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# Putting yourself in someone else's shoes: The impact of a location-based, collaborative role-playing game on behaviour



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## ABSTRACT

The goal of this study was to probe the effectiveness of a mobile game-based learning approach in modifying behavioural outcomes and competence. The experiment was set against the background of low rates of laymen providing CPR during sudden cardiac arrests. A post-test control group design was used to contrast and evaluate the effects of the two different types of learning. Two hundred two students were randomly assigned to two conditions, a game-based variant simulating an emergency situation (experimental group), and an instruction-based approach (control group). After the intervention participants completed a questionnaire assessing self-prediction, self-efficacy, attitude, subjective norm, empathy and competence. The largest arguably significant difference between the two groups showed in self-prediction and capacity beliefs. Results further revealed a positive relationship between self-prediction and the variables attitude and self-efficacy. The type of scenario did not translate into the other concepts we assessed, though, and results were inconclusive regarding the effectiveness of the type of learning scenario and CPR knowledge. We explain the small effect size partly by the experimental procedure and the design of the game intervention, which is discussed in the course of this article.

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## 1. Introduction

In Europe, approximately 350,000 people die each year due to out-of-hospital cardiac arrest (OOH-CA). On a daily basis, this is around the equivalent of two full jumbo jets, which puts this cause of death in third place behind all cancers combined and other cardiovascular causes (ESA, 2014). Around 100,000 of these deaths could be prevented if members of the public, beginning with schoolchildren, had the resuscitation knowledge needed to save a life. Despite an extensive introduction of cardiopulmonary resuscitation (CPR) training measures in the 1960s, the rate of laymen providing CPR during cardiac arrests is still low (Plant & Taylor, 2013; Vaillancourt, Wells, & Stiell, 2008). It seems that knowledge on how to provide CPR is not the only decisive factor. Studies investigating the impact of psychosocial factors on laymen providing CPR identified factors such as perceived risk of infection with a communicable disease during CPR, or disagreeable physical characteristics, e.g. the presence of blood, which influenced and even prevented lay helpers' willingness to provide CPR (Cho, Sohn, Kang, Lee, Lim, Kim et al. 2010; Coons & Guy, 2009; Johnston, Clark, Dingle, & FitzGerald, 2003; Kanstad, Nilsen, & Fredriksen, 2011; Query, 2006).

Coons and Guy (2009) concluded, "the relative importance of the reasons for not performing CPR is informative" [p. 334]. They emphasized that there is potential to change CPR-related attitudes and beliefs and proposed different forms of educational intervention to achieve this. Axelsson Herlitz, & Fridlund (2000) also argued that CPR trainings should include appropriate models to produce the feelings of personal responsibility and courage required to intervene and to prepare lay helpers emotionally for dealing with unexpected and unwanted situations.

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With this paper we argue that a location-based, collaborative role-playing game, which simulates an emergency situation, is likely to enable such models. The study by Baranowski, Buday, Thompson, and Baranowski (2008) supports this. Their results on the outcomes of video games for children and adults showed that the use of video-game-based intervention promoted changes in attitude and behaviour, which were corroborated by other studies (Peng & Liu, 2008; Plant & Taylor, 2013). Especially the use of CBT, 'virtual worlds' and 'multi-player online simulation' in CPR training could be an attractive CPR, AED (automated external defibrillator) and first aid training and/or retention tool to use with children (Pavey, Greitemeyer, & Sparks, 2012).

Building on this strand of research we developed the mobile game *HeartRun*. The game supports the efforts of the project EMuRgency (Kalz, Klerx, Parra, Haberstroh, Elsner, Ternier, et al. 2013), which aims at increasing the number of lay helpers in the long run by providing mass training events for school children. *HeartRun* is a location-based, collaborative role-playing game that simulates an emergency thus preparing learners to react quickly and adequately in a closely related situation. During cardiac arrests it is important to intervene immediately to save seconds and minutes, and to give the most appropriate help possible. Comparable to an unexpected emergency, the game intervention involves instant decisions on what to do and the recall of CPR knowledge under unexpected circumstances.

