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Student's attention: The use of Brain Waves Sensors in Interactive Videos

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Abstract*— *This article describes the use of brain wave sensors to investigate attention to the use of interactive videos. Attention is a psychological and neurophysiological phenomenon. With the use of electroencephalogram tools, it is possible to map this attention through brain waves. This study has found the status of attention to the use of tasks proposed to it. No study the student performed the two activities suggested to him. The results indicate that attention status is essential for learning effectiveness.

***Keywords*— Keywords: attention, learning, brainwaves**

I. INTRODUCTION

It is well known that attention and concentration are required skills for good learning. In fact, attention has been subject of study for a long time. The first studies of attention are from the nineteenth century. There is evidence in the literature demonstrating the close relationship between attention and learning. [10], states that "if there is no attention, there is no memory". And if there is no memory, there is no learning.

Due to the importance of attention and concentration in learning effectiveness, the aim of this study is to map attention status using brain waves sensors, using different teaching and learning technologies.

The education system suffers from a lack of resources and understanding, which undermines teachers' ability to mentor students with learning disabilities or simply does not learn well from conventional methods. Some classes have already been done in the EEG readings, although the students are somehow focused on English class. In addition, EEG-enabled educational games are characterized as being of great intensity and assisting students to get discarded in a training of their brains to concentrate better. The technologies for the application of neuro education already exist, however, a little more to acquire, what already exists is that of a software of programming for applications that already has been developing in a very great rate of programming. As the developments are being developed with applications for measuring brain waves, the process as a whole is more promising. Teachers can retell more often for mobile and portable applications for student follow-up (NeuroSky, 2019).

II. TECHNOLOGIES

A. NeuroSky;

NeuroSky is a portable EEG brainwave sensor used to detect electrical activity in the brain. Studies published in the literature regarding brain waves detection, recording and interpretation began in the late nineteenth century,[2], with the discovery and exploration of electrical patterns in mammalian brains. From this point on, the technology has evolved allowing its application in a wide range of situations such as in the detection of neurological disorders and games controlled entirely by the mind. Figure 1 illustrates the headset.

Fig. 1: Headset Neurosky

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B. Effective Learner

Effective Learner app has a simple and intuitive interface. The app uses NeuroSky sensor to detect the student learning effectiveness. The app informs the students, in real time, their effectiveness through color charts during the execution of a task. Reports are recorded for learning effectiveness data analysis. Figure 2 illustrates the effective learner.

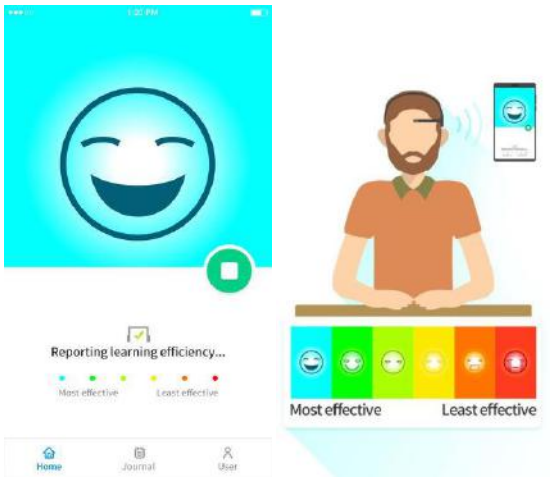

Fig. 2: Affection data

C. Videos used in the study

Educational and interactive content was created using H5P as a complement to traditional teaching. The content was developed to address the student's ability to require short- and long-term memories with predefined stimuli and their neural behavior. Data analysis identifies how brain understands this type of technology in relation to the traditional ones, in order to recognize the most effective teaching and learning tool. Figure 3 and figure 4 illustrates the framework H5P.

