

## Chapter 56

# Mobile Games Individualise and Motivate Rehabilitation in Different User Groups

**Antti Koivisto**

*Satakunta University of Applied Sciences, Finland*

**Sari Merilampi**

*Satakunta University of Applied Sciences, Finland*

**Andrew Sirkka**

*Satakunta University of Applied Sciences, Finland*

### ABSTRACT

*Trials on Mobile Games are presenting a huge potential in cognitive, physical and mental rehabilitation. This paper is to discuss user viewpoints of trials with mobile games combining cognitive stimulation and physical exercise in rehabilitation: Game#1 controlled by tilting the mobile phone embedded in a balance board; Game#2 controlled by tilting the tablet pc; and Game#3 a modified game version of Trail Making A -memory test played by tapping figures on the tablet pc touch screen. The total amount of participants was 89 of which 74% were older adults (women=24; men=33; average age 85.9 years) and 26% people with learning disabilities (n=23;  $\bar{a}$  38.9 years). The gameplay setting was similar for all target groups, although the game graphics (Game#1) were slightly modified based on each user group. Mobile devices were used as the game platform to create easily approachable games of low costs and suitable for the majority of people.*

### 1. INTRODUCTION

People with special needs have too often been seen as a minor and marginalised group that have no use or even interest for game technology. However, alongside with the ageing of populations and dwindling resources, modern user-friendly technology applications have shown huge capacity in intensifying care and rehabilitation services. Active ageing, self-supported care, and other aspects in quality of life would take an enormous step forward with deployment of user-friendly technologies (Leinonen et al. 2012; McCallum 2012; Confalonieri et al. 2012).

DOI: 10.4018/978-1-5225-0034-6.ch056

The sense of having possibilities to be mentally, physically and socially active is an important part of well-being in all ages. People with special needs like cognitive impairment or physical limitations often feel unnecessarily disabled because of mental limitations and beliefs prevailing in the environment, including care professionals. To break the unnecessary impediments, new means and methods are required. Entertainment and therapy content are the elements put together into the mobile games investigated in this study to make games become a tool for rehabilitation adoptable for anyone. (Leinonen et al. 2012.)

Several studies show that both physical exercise and game play have positive effects on people, including older adults or people with learning disabilities, combating serious depression or even Alzheimer's disease (e.g. Fairchild & Scogin 2010; Geda et al. 2010; Spector et al. 2003; McCough et al. 2011; Merilampi et al. 2014). Findings from scientific research studies show that, in general, playing video games can lead to changes in an individual's pleasure, vigilance, dominance, and therefore in the overall state of experienced well-being. Also in the case of older adults, simple and easy to play video games are well accepted and found to create positive feelings and enjoyment (Khoo & Cheok 2006; Koivisto et al. 2013; Sirkka et al. 2012; Snowden et al. 2011). Even few minutes regular gaming exercise on daily basis has cognitive benefits improving performances requiring skills like attention and concentration (Gao & Mandryk 2012). This knowledge has been the source of inspiration for Well-being Enhancing Technology research group (WET-RG) in generating games that combine physical movement with cognitive impetus and testing them in several target groups.

WET-RG at Satakunta University of Applied Sciences (SAMK), Finland, has set the focus on generating gamification tools to activate and assist people with special needs. Instead of investing in design for all, WET-RG has chosen to design for somebody. This paper presents three different cognitively stimulating mobile games and trials where the games were tested in different target groups. The paper also discusses the subjective experiences of participants and staff observations related to these trials.

## **2. DESIGN PRINCIPLES OF THE THREE GAMES**

The three different games presented in this study are categorised based on the control method and the game display. Game#1 is controlled by tilting the mobile phone allocated in a balance board, and the game is played on a large TV screen. Game#2 is played with a tablet PC; game figures are controlled by tilting the tablet. Game#3 is also played on a tablet by tapping the figures on touch screen. Game#1 was tested in trials with older adults and people with learning disabilities. Game#2 and #3 are cognitively stimulating games, and were tested by a group of older men with diagnosed memory impairment. Each game version is explained in more details later on in this chapter.

As our target groups consisted of people with special needs (like diagnosed memory impairment, older old adults and people with learning disabilities), a special attention was paid on the game design. Due to the impaired perception and sensation skills in the target groups, the following accessibility principles were deployed in the game design: large target button elements, simplified and only necessary graphics, minimal amount of animation, colours used conservatively with high contrast, simple one-view display at the time, and placing important information in the middle of the screen. (Díaz-Bossini & Moreno 2014.) Apart from the above mentioned accessibility principles, the games were designed to use obvious logics without additional introductions how to play. This was seen especially important by people with learning disabilities even when assisted by staff to start the gameplay. (Sirkka et al. 2014.)

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