Cognition Outreach Module
Grades 6-8

Driving Question: In what ways can we improve and alter our brain function?

Objectives: Students will be able to…

• Define the term cognition.
• Explain how quality of sleep affects brain function.
• Use mnemonic devices to improve working memory capacity.
• Understand how things move from short-term into long-term memory.
• Discuss the different parts of the brain in the different types of memory.

Next Generation Science Standards:

• MS-LS1-8 Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.

Materials:

• Video- multitasking

Procedure:

Engage: Ask the following questions:

• What does your brain do?
• What defines memory?
• What are the 2 main types of memory?
Explore:
- Learning and Memory
  - Short-term Memory: Number/Letter task
  - Long-term Memory: Grocery list
- Attention
  - Monkey Business video
  - Task-switching
- Decision making
  - Eating healthy, having a healthy lifestyle

Explain:
- Different parts of the brain have a certain job. Discuss primarily the lobes and specific areas for decisions and emotions (prefrontal cortex).
- **Learning and Memory**: Divide the class into groups by how many hours of sleep they received during the previous night. Write the following set of random numbers on the board: 12, 3, 15, 6, 8, 20, 1, 17, 5, 2. Allow the class 30 seconds to look at them then cover it up. Have them record as many numbers as they can remember.
- **Chunking**: Hold a piece of paper with the letters (ABCFBICIABIO). Allow the class 30 seconds to look at them then hide the paper. Have them record as many numbers as they can remember.
- **Attention**: Watch the Monkey Business video on YouTube and discuss.
- **Decision Making**: Brainstorm different healthy and unhealthy living habits and construct healthy daily habits for the students to try. Allow them to set a personal goal and record how it will benefit them and their brain function.

Elaborate:
- **Learning and Memory**
  - **Short-term memory** is like a workbench. It holds 7+/ - 2 pieces of information. The 7 is key (like a phone number of information for only about 30 seconds. The prefrontal cortex is involved in storing information in short-term memory. After 30 seconds, unless you have processed the information into your long-term memory, it will be lost.
  - We can increase the amount we retain in short-term memory by "chunking". You can use acronyms or relating the information to something you know much about.
• If the students were divided into groups based on how much sleep they received, create a graph as a group displaying the results of those who received more sleep versus the groups who received less sleep.

• **Long-term Memory:** Grocery List
  o Ask the class to remember this grocery list:
    ▪ Honey, dog food, sugar, oranges, ice cream, peanut butter, bread, pork chops, milk, potato chips
  
    • Ask them how much of the list they remember, then retell it in a story:
      o We begin in the kitchen and see *honey* dripping down the toaster on the counter and a giant Saint Bernard eating his *dog food* on top of the kitchen table. We proceed to the living room, where *sugar* is embedded in the carpet, *oranges* are under the sofa pillows, *peanut butter* is stuck between the piano keys, and *ice cream* is roaring in the fireplace. We proceed up the stairs, with a slice of *bread* on each step. *Pork chops* are floating in the bathtub, *milk* is tipped over on the dresser in the bedroom, and *potato chips* are stuck between the bedsheets.
      
      • Now review the story with the class and see how much more they can remember by adding visual cues and meaning behind it.
  
    • Sleep is extremely important in memory! When you sleep, your memories are consolidated and organized, which can also improve your short term memory. Often we see a relationship between the number of hours you sleep and the amount of numbers you remember from the learning and memory number activity. Growth hormone is also secreted during sleep and your immune system reboots itself. The brain also prepares to concentrate and learn new information. If you are sleep deprived for long periods of time you will be irritable, have short-term memory dysfunction, and sometimes have paranoia.

• **Attention/Multitasking:**
  o Your brain can only focus on one thing; this is what we call selective attention. When focusing on the white, you ignore the black, missing the giant gorilla. We cannot remember what we don't pay attention to; therefore, distracted people do not learn.

**Evaluate:**
• Did the CEN Outreach volunteer teach the student objectives?
• Did the CEN Outreach program reach the goals of the teacher?
• Did the CEN Outreach program reach it's own goals/objectives?