messages to be sent to individual muscle groups; these have to be coordinated with incoming messages from sight and touch sensors about where the body is in relation to the things around it, and adjusted accordingly.*

- If students had a chance to switch roles, how did the “brain” and “body” roles compare? What were the hard or easy parts of each? Was there any difference between those who were the “brain” first, and those who played that role later?

As a task is repeated, the brain strengthens the connections among that particular group of messages, making it easier to produce the same sequence later. This “muscle memory” is stored in the cerebellum, the brain’s center for balance and movement. Once a task has been repeated enough times, the message sequence can be sent without requiring other parts of the brain’s processing systems (like attention, decision-making, etc.), leaving them free for other tasks. *This is why everyday movements like walking, bending, or reaching happen without having to think about each step of the process.*

**EXTENSION:**
To emphasize the brain’s role in coordinating many different types of input and output, repeat the activity, but this time **add a third link to the communication chain. Assign the three members of each group to be “body,” “brain,” and “eyes.”** In this round, the “brain” must sit or stand with her back to the “body,” so that she cannot see what the body is doing.

The “eye” stands so that he can see the “body;” however, the “eye” can only communicate visually (drawings, hand gestures, etc.) with the “brain” about what the body is doing.

Communication flow should look something like this:
- Brain gives verbal command
- Body moves
- Eye communicates to brain via drawings or gestures where body is/how position has changed, etc.
- Brain gives next command, etc.

How does this change the activity? What were the challenges in this version?