

## Chapter 2

# Cognitive Load and Empathy in Serious Games: A Conceptual Framework

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### ABSTRACT

*The design of serious games does not always address players' empathy in relation to their cognitive capacity within a demanding game environment. Consequently players with inherent limitations, such as limited working memory, might feel emotionally drained when the level of empathy required by a game hinders their ability to cognitively attain the desired learning outcome. Because of the increasing attention being given to serious games that aim to develop players' empathy along with their cognitive competencies, such as Darfur is Dying (Ruiz et al., 2006), there is a need to investigate the empirical relationship between players' cognitive load and empathy development capacity during serious game play. Therefore this chapter examines cognitive load theory and empirical work on empathy development to propose a conceptual framework to inform the research and design of serious games that have empathy as part of the learning outcomes. Future research should focus on implementation and empirical validation of the proposed framework.*

### INTRODUCTION

The concept of serious games and their processes was first noted by Abt in 1970. In this seminal work, Abt argued that serious games should require players to make consecutive decisions

in order to achieve predetermined game objectives. Players' actions, in turn, are bound by rules and constraints while competing with others on various challenges (Abt, 1970). To these characteristics, Gredler (1994) and Suits (1978) add the aspects of voluntary participation of players

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and entertainment. Prensky (2001) expanded the notion of where and how serious games could be played, arguing for their use in education and training by designing games for computer-based environments. Many of today's serious games are digital games delivered via computers or video game consoles for instructional purposes. Both types of games have gained a substantial level of attention in recent years (Huang & Johnson, 2008). Hence, their broad educational applications across organizations and disciplines have been widely recognized by scholars and industries (Federation of American Scientists, 2006; Serious Games Initiative, 2010). These games are also capable of emulating and rendering scenarios with high fidelity, which gradually diminishes the boundary between serious games and simulations (Raybourn, 2007).

Despite serious games' emphasis on education and training in digital formats, their core game components remain unchanged from other games. Crawford (1982) identified four independent but interconnected game components: representation, interaction, conflict, and safety. The representation of the game system consists of all participating agents (e.g., players, system interface, game rules, game objectives), which enables intended interactions. Conflict is the means and/or the end of interactions that requires players to resolve complicated situations. The safety component encourages players to experience the outcome of their game-playing actions without any real harm. Amory (2007) further suggested that in order to understand the effect of serious games on learning, we should also include *Game Space* (play, exploration, authenticity, tacit knowledge, etc.), *Visualization Space* (critical thinking, storylines, relevance, goals, etc.), *Elements Space* (fun, emotive, graphics, sounds, technology, etc.), *Problem Space* (communication, literacy level, memory, etc.), and *Social Space* (communication tools and social network analysis). In addition to their multi-component architecture, serious games also encompass numerous characteristics

that enable them to develop players' holistic and complex skills. It is suggested that challenges, fantasy, competition, multimedia representation, role-playing, and goal-oriented actions, to name a few, may enhance the learning experience in serious games (Huang & Johnson, 2008).

In addition to providing players with information about current issues and topics such as health, environment, and human rights, serious games have also become a major medium to train and teach skills such as social etiquette and prosocial behavior. The focus of this chapter is serious games for change, with a specific emphasis on games for cultural change. In games that are developed for cultural change, one common design strategy is getting the player to feel sympathy and/or empathy for the characters in the game. Most games for change simulate real physical casualties so that the player develops an awareness of a situation where war and genocide may be central to everyday life. While other educational serious games may focus on teaching a specific concept or subject (e.g., algebra), games for cultural change center on a different concept, one that concentrates on behavioral or attitudinal changes where the purpose is to raise awareness and evoke empathic concern. Empathy becomes one of the primary outcomes of the game.

Given serious games' complexity, it is commonly understood that players will engage in intense cognitive and emotional processing (Gray, Braver, & Raichle, 2002; Gunter, Kenny, & Vick, 2008). Such game-playing experiences would very likely overload players' limited cognitive processing capacity if gameplay and its resulting cognitive load were not carefully managed (Ang, Zaphiris, & Mahmood, 2007). Therefore, players' cognitive load levels should be considered when designing serious games (Huang & Johnson, 2008; Low, Jin, & Sweller, this volume). However, while serious game designers are beginning to consider issues of cognitive load, little attention has been paid to affective/emotional interactions with cognitive load. This may be particularly relevant for

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