

An Innovative Information Technology Educational Framework Based on Embodied Cognition and Sensory Marketing

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ABSTRACT

This article describes and implements an innovative framework for information technology (IT) education. The proposed framework creates metaphors for various IT topics using music. The theory of embodied cognition or grounded cognition argues that all aspects of cognition, including decision making, are shaped by aspects of the body. Various theories of neuroscience, the interdisciplinary study of the nervous system, are used to explain how the brain processes the information and multi-modal stimuli generated by the authors' model. The framework proposed in this article can also be considered a form of sensory marketing, which is also based upon embodied cognition, theories of neuroscience and the cognitive significance of metaphors. The model was implemented at the secondary and university levels using both a formative and summative evaluation process. The survey results support the theoretical arguments supplied by many theories of embodied cognition and neuroscience.

KEYWORDS

Embodied Cognition, Information Technology (IT), Metaphors, Neuroscience, Sensory Marketing

INTRODUCTION

In this paper, we propose an innovative framework that enhances the understanding of Information technology (IT) based on the theory of embodied cognition. The proposed framework is an extension of the one proposed by Rappaport et al. (2016) which was applied to the topic of robotics and automation. The theory of embodied or grounded cognition argues that all aspects of cognition, including decision making, are shaped by aspects of the body. The physical aspects include the motor system and the perceptual system that are built into the brain and effect the body's interaction with the environment (Rosch, Thompson & Varela, 1991). In social and cognitive psychology, research on embodied cognition encompasses issues such as social interaction and decision-making (Borghini &

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Cimatti, 2010). This research supports the embodied cognition view that the motor system influences cognition, just as the mind influences bodily actions. Furthermore, Edelman (2004) and Damasio (1999) have outlined the connection between the body, individual structures in the brain and aspects of the mind such as consciousness, emotion, self-awareness and will.

The model is presented by a multi-media PowerPoint presentation in which metaphors link various topics of IT with popular music videos. Sensory stimuli from these videos including the lyrics of the songs, still images, other movements of humans and inanimate objects, facial expressions and the general motion pictures actualize the process of embodied cognition. For example, dance routines can represent different forms of data transmission or networking. Because the music can instill an emotional aspect to a presentation, our model is particularly innovative; IT topics are not normally associated with emotions. An important aspect of the model is its ability to enhance the imagination of the participants.

The model has been implemented for junior and senior high school students as well as for introductory computer science classes at the university level. Initially, a formative evaluation process was conducted using a focus group at one of the Philadelphia charter high schools. An improved framework for the PowerPoint presentation was developed based upon the feedback from the focus group and then implemented at additional sites. A summative evaluation using the impacts frameworks for informal science projects developed for the National Science Foundation, as well as statistical results from questionnaires support the validity of the model.

Our model is based to a great extent upon the role of sensory experiences in judgement and decision making which has been of interest to researchers in recent years in marketing and psychology. In marketing, the scattered research on the role of the senses in consumer behavior has been brought together under the name “sensory marketing” (Krishna, 2012, 2014) and is based in large part on the theory of embodied or grounded cognition. The stimuli from the videos in our presentation create sensory experiences for the participants with potential to alter their judgement and behavior in positive ways towards the study of IT topics. The participants play the role of the “consumers” in our model.

Many theories of neuroscience, the interdisciplinary study of the brain, support the idea of embodied cognition. Neuroscience also reveals that effective decision making is not possible without the motivation and meaning provided by emotional input. For example, Antonio Damasio had a patient who underwent neurosurgery for a tumor and lost a part of his brain connecting the frontal lobes, that control reason, with the emotions. Rather than this making the patient more rational, he became paralyzed by every decision in life. In other words, feelings provide an essential component of human decisions (Jarrett, 2014; Seth, 2014). Our paper shows how many theories of neuroscience support our model.

For many consumer researchers, embodied cognition is intimately connected with the idea that sensory experience in one domain can influence cognition, emotion, and behavior in a different domain in ways that follow familiar metaphors. For example, the association of physical and social warmth in everyday language speaks of a “warm” person or a “cold” shoulder. Metaphors play a critical role in our model as they link the sensory experiences from the videos to various IT topics. For example, the beat of a drum can be linked to the concept of a database which is typically symbolized by a “drum” symbol in the IT literature, and can be viewed as radiating waves of information throughout an organization’s environment.

Another component of our model considers various contextual factors such as race, ethnicity, culture, and the vehicles for socialization used by our youth. Music videos are generally targeted to the youth and contain many social and cultural manifestations of their real life experiences. Integrating these into the educational process allows students to reflect on their own experiences and direct their own learning based upon these experiences. Our model also has the potential to engage students with diverse cultural backgrounds and particular demographic groups, including African Americans, Latinos or females. In addition, our model can be used to integrate students with diverse cultural backgrounds within the same learning environment. For example, hip-hop/rap music is generally

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