Chapter 9
A Quantum NeuroIS Data Analytics Architecture for the Usability Evaluation of Learning Management Systems

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ABSTRACT

NeuroIS uses tools such as electroencephalogram (EEG) that can be used to measure high brainwave frequencies that can be linked to human anxiety. Past research showed that computer anxiety influences how users perceive ease of use of a learning management system (LMS). Although computer anxiety has been used successfully to evaluate the usability of LMS, the main data collection mechanisms proposed for its evaluation have been questionnaires. Questionnaires suffer from possible problems such as being inadequate to understand some forms of information such as emotions and honesty in the responses. Quantum-based approaches to consciousness have been very popular in the last years including the quantum model reduction in microtubules of Penrose and Hameroff (1995). The objective of the chapter is to propose an architecture based on a NeuroIS that collects data by using EEG from users and then use the collected data to perform analytics by using a quantum consciousness model proposed for computer anxiety measurements for the usability testing of a LMS.

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INTRODUCTION

NeuroIS uses neurotechnology tools such as galvanic skin response (GSR) and Electroencephalogram (EEG) for research in Information Systems (IS) (Dimoka et al 2010). High brainwave frequencies can be linked to human anxiety and neurotechnology can be used to measure these frequencies (Valverde 2015). Past research showed that computer anxiety influences how users perceive ease of use of a learning management system (Saade & Kira 2009). Although computer anxiety has been used successfully to evaluate the usability of learning management systems, the main data collection mechanisms proposed for its evaluation has been questionnaires. Questionnaires suffer from possible problems such inadequate to understand some forms of information such as emotions, lacks validity, possible lack of thought and honesty in the responses (Ackroyd & Hughes 1981).

Learning management systems (LMS) are designed to facilitate the learning process and have been used in recent years extensively in Business Schools (Condon & Valverde 2014). However, it has been reported that as many as fifty percent of adults, including first-year University students, have some sort of computer-related phobia and previous studies have shown that computer anxiety influences how users perceive ease of use and computer self-efficacy an information system (Saade & Kira 2009). Much effort has been devoted to creating user friendly interfaces in resent years (Venkatesh & Morris, 2000) in particular with the use of NeuroIS (Dimoka et al 2010). Motivated by previous computer-anxiety studies and the lack of studies that incorporate data collection and analytical techniques using neuroscience that can better capture the perception of computer users for the purpose of usability evaluations, the objective of this study is to provide an understanding on how to use neuroscience techniques for data collection of the use of a LMS and provide the analytical tools that can process computer anxiety measurements for usability testing.

Quantum based approaches to consciousness have been very popular in the last years. Some of the approaches include the Quantum emission probabilities (Eccles, 1986), where the two-way mental-neural interaction (with the electric/magnetic fields as a link) is supposed to be realized in a manner analogous to probability fields in quantum Mechanics, the Photon-corticon interaction (Jibu & Yasue, 1995), where consciousness was reduced to the creation and annihilation dynamics of photons (as quanta of an electromagnetic field) and corticons (as quanta of a rotational field of water dipoles) and the quantum model reduction in microtubules (Hameroff, 1998;Penrose & Hameroff, 1995), where quantum coherence occurs by exciting quasicrystalline water molecules as dipoles buried in microtubules.

The objective of the chapter is to propose an architecture based on a NeuroIS that collects data by using neurotechnology from users and then use the collected data to perform analytics by using the quantum consciousness model proposed by Pop-