

## Chapter 18

# Evaluation of Situations Causing Split of Attention in Multimedia Learning Environments via Eye-Tracking Method

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### ABSTRACT

*In this chapter, situations that can cause split of attention in multimedia environments were determined via eye tracking method. Fixation numbers, heat maps and area of interest of learners were analyzed. As a result of these analyses, design suggestions were determined for multimedia environments to provide focusing attention to content without split attention effect. Visual and auditory resources should be provided simultaneously. Visual information should be supported with auditory expression instead of texts. Images such as videos, pictures and texts should not be presented on the same screen. Texts provided with pictures should be presented via integration to each other instead of separate presentation of text and picture. Texts provided with videos should be presented via integration to each other instead of separate presentation of text and video. Images should be given via marking important points on images to increase attention.*

### 1. INTRODUCTION

In learning environments, many studies revealed that learners showed higher learning performances in the environments with audio-based animations than in static environments (Plass, Heidig, Hayward, Homer and Um, 2013; Lin, Hung and Chang, 2013; van Genuchten, Scheiter and Schüler, 2012; Köhl, Scheiter, Gerjets, & Edelmann, 2011). In the studies performed by Huff, Bauhoff and Schwan (2012), Cierniak, Scheiter and Gerjets (2009), Liu, Lai, and Chuang, (2012), they found out when text and pictures were

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not integrated together, applied test scores of people learning with split attention effect decreased. On the other hand, simultaneous presentation and presence of semantic harmony between them should be considered when animation and narration is used together (Širanović, 2007; Mayer, 2009).

In multimedia, presentation of texts visually rather than aurally prevents split of attention (Bayram and Mutlu-Bayraktar, 2012; Schmidt-Weigand, Kohnert and Glowalla, 2009; Seufert, Schutze and Brunken, 2009). It was highlighted that learners needed more expressive education and guidance to manage split attention situations better (Agostinho, Tindall-Ford and Roodenrys, 2013). In addition to these, it is emphasized that preparation of effective presentations in multimedia has positive effects on prevention of cognitive load, focusing of attention correctly and emotional and perceptual processes such as motivation and these effects are reflected on perception and transfer performances (Plass et al., 2013; Moreno & Park, 2010; Plass, Moreno and Brünken, 2010).

### **1.1. Split Attention Effect**

Attention is loudly and clearly to embrace one of objects or thoughts appeared simultaneously in the mind. When it comes to attention, it is understood to give up others in order to deal more effectively with some things (James, 1983). Attention is defined as concentration of mental effort on sensory or mental events by Solso, Maclin and Maclin (2008).

Diversification of stimulants while providing information to learners is effective in terms of attracting attention. However, attention is divided while providing these stimulants and mental efforts of individuals can be directed to different parts (Mayer, 2001).

People can learn better in the environments that words and pictures are integrated and provided close to each other physically and formally. In the environments which information is provided from multiple sources, split attention effect does not arise in the case of that sources are quite clear and they are integrated without any need for further explanation (Ayres and Sweller, 2005). Extra information that is not integrated with other sources decreases learning performance of student and constitutes unnecessary memory space. In Web-based education, more effective results are obtained when verbal and visual information is provided together. Presentation of this information close to each other without separation prevents split of attention (Sweller, 2004).

While learners are studying information from multi-source presentations, giving information as integrated provides learners to understand better. Information that is not presented in accordance with this principle causes split of learner's attention for two different tasks. For instance, it is thought that trying to read text results in split into two different tasks while animation is operating (Sorden, 2005). In addition, learners watching visual contents have to simultaneously combine number of features such as perception-oriented style, form or direction with movements of objects moving from one place to another on screen. It is stated that movements and changes in objects draw attention and prevent to focus on actual content (Hillstrom and Chai, 2006). Besides these, it is emphasized that preparation of effective presentations in multimedia, prevention of cognitive load and accurate focusing positively affect learners' emotional and perceptual progresses such as motivation and it is reflected on cognition and transfer performances with this effect (Plass et al., 2013; Moreno and Park, 2010; Plass, Moreno and Brünken, 2010).

In presentations that texts and pictures are provided together, it is known that giving text below picture as an explanation is enough, but it is thought that more effective results can be obtained when text is integrated to picture. In this case, picture and text is put into information process. In presentations that

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