

Chapter 71

Accessible Mobile Rehabilitation Games for Special User Groups

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ABSTRACT

This chapter presents viewpoints of 104 users upon trials on four mobile games which combine cognitive stimulation and physical exercise in rehabilitation. The first game requires users to control by tilting a mobile phone embedded in a balance board; the second game can be controlled by tilting the tablet computer; the third game is a modified version of Trail Making Test A—a memory test that can be played by tapping figures on the screen of tablet computer; and the fourth game is an activation game with a special controller, dedicated for people with severe physical limitations. Users welcomed the use of games as self-rehabilitation tools that can be adjusted according to personal skills and limitations. The games not only gave them meaningful activities, but also saved time and efforts of professional care takers who might be unable to socialize frequently with clients.

INTRODUCTION

People with special needs are too often seen as a minor and marginalised group having 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, Koivisto, Sirkka, & Kiili, 2012; McCallum, 2012; Confalonieri, Guandalini, Da Lio, & De Cecco, 2012).

DOI: 10.4018/978-1-7998-3432-8.ch071

Having real possibilities to be mentally, physically and socially active is an important part of well-being in all ages. People with special needs, like cognitive or physical limitations, often feel unnecessarily disabled because of attitude and belief prevailing in the environment, including care professionals. To break the unnecessary impediments, new means and methods are required. Elements of entertainment and therapy content can be put together into mobile games, such as four games investigated in this study, to make games become tools for rehabilitation that is adoptable for anyone in need (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, who are 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, Sirkka, Leino, Koivisto, & Finn, 2014). Findings from scientific research studies show that, in general, playing video games can lead to changes in an individual pleasure, vigilance, dominance, and therefore improving the overall experience of well-being. In the case of older adults, simple and easy to play video games are well accepted, as the games were found to be able to create positive feelings and enjoyment (Khoo & Cheok, 2006; Koivisto, Merilampi, Kiili, Sirkka, & Salli, 2013; Sirkka, Merilampi, Koivisto, Leinonen, & Leino, 2012; Snowden et al., 2011). Even a few minutes of regular game playing exercise on daily basis can generate cognitive benefits, improving skills required to enhance performances like attention and concentration (Gao & Mandryk, 2012a). This knowledge has inspired the Well-being Enhancing Technology research group (WET-RG) to create games that combine physical movement with cognitive impetus, and then testing the games in several target groups.

In Finland, the WET-RG at Satakunta University of Applied Sciences focuses on generating gamification tools to activate and assist people with special needs. Instead of investing in design-for-all, WET-RG chose to design for somebody. This chapter presents findings of trials on four different cognitively stimulating mobile games, where the games were tested with different target groups. The chapter also discusses the subjective experiences of participants and the observations of staff related to these trials.

DESIGN PRINCIPLES OF THE GAMES

Four different games presented in this study are categorised based on the control method and the game display. The first game (Game#1) is controlled by tilting the mobile phone allocated in a balance board, and the visual of the game is displayed on a large television screen. The second (Game#2) and the third (Game#3) games are playable on a tablet computer, in which figures of the second game can be controlled by tilting the tablet; while figures on the third game can be manipulated by tapping the screen. The fourth game (Game#4) is playable by moving custom-made a hand controller and a head controller, in which the visual of this game can be showed either on a tablet computer screen or on a bigger screen.

Game#1 was tested with older adults and people with learning disabilities. Game#2 and #3 were tested by a group of older male participants with diagnosed memory impairment. Game #4 was tested in a rehabilitation centre with people with varying physical disabilities.

The target groups consisted of people with special needs, such as diagnosed memory impairment, older adults and people with learning or physical disabilities, therefore a special attention was paid on the game design. Due to the impaired perception and sensation skills in the target users, the following six accessibility principles were deployed in the game design: a) large target button elements, 2) simplified and only necessary graphics, 3) minimal amount of animation, 4) colours used conservatively with high contrast, 5) simple one-view display at the time, and 6) placing important information in the middle of

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