



# A Neuroscience Approach to Fostering STEM Education in Elementary School Students: Impact of STEM Workshops at the Rkids Afterschool Program

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## Introduction

With the recent emphasis placed on science technology engineering and mathematics (STEM) in the education system, schools are now striving to build stronger curricula around these subjects. However, access to quality STEM learning opportunities is often limited for youths, making it difficult to generate enthusiasm about seeking STEM-based careers. Related research has shown that interactive learning environments aid in making information enduring and pertinent to students' lives. With this in mind, the Geneseo Neuroscience Program teamed with our AmeriCorps Vista representative to educate and engage local children about STEM related topics in an applied manner. To do this, neuroscience majors dedicated four weeks to developing workshops followed by five weeks of engaging local children in an active service-learning experience. Children involved in this program were being served by an afterschool program known as RKids that is sponsored by Vista AmeriCorps in cooperation with St. Michael's Episcopal church. The basic goal of our efforts was to entertain and educate children, while also increasing awareness of, and enthusiasm for, STEM based careers such as those in the field of neuroscience.

## Abstract

Recently, there has been a surge of education promoting Science, Technology, Engineering and Mathematics (STEM) in the United States. Within the overarching field of science, one of the fastest-growing areas is the study of neuroscience. Increasingly advanced research technology and methods allow for a better understanding of how and why the nervous system functions and malfunctions, and how researchers can work to prevent and combat some common malfunctions such as neurodegenerative disorders. Neuroscience is a field of the future, making it beneficial to begin teaching students about the brain and nervous system as early as elementary school. Sparking an early interest in STEM fields is essential to future research and advances in medicine, and beyond. Thus, SUNY Geneseo Neuroscience majors enrolled in Applications in Neuroscience (NEUR 215) have spent the current semester developing a set of workshops to present at an afterschool enrichment program for 4th-6th graders. These workshops are designed to expose students to a wide range of basic neuroscience activities, including studying anatomical structure of the brain and perceptual abilities involving visual and tactile stimuli. Basic student understanding and interest were assessed pre and post-workshops to determine the relative impact of this novel program.

## Methods

Workshops were conducted twice weekly for five weeks. Each day focused on a different division of neuroscience.

- February 28th—Brain anatomy
- March 1st—Frontal lobe, Parietal lobe, and Cerebellum functions
- March 7th—Temporal lobe and Occipital lobe functions
- March 21st—Candy Neuron
- March 22nd—Sensation and Perception
- March 28th—Spinal Reflexes
- March 29th—Concussions
- April 4th—Brain Bingo
- April 5th—Jello Brain and Assessment



Candy Neuron Activity



Brain Protection Workshop



Demonstrating Importance of Brain Protection



Jello Brain

Quantitative data were limited due to the nature of this program. Prior to the five week program, children were unable to identify the lobes when given a blank "pre-assessment" coloring sheet detailing the structures of the brain. Of the children in attendance during the first session, five of the five students incorrectly identified the lobes. Post assessment activities such as "Brain Bingo" and a repeat of the lobe coloring activity showed retention of information learned through the program and increased interest in the field of neuroscience. Of the six students who attended the last session, one was able to correctly identify each of the lobes. Children were also able to recognize key terms used throughout the study such as "frontal", "parietal", "temporal", "occipital", "dendrite" and "axon".

The overall experience working with children in the RKids program was rewarding for all parties involved. When first attempting to teach children in fourth through sixth grade about the brain, designing workshops that were both engaging and educational was challenging. After research into similar programs, we created interactive activities to keep kids focused on various STEM and neuroscience topics. Although each child participated in the activities when presented, some were more engaged than others, and attendance throughout weeks was inconsistent. Future programs should end each session by revisiting topics with all the children instead of only the few who continued to ask questions. Also, reiterating important concepts throughout the session will help the children retain information. Lastly, even though the interactive activities were entertaining, perhaps more careful assessment could be used to better evaluate the learning that occurred in future programs.

Chudler, E. H., Ph.D. (2017). Neuroscience for Kids. Retrieved from <http://faculty.washington.edu/chudler/experi.html>