

# How Does School Affect your Brain Waves?

[TELEGRAPH]

## Abstract

We carried out an experiment testing our brain waves to see how relaxed we were during different activities in school, using the Myndplay App. We hypothesised that activities such as constructing a star in Design & Technology (D&T) and drawing would be “resting” activities, whereas activities requiring more cognitive function, like typing and gaming, would be “non resting” activities. Our results showed that some activities such as attending the theatre, typing, and weaving are relaxing for us, but activities such as making things and playing percussion are not.

## Funding Statement

Royal Society Partnership Grant

## Materials and Methods



Figure 1: The Neurosky Mindwave mobile headset

The aim of our experiment was to how our brains respond to certain activities. In particular, we wanted to study brain waves and how they change according to what activity you are doing. We used the following equipment to do this:

- Neurosky Mindwave mobile headsets bought from Myndplay (see figure 1)
- iPhones/iPads with Myndplay App
- Myndplayer Pro Software

The following activities, which involved many different departments of our school, were investigated:

- cutting a star with a saw in D&T (referred to as “constructing the star”)
- drawing some sweets in art
- playing percussion in music (call and response activity)
- observing a light show in music
- watching a play in drama (“Bugsy Malone”)
- typing up a story (“Goldilocks and the Three Bears”)
- making a rug out of threads in textiles
- playing a computer game (Pacman)
- solving a maths problem

To start, we uploaded the Myndplay App onto our iPads and iPhones. This is an app where you can observe and record your brain waves<sup>1</sup>. We were interested mainly in mid Gamma, high Alpha, and high Beta waves, as these are active when we are conscious<sup>2</sup> (see figure 2 for an image of different types of brain waves). To record data during the

activity, we had to pair our NeuroSky headset by Bluetooth to our iPhone or iPad. We then had to carry out breathing exercises to calm ourselves down. Thereafter, we recorded our brain wave

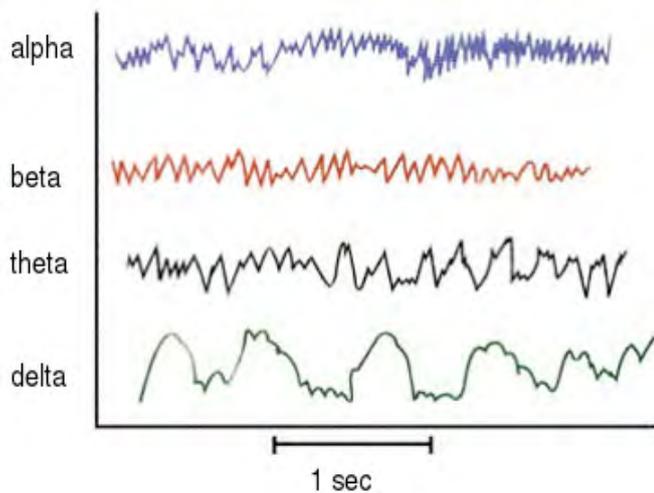


Figure 2: different types of brain waves [SSRC]

patterns whilst carrying out the respective activity in approximately five one minute recordings (longer recordings tended to crash Myndplay). All data was then saved and analysed using the Myndplayer Pro Software. The data was converted to an Excel file so that a graph could be generated from the data. Users also use Python, there are many tutorials and existing codes on the internet that are useful for this project.

We only looked at the middle 20 seconds because the first 20 seconds are based on starting the recording, and the last 20 seconds are based on stopping the recording. So the middle section contained the data we were interested in, and we found out the mean of the three waves, and plotted a bar chart for each 20 second set of data and recorded the majority wave.

## Results

195 graphs were analysed and the results showed that the following activities are:

- “Resting” ( $\alpha$  wave) activities: watching drama, typing, problem solving in maths, watching a light show and weaving
- “Non resting” ( $\beta$  wave) activities: playing percussion and constructing the star

- “Problem solving” ( $\gamma$  wave) activities: drawing and gaming

## Discussion

Before we started the project we thought that activities such as constructing the star and drawing would be “resting” activities, and activities requiring more cognitive function, like typing and gaming, would be “non resting” activities. Looking back at the experiment there were factors that could affect our results, such as interruptions from people entering and leaving the room whilst we were collecting data. Texting, photographs being taken, weather (data collection occurred throughout the year), incidents in lessons prior to data collection, mood and talking with others could have affected our results as well. We also had to start and end the data collection on our iPhones and iPads ourselves, and this would have affected the results. Ideally, it would have been better if we could have had another person starting and finishing the data collection. Other improvements would be to have minimum of 5 students to carry out each activity and have a controlled environment to carry out data collection, without disturbances.

What the results mean for us as students is that some activities like attending the theatre, typing, and weaving are relaxing for us, but activities like making things and playing percussion are not. This kind of data can be useful when you want to get yourself to a certain state, or help teachers when they want a calm atmosphere, or a busy environment, where students are engaged in higher learning tasks like maths problems. Teachers can manipulate the learning atmosphere in the classroom by altering the type of activity given to their students.

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## References

1. Myndplay app (2015). “Myndplay Explained”, Online.
2. Brogaard, B. (2012) “Brain Waves as Neural Correlates of Consciousness”, Psychology Today, Online.

## Author

**The Misbourne School, Buckinghamshire**

The Misbourne is a close-knit family community school in Great Missenden, Buckinghamshire. We found this project fascinating; we’ll never think of thinking in the same way again.

