Chapter 3
An Emotion-Aware E-Learning System Based on Psychophysiology

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ABSTRACT

Computer-based learning and training has increased over the past few decades and has become the norm of today. This allows students to learn from the comfort of their home at their convenient time and pace. The learning materials can be accessed at any time and from anywhere making it easier for students. Recent studies indicate that negative emotions such as anger, frustration, confusion, and boredom inhibit the learning process and positive emotions such as excitement and enthusiasm support the learning process. Many students complain of boredom and similar negative emotions, which deteriorate the rate of learning. This research tries to integrate the emotion recognition system to help students during the learning process. Appropriate coping mechanisms can be integrated into the e-learning system to keep the students engaged and alert in the process. Emotions can be identified using wearable sensors and appropriate learning activity or breaks or physical activity can be given to students based on the emotion experienced by the students.

1. INTRODUCTION

The blooming of the knowledge era coupled with the pandemic and reliance on the Internet has increased the number of students and employees to rely on computer based learning methods such as Massive Open Online Courses (MOOCs), Intelligent Tutoring Systems (ITS) etc., (Imani & Montazer, 2019). The number of courses offered via MOOCs have compounded over the years as in Figure 1. Various modalities such as synchronous and asynchronous e-learning are proposed by faculty and researchers to improve the quality of teaching and learning.

These have brought world-class education into our homes and have open end wide avenues to learn and excel in the desired scope and subject of study. Students, researchers, faculty members and employees of multi national companies equip through the various e-Learning platforms that are available (Hökkä et al., 2020). The endless possibilities have made MOOCs an influential parameter in the higher education spectrum(Muñoz et al., 2020). Governments are devising policies to inculcate e-Learnings into their education systems. The SWAYAM/NPTEL courses in India provides opportunities to learners at all levels to learn anywhere and anytime (Chauhan & Goel, 2017). Researchers have indicated that the learning outcome is improved with the skills and techniques learnt by students online. The idea of life-learning is also promoted through the various e-Learning and web based courses (Alhazzani, 2020).

Synchronous learning enables all learners to connect online at the same time as an online classroom approach replicating a traditional classroom on the screen. These scheduled classes are found to be more collaborative compared to the self-paced courses or asynchronous e-learning is that is largely dependent on the learner (Imani &Montazer, 2019; Min & Nasir, 2020). Learners are required to be self-regulated, guided by metacognition, plan, set goals, self- monitor, self-instruct and self-reinforce to be successful(Min & Nasir, 2020). Though they are widely used by many learners, they have also reported high levels of boredom, frustration and anger (Stephan et al., 2019). Skills such as attention, learning, memory, reasoning and problem solving are affected by the human cognitive process (Tyng et al., 2017). The low retention and success rates of MOOC compared to the enrollment rate is also a matter of concern (Crane & Comley, 2021; Hamann et al., 2021).

As, learning is a cognitive process that is highly influenced by emotions, many of the recent researchers are focusing on finding the correlation between emotions and learning. Positive emotions enable faster learning, better retention capabilities and tends to widen the cognition, attention and action and engagement of learners (Imani &Montazer, 2019; Muñoz et al., 2020). The attentional and motivational components of emotion have been linked to enhanced learning and memory. Designers of educational courses should work to maximize learner engagement to improve

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