Virtual Community Outreach for Elementary School Students in R-Kids After-school Program: A Novel Way to Teach Children about Neuroscience

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Abstract

Applications in Neuroscience (NEUR215) offers an opportunity for community outreach within the Neuroscience major. Students enrolled in NEUR215 create neuroscience-based activities designed to foster an excitement for science and to promote higher education in elementary school students recruited through the R-Kids after-school enrichment program. Four one-hour live sessions were held via Zoom with 2-5 R-Kids participants attending each session. Due to the COVID-19 pandemic, all lessons were transitioned virtually during the fall 2020 semester, and effective teaching strategies in a virtual environment were explored. The results of this investigation showed that online learning can be both fun and effective. Inviting student participation, providing hands-on activities to follow the lessons, and having pre-recorded lecture material were strategies that seemed most effective at fostering a virtual learning environment.

Objectives

Four one-hour live sessions were held via Zoom with 2-5 students at a time from the R-Kids after school program. The neuroscience lessons aimed to foster excitement for science, with the hopes of sparking interest in pursuing college in the future through exposure to college students and research labs. Due to the COVID-19 pandemic, all lessons were offered virtually during the fall 2020 semester. Although learning in a virtual format was novel, the goal to foster excitement about the field of neuroscience remained the same. Throughout the semester children were observed to determine if they remained engaged and enthusiastic about the presentations

Quotes from Children

- "The most interesting [thing we did] was making the candy neuron [we] made the structure and then ate it. I'm thankful for all I learned"
- "I learned that the brain transfers stuff with electricity"
- "[I learned that] the brain uses electricity and we have lots of lobes"
- "I learned that octopuses have 500 million neurons"

Methods

10/22 ***What happens when you "break" your brain?***
-Each sense was attributed to its corresponding brain lobe and students applied their understanding to "broken brains" (ie. "Without the parietal lobe, an individual would be unable to feel this play dough in the way that we can right now. ")

10/29 ***Could Frankenstein really have been brought to life? How neurons communicate through electricity***

Frankenstein's electric shock into life was playfully related to the relay of electric signals within the brain, and communication between neurons was explained.

-Children applied their understanding of the structure of a neuron by creating a version out of candy, in the spirit of Halloween.

11/2 ***"Qualities that help us be Scientists: You have them too!"***

-Everyone shared qualities they believe they have in an effort to help children view themselves as capable future-scientists.

-Children watched a pre-recorded tour of the Neuroscience research labs at Geneseo to see "scientists at work" and a dissection of a sheep's brain in which basic structures were identified.

-Children then followed along making a playdough model of the brain featuring the structures shown in the sheep brain, acting as scientists themselves.

12/10 ***Brain Protection, Jeopardy Game Review & Reflection***

-Children watched a pre-recorded melon drop experiment with and without a helmet, emphasizing the importance of brain protection.

-Children played an interactive Jeopardy- style review game of basic knowledge taught throughout the previous lessons.

Take Home Gifts

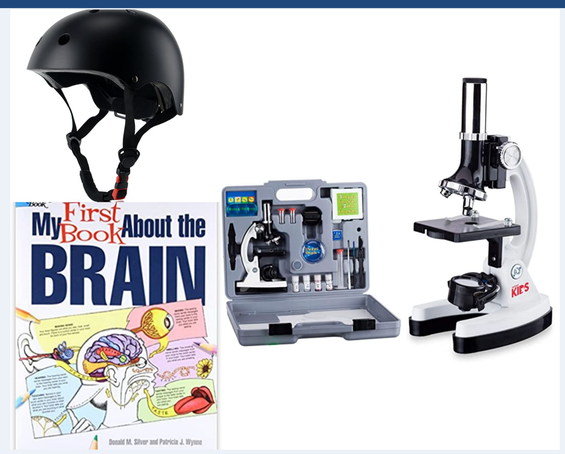

Fig 2. Take-home gifts for participating students. Through the generosity of the R-Kids program, each child received a helmet to emphasize brain protection, a miniature microscope, and brain coloring/informational book.

Conclusion

All children participating showed a high level of interest in the material presented, displayed through verbal participation and completion of the corresponding activities such as creating the candy neuron and play-dough brain. The first lesson, featuring the roles of each brain lobe, was grasped almost immediately by the children, and therefore subsequent lessons were adjusted to be more difficult. In an effort to keep the children engaged and actively participating, activity bags were sent home so children could follow along in real time. It seemed that activity bags helped the children remain better engaged through a digital format, and contributed to their enthusiasm. Additionally the children were visibly excited when they learned they would be receiving science related gifts, and we are hopeful that these gifts will continue to foster curiosity and interest in neuroscience now that our lessons have finished. In the jeopardy review game, it was clear that the children retained some information; they were able to answer all true/false questions without the help of any volunteers. Therefore, despite the challenge of interacting in a virtual environment, the children were engaged and excited to learn about neuroscience and participated frequently. With the uncertainty of the future, virtual learning could potentially be a more frequent and useful alternative for teachers/professors around the world.