Fig. 3: Video on H5P

Fig. 4: Framework H5P (H5P.org)

III. DATA COLLECTION

This paper shows the most significant data found in the survey, which was based on the information collected by 7 individuals. The volunteers were submitted to two different tasks: (1) a 3-minute duration reading, available at Moodle Plataform; (2) a 3-minute interactive video, with the same content shown at activity 1. Data were obtained in extra-class hours at a Federal Teaching Institution, with undergraduate students, using the Blind Review technique.

A. Data analysis

The results were obtained based on two different scenarios: (1) a reading at Moodle Platform; (2) watching a video. In both situations, students used NeuroSky in order to detect brain waves and evaluate attention status/level.

Effective Learner app provides, as a final result of attention, the sum of the percentages in the highest levels of attention, that is, the sum of the percentages referring to blue, dark green and light green colors.

It can be observed that 34.7% of students were were not effective, 21.5% were intermediate and 16.7% were effective.

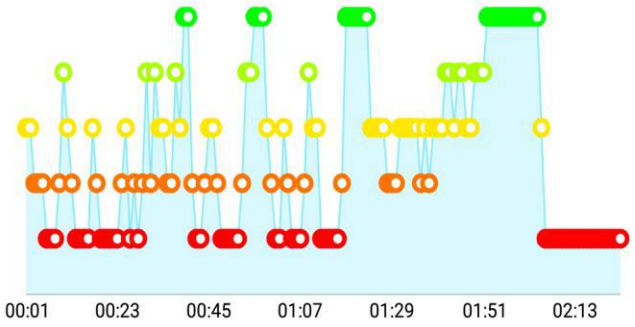

Fig. 5: Attention status during the reading session at Moodle Platform

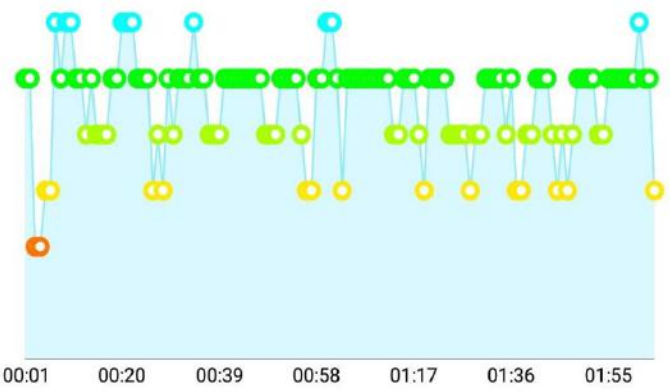

Fig.6: Attention status during the video session

It is clearly demonstrated, in Figures 5 and 6, that the attention density is higher in Figure 6 when compared to Figure 5.

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As can be observed in Figure 6, the students had higher levels of attention density during video exposure. However, it is important to point out that this higher density observed during video exposure could be due to distracting elements. Oscilation and confusion can be observed during the first minutes of the video, in which the student is still imagining what is happening, trying to find the theory that fits the content. Such oscillations involve the possible resumption of thinking and the organization of new ideas for response stimuli, as well as the re-reading of each alternative. According to Ausubel's theory, there are signs of representational and conceptual Significant Learning, because the student is able to think the phenomenon and assign meanings to them, [1].

Fig.7: Attention status during the video session

IV. CONSIDERATIONS

The aim of this study is to map attention status using brain waves sensors, using different teaching and learning technologies. Our results demonstrate that interactive activities develop students' higher attention in the learning process than traditional activities.

The relationship between the studied concepts brings the existence of subsumers and the evolution to occur the fuller attention. In addition, theachers' use of mobile devices in order to have real-time feedback corroborates for effectiveness in teaching.

At the same time that the student is assimilating the content in an attentional or non-attentional situation, the teacher can verify this stimulus in real time, changing its practice, while the class is still happening. Finally, we conclude that the use of interactive video with the mapping of brain activity are important tools to assist teachers during the teaching process. Further research is required to advance studies with the use of ocular tracking during video viewing and reading with students. To propose visual narratives to detect stimuli during the process in a traditional classroom and classes with the use of technologies.

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