Chapter VI

Considering Students' Emotions in Computer-Mediated Learning Environments

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Abstract

This text aims to present the current state of the art of the e-learning systems that consider the student's affect. It presents the perspectives adopted by researchers for the solution of problems (for example, which kind of tools we might use to recognize users' emotions) and also some better-known works in order to exemplify. It also describes the necessary background to understand these studies, including some concepts in the fields of Artificial Intelligence, Computers in Education, and Human-Computer Interaction, and a brief introduction on the main theories about emotion. The authors conclude the chapter by presenting challenges and the main difficulties of research in affectivity in e-learning systems and ideas on some new work on the matter.

Introduction

Due to the traditional dichotomy in Western society between reason and emotion, which was inherited from Descartes' dualist vision of the mind and body, little attention has been paid to the role of the affectivity in cognition and learning. As it occurred in a real class, educational computing environments considered only the cognitive capacities of the student and his knowledge in order to make the system more customized to him.

Recent works of psychologists and neurologists have been pointing out the important role of the motivation and of the affectivity in cognitive activities, such as learning (Damasio, 1994; Izard, 1984). Psychologists and pedagogues point out the way that the emotions affect learning (Goleman, 1995; Piaget, 1989; Vygotsky, 1994).

Due to the important role of the affectivity in learning, researchers of the Computer in Education field have studied techniques of Artificial Intelligence in order to make the educational systems more customized to the affective states of the student.

The field of Artificial Intelligence that researches about emotion in computers is called "Affective Computing." Picard (1997) defines Affective Computing as "computing that relates to, arises from, or deliberately influences emotions." According to Picard (1997), an affective (computational) system must have some of the following capacities: (1) to recognize, (2) to express, or (3) to possess emotions.

In order to adapt the system to the student's affectivity, the system should *recognize* the student's *emotions*. For example, if a student is disappointed with his performance, he will probably abandon the task. The system needs to know when the student is disappointed in order to encourage him to continue studying and accomplish the task at hand. This way, it is necessary for the system to have not only a cognitive model of the student, but also an emotional one that takes into account the affective history of the student—all the emotions that he felt while using the educational system.

The educational system may *express emotions* as empathic teachers do in a real class. When they are able to show emotions, they can motivate and engage the student in the learning process, become amusing, and promote positive emotions in the student, which is an upswing for more effective learning (Coles, 1998; Izard, 1984). In order to transmit emotions, generally, the educational systems are represented by a lifelike character.

Several researchers believe that for a computational system to exhibit affective behavior in a coherent manner, they should also be constituted of models of emotions, which Picard (1997) referred to as *Emotion Synthesis*. The system has a computational architecture that allows it to analyze situations and events of the environment with some heuristics that are based on a human model of emotions. But the inclusion of an architecture of emotions must be well justified, since the process of emotion synthesis makes the system substantially more complex.

In the next sections, we first present an introduction to emotions and affectivity. In order to implement e-learning systems that are able to recognize, express, and simulate emotions, we need to know the main theories about emotion, what an emotion is, and also know the main psychological models of emotions that are used by the works on affective computing.

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