Introducing Young Minds to Topics in Neuroscience

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Abstract

The Applications in Neuroscience (NEUR 215) course allows SUNY Geneseo neuroscience majors to share their knowledge and interests with local elementary-aged children through a partnership with the local R-Kids program. R-Kids is an afterschool program that provides children with homework tutors and interactive enrichment activities. Due to COVID-19, NEUR 215 activities were entirely online and designed to be done virtually by the children at home. Activities were designed to increase interest in STEM-related fields, particularly neuroscience. Topics covered during the enrichment sessions included the neurons' anatomy, neurotransmitters, learning, memory, brain health, and brain safety. These topics were covered through Google slides by providing brief and age-appropriate information. After covering the topics, interactive activities ensued, such as the egg-drop, virtual memory games, and kahoots. The children, across three sessions, were engaged and remembered many topics as shown during the end-of-class jeopardy game. Neuroscience students began the semester with little if any experience lesson planning for children, but quickly learned skills for making enrichments effective and efficient. All students felt that over the course of the semester, they had stimulated the children's interest in neuroscience and perhaps also motivated their educational futures.

Methods

All sessions for this project were run via Zoom due to COVID-19. Three meetings were held over the duration of the semester. Each meeting was designed to teach the children about a different topic in neuroscience. The meetings consisted of a mix of presentations, quizzes, games, and hands-on activities to help the children learn about these topics in an enjoyable and interactive way. Prior to each meeting, we sent the director of the R-Kids program a list of materials to be provided to the children in their activity bags for the hands-on segment of each meeting. Brief informal surveys were also given at the start of each meeting to determine each child's prior knowledge of the subject matter. This was compared to a brief post-test survey given during the final meeting session to determine how much information the children retained from the previous meetings.
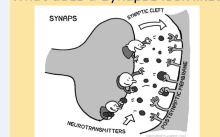
Sessions

Figure 1: A fun cartoon was used to demonstrate how neurons communicate via neurotransmitters

February 23: Neuron Anatomy and Neurotransmitters

During this session we taught the children about the parts of the neuron using candy like twizzlers, mike&ikes and marshmallows. We also talked about neurotransmitters and how neurons communicate with each other.

March 23rd: Brain Plasticity, Memory and Learning

The second session involved fun memory games to teach the children about the brain's memory storage and how we learn and store information. The children also learned about short term and long term memory.

Figure 2: Children were engaged in an online *Simon Says* game to test their short term memory

April 6th: Brain Safety

This session consisted of activities that emphasized making healthy decisions that positively affect brain health. Our main goal was to put an importance on wearing a helmet at appropriate times. To demonstrate this, we did an activity that involved making a safe "helmet" for an egg with items found within the children's homes that was then dropped onto the floor. The children all said that they have helmets and showed them to us on camera. They were given information about how to get a new free helmet if they ended up growing out of theirs.
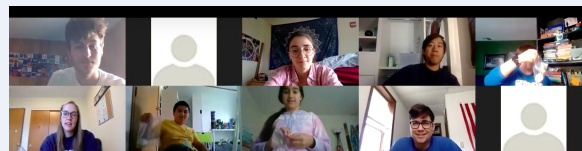

Figure 3: A live-egg drop demonstration was implemented to provide an interactive experience in learning about brain safety.

Conclusion

Throughout the sessions, neuroscience students took counts of what the children's favorite subjects were in school and whether or not they considered attending college. This was done in an effort to determine how much interest they already had in pursuing STEM-related education/work. All four children reported plans to attend college, and their favorite subjects were science (2), history (1), and math (1). As the semester progressed, the children were appeared increasingly interested in the topics presented as indicated by their increased interactions during activities. Overall, the experience from this course provided insight into what it is like to teach and engage younger children in interactive scientific learning activities. Throughout the multiple sessions, we found our activities were more interesting for the children since we were able to get a better understanding of their skill levels.

Future Directions

As a whole, it is very difficult to collect any quantifiable data from working with the R-kids. Our group, and those who work with the R-kids in the future, will work to develop a system that will allow for data collection. This may include using simple quizzes each session or kahoots. It may also include doing more sessions with the kids to have a long duration to attempt to collect data. As of now, the R-kids project is a fun way of educating kids and connecting them with older role models. However, it would be beneficial to our organization or fellow researchers that may want to develop a similar program in their area. Data will allow these individuals to trust that this type of program actually provides valid information and education to the children involved. Until quantifiable information is collected, the SUNY Geneseo students will remain connected and assume that this is an enjoyable and educative experience for both parties.

Acknowledgements