World Academy of Science, Engineering and Technology
International Journal of Mathematical and Computational Sciences
Vol:14, No:12, 2020

Intrinsic Motivational Factor of Students in Learning Mathematics and Science Based on Electroencephalogram Signals

Authors : Norzaliza Md. Nor, Sh-Hussain Salleh, Mahyar Hamedi, Hadrina Hussain, Wahab Abdul Rahman

Abstract : Motivational factor is mainly the students' desire to involve in learning process. However, it also depends on the goal towards their involvement or non-involvement in academic activity. Even though, the students' motivation might be in the same level, but the basis of their motivation may differ. In this study, it focuses on the intrinsic motivational factor which student enjoy learning or feeling of accomplishment the activity or study for its own sake. The intrinsic motivational factor of students in learning mathematics and science has found as difficult to be achieved because it depends on students' interest. In the Program for International Student Assessment (PISA) for mathematics and science, Malaysia is ranked as third lowest. The main problem in Malaysian educational system, students tend to have extrinsic motivation which they have to score in exam in order to achieve a good result and enrolled as university students. The use of electroencephalogram (EEG) signals has found to be scarce especially to identify the students' intrinsic motivational factor in learning science and mathematics. In this research study, we are identifying the correlation between precursor emotion and its dynamic emotion to verify the intrinsic motivational factor of students in learning mathematics and science. The 2-D Affective Space Model (ASM) was used in this research in order to identify the relationship of precursor emotion and its dynamic emotion based on the four basic emotions, happy, calm, fear and sad. These four basic emotions are required to be used as reference stimuli. Then, in order to capture the brain waves, EEG device was used, while Mel Frequency Cepstral Coefficient (MFCC) was adopted to be used for extracting the features before it will be feed to Multilayer Perceptron (MLP) to classify the valence and arousal axes for the ASM. The results show that the precursor emotion had an influence the dynamic emotions and it identifies that most students have no interest in mathematics and science according to the negative emotion (sad and fear) appear in the EEG signals. We hope that these results can help us further relate the behavior and intrinsic motivational factor of students towards learning of mathematics and science.

Keywords : EEG, MLP, MFCC, intrinsic motivational factor
Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development
Conference Location : Chicago, United States
Conference Dates : December 12-13, 2020