

Chapter 28

Game-Based Learning: Current Research in Games for Health, a Focus on Biofeedback Video Games as Treatment for AD/HD

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ABSTRACT

Sensor technology and its use in games control is a new area of video games development, and has demonstrated great application in the field of 'serious games' for edu-tainment and behaviour health. Attention-Deficit/Hyperactivity Disorder (AD/HD) is amongst one of the highest ranked mental health disorders in children and young adolescents. Children diagnosed with AD/HD frequently demonstrate a continuous pattern of inattention and/or hyperactivity-impulsivity, which are more frequent or serious than is typically observed in individuals of the same developmental level (APA, 2000).

*This chapter outlines the rapid uptake of video games with new interface technology and how current research is providing evidence of the success of these modalities to influence academic abilities and remediate common attention problems, such as AD/HD. The authors pay special focus to their own leading research in biofeedback technology. With support from previous research on biofeedback technology, the findings from this study show that as a biofeedback system, *The Journey to Wild Divine* video game has the potential to produce positive changes for disruptive behaviours, with minimal side effects. It has shown the ability to teach children breathing and relaxation techniques, which helped reduce core symptoms in children with AD/HD aged between 5 and 15 years, and improve parental depression, anxiety, and stress levels.*

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Whilst biofeedback video games are still new to AD/HD treatment options, this Chapter demonstrates that with children growing up in a technologically advanced world, it is not surprising that the prospect of learning relaxation skills to clear the mind, and calm anxiety or frustration, and receive treatment through a video game would increase a child's interest and cooperate with biofeedback treatment.

INTRODUCTION

Computer and video games provide players with a medium that engages and, in some instances, cognitively immerses them for certain periods of time. By balancing numerous game components including game narrative, character traits, obstacles and challenges, game rewards, competition and collaboration with other human gamers. Video games draw out powerful emotional reactions in their players. These emotions include wonder and elation, power, fear, aggression, and joy (Squire, n.d.). Research studies conducted on computer and video games are increasing in number. Malone (1981) and Bekhtina (2002, cited in Cole & Griffiths, 2007) suggests that the basic motivations for playing video games are curiosity and interest, mastery and control, challenge, cognitive stimulation, as well as indulgence in fantasy and enjoyment of attending to life in a virtual world.

More recently, research has investigated the different 'affective' avenues video games can manipulate. As an entertainment source, video games have been produced that guide the player to focus, relax, be challenged, and become immersed in another world. As an education tool, video games have been shown to teach a range of technical and cognitive skills in increasing perception and stimulation, problem solving, strategic thinking and assessment, organising and discovering answers (Subrahmanyam, Greenfield, Kraut, & Gross, 2001; Wan Rozali, Hamid, & Sabri, 2007). Over the years, video games have evolved from basic sources of entertainment into a completely new level of fun, socialising, and education using advanced technology – which are frequently referred to as, serious games.

Serious games are associated with games which aim to achieve something more than just entertainment. Game-based learning deals with applications with defined learning outcomes and include the teaching, training, and informing features of education (Susi, Johannesson, & Backlund; 2007). Serious games are "... about leveraging the power of computer games to captivate and engage end-users for a specific purpose, such as to develop new knowledge and skills" (Corti, 2006, p.1; cited in Susi, Johannesson, & Backlund; 2007).

This Chapter will focus on the serious games of health, with particular focus on biofeedback technology for AD/HD.

Serious Games in Health

Serious games have been noted to support the development of a number of different skills including strategic and planning skills, insight, analytical and spatial abilities, learning and recollection proficiency, psychomotor capabilities, group collaboration, communication, negotiation, and decision making skills (Mitchell & Savill-Smith, 2004; Squire & Jenkins, 2003; Susi, Johannesson, & Backlund, 2007).

Serious games in health can have both a direct and indirect positive physiological and psychological effect on individuals. Susi, Johannesson, & Backlund (2007) provide a number of examples related to physical and mental health topics that have been developed for games. They focus on a number of *Wii* sport games such as *Wii fitness*, and others like *Dance Dance Revolution* for physical fitness. Education video game range in topics from self-directed care such as the *Hungry Red Planet*, which teaches children nutrition and healthy eating habits; to games such as *S.M.A.R.T*

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