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Formal Proposal-Byrne

Abstract:

The purpose of my project is, through research, to determine if there is a difference in the way the brain functions under different lighting conditions. During my project I plan to learn more about scientific research, how to use an electroencephalogram (**EEG**), and to gain knowledge about how the brain works.

Introduction and goals:

I decided I wanted to study the effects of different lighting conditions on the human brain because last spring, when i had a concussion, I noticed that certain types of light bothered me more than others. Noticing my brain reacting to lighting in this sensitive state, it sparked my interest in the question of whether or not one type of lighting is better for the brain than another. Wondering if possibly my brain could detect more in this weakened state. My goal during this project is to study the human brain through EEG technology and to gain a better understanding of that technology and the way to properly carry out research. By observing brainwaves I want to know if there is a difference in the level of relaxation of the brain under fluorescent, incandescent, and natural light. As a later step in my studies I would possibly like to begin research on brain activity associated with different mental disabilities and conditions.

Implementation and challenges:

I plan on achieving my overall objective during this project by spending the first couple weeks learning the equipment and surveying past projects that used the EEG technology I will use. Once I understand how to use the equipment and interpret the brainwaves data, I will set up a program or find an existing one where I can store my data and add in specific notes. I will then begin to gather test subjects and have them sit under each of my three lighting conditions for a specified amount of time such as five minutes. I will then analyze the data on the level of activity in their brains based on brainwaves and see if I can find a trend among different participants. This far in my research I have learned the physical differences between fluorescent and incandescent lighting. I have also read some articles by doctors who claim that their patients with mental illness can experience worsening of symptoms under fluorescent lighting, although there are very few studies to actually prove or disprove harmful effects of fluorescent lighting. The information I am missing is how to store the data from the EEG devices in an organized and manageable way. I plan on asking students who have dealt with the equipment in the past what they used to store their data and then potentially learning that

software program. A difficulty i expect to encounter during my project is how to interpret raw data from the EEG equipment. I am not exactly sure which EEG I will use yet between MUSE and Emotive Epoc.

Impact and Legacy:

This project will have a significant impact on me in the terms that it will greatly improve my research skills, data analysis skills, and knowledge of EEG and its associated software. In the long term, if I find that one type of lighting is optimal for brain relaxation, people could help give themselves the optimal environment for brain function by installing that type of lighting. This could be especially important for HPA classrooms as students spend a majority of their day in that setting. Byond HPA this research could help people with mental disorders or other sensitive conditions give themselves the optimal environment for good health.

Appendix A:

http://www.diffen.com/difference/Fluorescent_Bulbs_vs_Incandescent_Bulbs - this source explains the physical differnces between fourecent and incandecent lighting.

http://www.brainworksneurotherapy.com/what-are-brainwaves -this website was informative on the differnt types of brainwaves and what they indicate. It will be helpful if interpreting raw data.

https://www.psychologytoday.com/blog/mental-wealth/201409/why-cfls-arent-such-bright-idea -this article talked about diffent lighting rom a docters persepective winessing her patients have more mental illness symptoms under flourecent light.

Johnny yoon- He was able to help me better understand the different options of EEG equipment at the elab. Neurosky being the least complicated, MUSE being slightly more advanced, and then Emotiv Epoc which is the most advanced and can give data on specific parts of the brain.

Appendix B:

Critical:

- EEG device (already at elab)
- Fluorescent light bar (not at HPA to my knowledge)
- Incandescent light- lamp form prefered (not at HPA to my knowledge)