

Chapter 9

Affective Computing in E-Learning Modules: Comparative Analysis With Two Activities

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ABSTRACT

This article presents a study on emotions of students and their reactions towards learning and watching video clips with different personality traits, with the help of existing facial expression analyzing applications. To demonstrate this, the user's expressions are recorded as video while watching the movie trailer and doing the quiz. The results obtained are studied to find which emotion is most prevalent among the users in different situations. This study shows that students experience seemingly different emotions during the activity. This study explores the use of affective computing for further comprehension of student emotion in learning environments. While previous studies show that there is a positive correlation between emotion and academics, the current study demonstrated the existence of the inverse relation between them. In addition, the study of the facial analysis of movie trailer confirmed that different people have different ways of expressing the feeling. Results of the study will help to further clarify connection between various personality traits and emotions.

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INTRODUCTION

Biological actions like facial expressions, body gestures, gaze movement can be used to extract emotional contents from human beings. The process of detection and recognition of these actions is an essential aspect of affective computing and artificial intelligence. Getting a machine to recognize the human actions is demanding and is an active field of research. There are many scenarios where a researcher can be motivated in this emerging field. For instance, the ability to sense whether a student is feeling nervous, confused or happy; analyze witnesses' expressions by lawyers and numerous examples exist in our daily activities (Pantic & Rothkrantz, 2003). Among the two approaches of affective computing, which are audio-based approach and video-based approach, this study focuses on video-based techniques which examine and categorize facial expressions to gather information of emotion with the aid of different facial expression recognition applications.

Affective issues in learning technologies are concerned with emotional areas such as inspiration, attitudes, and feelings (Jones & Issroff, 2004). It is the study of Human-Computer Interaction to diagnose and measure the emotion (Lin, Wu and Hsueh, 2014). Emotion is one of the most researched topics in the study of psychology (Cho & Heron, 2015; Plutchik, 2001). Plutchik (2001) notes that over 90 definitions of emotion have been proposed since the 20th century; emotion is expressed in the form of anger, despair, joy, and grief. Learning strategies like critical thinking (Cho & Heron, 2015), and effort contributed less in explaining students' achievement compared to motivation and emotions related to it. Therefore, more motivational and emotional supports are necessary to enhance the student's success. Moreover, affective states play a significant role in the daily activities of humans, including tasks performed in front of the computer (Jones & Issroff, 2005). An objective study of emotion itself is a challenging task as several emotions could be experienced at the same time (Plutchik, 2001). Emotion can be treated as on or off switch for learning (Vail, 1994). Positive/negative emotional states increase/decrease intellectual energies and capacities. Having to attend the time-limited quiz where there is continuous tension of ongoing time and memory, can impede students' performance increasing anxiety (Jones & Issroff, 2005).

The limbic system, also known as the emotional brain, is one part of the three-way view of the human brain interprets the emotional value of incoming stimuli and decides if they are neutral, good or deadly; controls the ability to learn, memory and make novel connections (LeDoux, 2003). The active states of different parts of the brain give different facial expressions. For example, anger results from activation of some parts of the brain that help to react with more speed and strength while overpowering prudent things replacing cautiousness with aggressiveness and compassion with resentment. Emotional expressions are states that define different ways of thinking. Furthermore, facial signs are perceived differently than non-facial signs such as audio for the same emotions (Ekman & Friesen, 2003).

Robinson (2008) categorizes interest, curiosity, surprise, joy, and love as positive emotions; while panic, aversion or disgust, fear, anger, anxiety, sorrow, and frustration are considered as negative emotions. Positive states like happiness cause positive impacts on learning while negative states like anger and sadness generate negative effects. The theoretical assumption of the control-value theory suggests that negative emotions can produce a positive outcome (Pekrun, 2006). To the contrary, "learning by positive reinforcement" does account for how people learn.

The relationship between emotional intelligence (EI) and academic performance (AP) of the students shows a substantial positive association between them. EI is the ability to perceive and express emotion. It is used to facilitate thoughts, understand and reason with emotion. The technologies which recognize, and express emotional states are leading to the development of different algorithms which

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