



## **Investigating the Emotions of High and Average Performing Filipino Math Learners based on Electrodermal Activity, Facial Expressions, Behavior and Contextual Information**

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Intelligent Tutoring Systems provide one way for educators to employ differentiated learning. This is done in order to address the different learning needs of students. To be as effective like human tutors, these systems need to recognise student emotions in order to respond appropriately to student's learning needs. Studying and analysing how a student behaves and feels during mathematical learning would, in turn, help Filipino teachers, learning system designers, and psychologists enrich the students' learning experiences.

This research involved the study of the affective states, specifically interest, boredom, confusion and frustration of average and high-performing Filipino learners as they study Math. To do this, the researchers collected data from different high schools to build a corpus containing facial expression, electrodermal activity, contextual and affective data. Z-score normalisation was applied on the EDA data and segmented into 5-second windows with 3-seconds overlap. For each of these segments, six statistical features were extracted and synchronised with the affective labels identified earlier.

Findings indicate EDA data can be used to differentiate between positive and negative affective states. Facial expressions were not reliable bases for judging emotions, as students did not typically express any emotion using their faces. Contextual information tends to be a good indicator of affective state, as students tend to be influenced by their progress in the activity.