An interactive neuroscience program for high school students

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Introduction

The BrainWaves program supports high school students’ creation of their own neuroscience research study in the classroom, using Electroencephalography (EEG). The curriculum provides an overview of neuroscience including the implications of neuroscience to public health. Students are also encouraged to think critically about how their lifestyle choices affect their own brain health.

Curriculum

The BrainWaves curriculum is comprised of two units that span the length of the course. Students cover topics ranging from structure and function of a neuron to the analysis and presentation of their EEG experiments. The curriculum was developed using a backwards design approach and incorporates the NGSS. Furthermore, units are structured around a 5E inquiry model.

Unit 1: neuroscience crash course

The first unit is a hands-on neuroscience mini-course which covers:
- content ranging from the cellular level to cognition
- research design

Unit 2: students as EEG researchers

In the second unit, students become brain researchers. Small groups formulate and execute cognitive neuroscience-related research. They are mentored both by a scientist (typically, a grad student) and their science teacher.

Under the guidance of science mentors, students:
- design and develop a neuroscience experiment
- collect and analyze EEG data
- document and present their findings

Research Instruments

- Pre/Post Student Surveys
- Measuring Attitudes Towards Science, Neuroscience Content Knowledge, and Proficiency in the Scientific Method
- Student, Teacher, and Mentor Interviews

BrainWaves App

The BrainWaves Application allows students to:
- design a neuroscience experiment with customized stimuli
- collect behavioral and EEG data
- analyze data

Teacher Training

Teachers undergo a hands-on training where they:
- experience the major labs
- plan for implementation
- learn about neuroscience research
- interact with the BrainWaves App

Fall 2016 - Present

BrainWaves has been implemented at fifteen NYC public high schools. The schools implemented the program for either the entire year or over the course of a semester. The BrainWaves team provided schools with a mentor and a 14-channel emotiv EPOC headset.

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