Possible marker found to predict long-term learning

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For the first time, researchers have discovered a possible biomarker for long term learning.

Could this new discovery help reshape how students learn and how they are taught?

Researchers at the VA Boston Healthcare System (VA Boston) and Boston University School of Medicine (BUSM) believe their breakthrough may lead to different educational techniques to improve long-lasting learning (information retained for a lifetime) in the classroom.

The ability to move newly learned knowledge into long-term memory is crucial to allow past experiences to help influence future actions. "In medicine, long-term learning is essential as life and death decisions may be based on information learned years earlier during medical school. At this time, there is no good biomarker that has been correlated with retention of long-term learning," explained senior author Andrew Budson, MD, chief, cognitive & behavioral neurology at VA Boston and professor of neurology at BUSM.

The researchers studied first-year BUSM students undertaking an introductory anatomy class. They measured students brain responses to anatomical terms using electroencephalography (EEG) before starting the course, immediately following the course and six months after the completion of the course. "We found that a spike in the late positive component (LPC) brain wave correlated with one's ability to retain the anatomical information long-term," said corresponding author Katherine Turk, MD, director of graduate medical education for neurology at VA Boston and instructor of neurology at BUSM.

According to the researchers, this brain-wave biomarker has the potential to allow educators to try out different educational techniques to improve long-lasting learning by measuring the results using special EEG event-related tests. Thus, these findings may have relevance for educational curriculum development. "Our results allow for various

teaching methods to be tried in a classroom setting and measured immediately at the end of the course—possibly even at the end of a particular lesson," added Turk.

Further implications of this discovery may result in incorporating teaching techniques in the classroom that produce the greatest LPC. Use of such biomarker-proven teaching techniques could facilitate education that will last for a lifetime.

These findings appear in the *Journal of Cognitive Neuroscience*.

More information: Katherine W. Turk et al, Late Positive Component Event-related Potential Amplitude Predicts Long-term Classroom-based Learning, *Journal of Cognitive Neuroscience* (2018). DOI: 10.1162/jocn_a_01285

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