

Chapter 43

Emotional Design in Multimedia and Measuring Learning Emotions

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ABSTRACT

Cognitive learning theories have extensively been used for designing effective and efficient multimedia materials. Yet, these theories have been limited to cognitive aspects of learning. With the introduction of the recent cognitive-affective theories, emotional and motivational factors are generating considerable interest. Recently, emotional design approach has been introduced by the researchers. Emotional design refers to manipulating visual appeal of a product or a learning material in an effort to induce positive emotions and thereby learning. Although emotional design approach is interesting, the research on the issue is at the beginning. What is more, studies mostly adopted paper-based measures that are based on self-report to detect learning emotions. Given this rationale, the aim of this chapter is to introduce emotional design approach used in multimedia, to mention different techniques for inducing positive emotions, and to address research on the topic. It also discusses objective tools identifying learning emotions with a focus on emWave emotion recognition technology.

INTRODUCTION

Cognitive theories of learning have dramatically affected the design and development of multimedia learning. However, common multimedia theories were criticized as dealing mostly with the cognitive elements of the design, whilst underestimating the non-cognitive (Astleitner & Wiesner, 2004). “Although it is well known that metacognitive, affective, and motivational constructs are central to learning, they have not been the focus of cognitive load research” (Brünken, Plass, & Moreno, 2010, p. 262). This

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maybe because of the cold cognitive approach, which underestimates the role of affective design and regards using these elements in multimedia as a source for extraneous processing (Park, Flowerday, & Brünken, 2015). Accordingly, recent cognitive theories adopted a more integrative perspective. For example, Cognitive Affective Theory of Learning with Media (CATLM) (Moreno, 2006) and Integrated Cognitive Affective Model of Learning with Multimedia (ICALM) (Plass & Kaplan, 2016) postulate that cognitive and affective processing are entwined and affect mediates learning by increasing or decreasing cognitive engagement. With this in mind, emotional design in multimedia has been presented (Plass, Heidig, Hayward, Homer, & Um, 2014; Um, Plass, Hayward, & Homer, 2012) and defined as “redesigning the graphics in a multimedia lesson to enhance the level of personification and visual appeal of the essential elements in the lesson” (Mayer & Estrella, 2014, p. 12). The fundamental idea of emotional design is that if affective design elements in multimedia are used carefully, they may induce positive emotions which increase cognitive engagement and learning. Although the approach is of considerable interest, research on this issue is still at the preliminary stage (Heidig, Müller, & Reichelt, 2015). Furthermore, studies have mostly adopted subjective measures to detect emotions. The aim of this chapter is to discuss the emotional design approach used in multimedia, to refer to different design techniques for inducing positive emotions, and to address the recent research on the topic. Finally, the chapter discusses objective tools identifying learning emotions with a focus on emWave emotion recognition technology.

BACKGROUND

Cognition, emotion, and motivation are all associated with learning (Schiefele, 1987). The limitation of the pure cognitivist approach is that they regard mind and thinking as solely objective, cold, mechanical, and rational (Dai & Sternberg, 2004). However, it is recognized that emotions and thinking are inseparable and that everything we do is linked with emotions (Barry, 1997; Norman, 2004). Hence, a more integrative approach dealing with affective issues in multimedia is needed (Park, Flowerday, et al., 2015). In this section, motivational and emotional issues in multimedia learning are discussed.

Cognitive Theory of Multimedia Learning

Cognitive Load Theory (CLT) (Paas & Sweller, 2014) and Cognitive Theory of Multimedia Learning (CTML) (Mayer, 2009) assume that cognitive resources should be optimally used for effective learning (Mayer, 2009). If information to be processed exceeds the WM capacity, then a cognitive load effect may occur (Paas & Sweller, 2014). The total capacity is decided by three types of cognitive processing (Park, 2010): Extraneous cognitive processing indicates nonessential processing accounted for by poor instructional design; Essential cognitive processing refers to intrinsic complexity or difficulty of the material; and Generative cognitive processing refers to “cognitive processing that contributes to learning” by “...motivating the learner to exert effort toward understanding the material” (Mayer & Moreno, 2010, p. 133). According to CTML, the goal of instructional design should be eliminating extraneous processing, managing essential processing and fostering generative processing (Mayer, 2009). Previous work on multimedia have been limited to extraneous and essential processing. However, efforts so as to eliminate extraneous processing and manage essential processing have been limited in certain situations. For instance, if learners have insufficient levels of learning interest and motivation, they may not engage in generative processing and not exert the necessary amounts of cognitive effort in order to learn

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