Abstract & Introduction

Human information processing system consists of two main channels (verbal and visual channel). The perceived information is integrated with the short-term memory (STM) with the existing information from long-term memory (LTM) and stored in the form of “schema.” Mayer’s Cognitive Theory of Multimedia Learning (CTML) and Sweller’s Cognitive Load Theory (CLT) suggests that comprehension can be in trouble if the working memory is overloaded. The information from both visual and verbal channels are transformed into pictorial and verbal/aural models in the working memory so that it unconscious mental process can integrate them with the prior knowledge. The working memory has limited capacity, and the speed of unconscious processing is different for each person depending on the prior knowledge, age, and numerous other factors. In this study, the primary goal is to prevent the WM overload by a real-time estimation of the viewer’s cognitive load and dynamically controlling the amount of visual and aural information presented to the viewer. The real-time cognitive load estimation method proposed in this study depends on eye-tracking methods. There are two main reasons for using this approach, the first reason is the accuracy and speed of the analysis, and the second reason is that the process of eye tracking is not intrusive and therefore the viewer is not distracted during the process. The eye-tracking technologies have recently become more cost efficient, and even some smartphones have this technology.

Preliminary results

The investigation of the results of eye tracking studies have proved existence of a direct relationship between the eye movements, pupil dilations and number of the blinks with the cognitive load of the viewers. Therefore, in this research initially the relationship between the gaze data and the cognitive load is studied.

Methods

Visual and verbal information processing is different for each person. Therefore, the effort required to integrate information can take longer and lead to cognitive overload, as the information is constantly pouring into WM.

Importance and Conclusion

In this research, the final product is not just a prototype or design, but a global framework for developing computer-based instructional materials for learners. The eye tracking methods applied, are not just a passive study (Duchowski, 2007) to analysis the interface, design or behavior of the user, whereas it is a modern facility to improve the efficiency of the viewers from media presented in different forms. With the rapid growth of eye tracking technology, this method can be the future of smartphones, mobile apps, and intelligent personal assistant programs. The results of the preliminary experiments indicate that it is possible to measure point by point cognitive load in every 3 to 4 seconds which compared to intrusive EEG methods is a considerable achievement.

References


Related Publications