# Promoting Interest in STEM through Neuroscience in a Local After School Program

Melissa Kaplan, Tucker Landwehr, Julie Perrone, William Widarsono, Aimee Owens, Terence Bazzett



# 💫 SUNY Geneseo Neuroscience Program 🔱





#### Introduction

Recently, in the education system, an emphasis has been put on encouraging children to participate in different Science, Technology, Engineering, and Mathematics (STEM) fields. However, many engaging programs related to STEM fields may be less accessible to socially or economically disadvantaged populations. Thus, students enrolled in Applications in Neuroscience, NEUR 215, were connected with 4th to 6th grade students from Geneseo through the RKids program sponsored by AmeriCorps, Over the course of three different weeks, the NEUR 215 students created PowerPoint presentations and virtual hands-on learning activities focused on the subject of neuroscience that were presented over Zoom. These euroscience-related activities were created with primary goals of enhancing both the children's knowledge of, and their interest in, possible future STEM careers.

## Method

Three educational activity sessions suitable for Zoom presentation were developed for the Spring '21 semester. Each lesson followed a PowerPoint presentation format and contained information on neuroscience topics deemed relevant for the age group in attendance. In each session, there were 1-5 children present.

- Session 1 (February 25th, 2021) was designed to encourage learning about the four lobes of the brain. For this activity, the children (n=4) first learned basic functions of the four lobes, after which they colored and labeled an image of a brain. The children then received an "activity bag" containing items related to the five senses (glow stick-sight, hand sanitizer-smell, squishy toy-touch, harmonica-sound, and lollipop-taste). At the end of the presentation, they learned how the four lobes contribute to processing input from the five senses. To conclude the session, the children played Kahoot! (a game-based learning platform with multiple-choice guizzes) based on information that had been presented.
- Session 2 (March 25th, 2021) was designed to encourage learning about how the brain perceives images. For this activity, the child (n=1) first learned how optical illusions "fool" the brain. He then saw four optical illusions (hollow face, 3-D hand, blind spot, and Penrose triangle). At the end of the presentation, the child applied the concept of an optical illusion through creating four examples (taped together a 3-D paper dragon to see its hollow face, and drew a 3-D hand, blind spot. and Penrose triangle on computer paper). To conclude the session, the child played Kahoot! based on information that had been presented.

• Session 3 (April 8th, 2021) was designed to encourage learning about memorization techniques. For this activity, the children (n=2) first learned the definition of memory and memory applications. The structure and function of the hippocampus was emphasized. The children were then presented with 3 ROTE memorization techniques: chunking, mnemonics, and working memory. To do this, they received an "activity bag" containing games to apply each ROTE memorization technique. To demonstrate chunking, they categorized four food groups (frozen foods, dairy, bakery, and fruits/ vegetables) by gluing labeled food cards onto a piece of computer paper. To demonstrate mnemonics, they learned "Hot Cross Buns" on the recorder with the notes "B-A-G." To demonstrate working memory, they played "Simon Game" and clicked every color that previously lit up (i.e. red, green, yellow, blue, yellow). At the end of the presentation, the children played Kahoot! based on information that had been presented. To conclude the session, the children took a post-assessment survey to evaluate the level of interest in science concluding the sessions.

### Results

Session		# of Students	Correct Answers	Incorrect Answers	% Correct Answers
	1	4	10	26	27.78%
	2	1	7	0	100%
	3	2	12	6	66.67%

Table 1. Kahoot! quiz data through all 3 meetings.

The children were assessed with an interactive guiz medium, Kahoot! The purpose was to gauge how well the children retain information throughout the presentation. In addition, the quiz medium served as a general guide of what presentation elements the children picked up on. Although the number of children varied, % correct answers increased compared to the first meeting.

Student	Interest
A	5
В	4.8

Table 2. Post-assessment survey of the level of interest in science from a 1 to 5 scale. 1 indicated less interest in science. 3 expressed the same level of interest, and 5 indicated more interest

During the last session, a postassessment survey was administered to evaluate the level of interest in science concluding the meetings. Children were asked to rate their interest in science on a 1 to 5 scale. 1 indicated less interest in science, 3 expressed the same level of interest. and 5 indicated more interest in science. Both children present indicated more interest in science.

### **Discussion**

In collaboration with the RKids after-school program, NEUR-215 students assessed the level of interest in science in addition to the percent of correct neuroscience-related questions answered by socioeconomicallydisadvantaged elementary school children. At the end of session 3, two remaining children rated an increased interest in science. We observed an increase in the percentage of correct answers from the participating children over the three sessions. At the beginning of the program, some children were new to using Kahoot! which may have impacted the correct answer percentage in the first session. We also noticed that more children participated in the program when the "activity bags" were filled with more physical items than not. Furthermore, we learned the importance of communal skills, specifically pertaining to science, children, and adolescentlearning as a whole. It is important to note that conducting these activities via virtual means did not hinder our ability to collect some useful data. We recommend extended studies aimed towards the effects of virtual learning on children's interest in the program and their ability to stay engaged.

Figure 1. (right): During session 1. the children tasted lollipops as they learned about the role of the parietal lobe in the tasting process.

# Lollipop (TASTE)

- After eating the sweet candy, receptor cells send signals through nerve channels from the tongue to the brain
- It then gets sent to the parietal lobe to process information about the taste



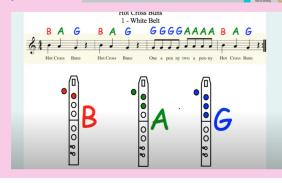




Figure 2. (left): During session 3, the children played a recorder as they learned about mnemonic memory.