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Tracing students’ attention through the Neurosky MindWave headset

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Abstract
This poster explores how students’ attention levels can be traced through recordings of their electroencephalography (EEG) signals. The EEG signals are recorded through the Neurosky MindWave headset during lectures in the classroom. We configured and aggregated the recordings searching for similarity in the signals throughout the group of students to create a dashboard and use them as pedagogical feedback to increase the students’ capabilities in controlling their attention and concentration in learning situations.

Furthermore, learning analytics methods are deployed to create a prototype of a neurofeedback tool as a real-time dashboard providing the students and teacher with information about the present attention levels in the classroom. The aim is to create a tool that visualizes the attention level for the whole class by aggregating the students’ individual levels of attention.

Data and analysis from the first pilot tests are presented here.

Introduction
Students’ capabilities to control their own levels of attention and concentration are paramount for both the students’ learning processes, learning outcomes and in relation to students’ abilities to manage and control their own learning. This includes students’ abilities to self-regulate their own learning, and the ability to control ones attention level is a fundamental ingredient thereof[1].

The advent of consumer-grade and relatively cheap sensor equipment capturing EEG signals, provides new opportunities for using EEG data to measure attention. The Neurosky MindWave Mobile Headset is such a low-cost brainwave sensor headset, which is set up to measure levels of attention and meditation.

In a recent study Poulsen et al showed the feasibility of recording students’ EEG in a natural classroom environment using commercial-grade wireless EEG devices[2]. Poulsen et al measured the students’ neural responses, while they were shown specific video sequences, similar to the approach developed by Dzienowski et al[3]. Their study reproduced previous results from laboratory settings regarding the measurement of students’ neural responses to media stimuli and found that EEG probably can be quantified from natural classroom environments[2].

Our study
This study investigates how students’ attention levels can be traced during the typical natural lecture in the classroom.

We conducted an experiment, where we recorded such a lecture, while the students each wore wearing Neurosky MindWave Mobile Headset.

Literature cited

Data system setup
The Student Client software synchronizes time through an Azur Function and then collects data e.g. attention values from the headset and sends the data to an Azur Service Bus topic (Fig. 3). The topic has more real time subscribers. An Azur Function persists data in a document database. A Management Client manages the class room sessions and oversees the recording. A Teacher Client display the attention level in a sliding graph for teacher and a bar on the whiteboard for the students. In that way, the teacher and the students can follow the students’ current attention level in real time.

![Diagram of the data system setup](image-url)