This study focused on the interrelation of factors that come along with the use of technology in education. We investigated the potential of a location-based, collaborative roleplaying game and contrasted this approach to a more instruction-based oriented scenario. In order to integrate features frequently associated with mobile games, i.e. cooperative action between team players who have different tasks or roles and time-critical orientation in physical space (Blum, Wetzel, McCall, Oppermann, & Broll, 2012), we included the mobile game design patterns 1) *Physical Navigation*, 2) *Collaborative Actions* and 3) *Roleplaying* (Davidsson, Peitz, & Björk, 2004). This is in accordance with game-design principles, which favour using groups of patterns, as learners seldom perceive a single pattern as a game (Björk & Holopainen, 2004; Kelle, Klemke, & Specht, 2011).

By focussing on design patterns for mobile learning games we further moulded our ongoing research into game design patterns, which aim at supporting instructional design processes. Little evidence exists to guide this process and to offer any guarantee that the use of gaming principles will be relevant for educational objectives. Thus we focused our research on the following two questions:

*RQ1: Does playing a location-based, collaborative role-playing game affect behaviour (empathy, attitude, subjective norm and self-efficacy) to a larger extent than learning with an instruction-based approach?*

*RQ2: Does playing a location-based, collaborative role-playing game have a greater impact on CPR competence than an instruction-based approach?*

In order to answer these questions, we formulated a series of hypotheses, which we tested in the course of our study. This paper reports the results. It is divided into four main sections. First, we provide a summary of related work in the field of digital games for health education. Subsequently, we describe the educational intervention, i.e. the location-based, collaborative role-playing game. Third, we introduce the hypotheses and describe the methodology that we used to test the hypotheses. In section four we present the findings and discuss them. We conclude by proposing possible implications for game designers, in this way providing orientation for future design decisions.

## 2. Related work: digital games to change health behaviour

Since the early nineties, experiential learning has raised great interest amongst health-care professionals. Experiential learning is learning through/from experience (Cooper & Libby, 1997). It is characterized by learning through doing, role-playing and simulation, all elements thus far shown by literature to enhance CPR training (Kidd & Kendall, 2007). As a result, practitioners in the areas of health education and physical education have increasingly started to investigate how digital games can assist their particular goals. Studies within this newly created field of games for health<sup>2</sup> have looked at efforts to raise awareness, facilitate empathy, built up knowledge, strengthen motivation of patients to take a specific medication or foster positive health-related behaviours (Gerling, Fuchslocher, Schmidt, Krämer, & Masuch, 2011; Lampert, Schwinge, & Tolks, 2009; Low, Clark, Soar, Padkin, Stoneham, Perkins, et al., 2011; Papastergiou, 2009; Tüzün, 2007).

Digital games are being increasingly employed in diverse health domains for training purposes, and there is extensive reported research on serious video games for health. Study results indicated that the innovative approaches yield positive health-related changes with respectable examples in the fields of dietary behaviour or motivation for physical exercise, e.g. "exergames" (Lucht, Domagk & Mohring, 2010; Yang & Foley, 2011). Though this field is still in its infancy (Thomson, 2012), results from recent studies showed evidence of the potential for video games to facilitate behaviour change due to the entertaining and engaging environment they provide and to enhance behaviour-specific knowledge, self-regulatory skill acquisition, and modelling of behaviours and skills (Thompson, Baranowski, Buday, Baranowski, Juliano, & Frazier, 2007).

Educational games for health particularly involve role-playing in their educational setup. In their study on how interactive digital games affect helping behaviours, Peng and Liu (2008) found that interactive games positively influenced participants' willingness to help and that role-taking partially moderated this relationship. The authors stated that during the role-taking process, an individual goes beyond his or her typically egocentric manner of perceiving the world to contemplate a different point of view. Chamberlain and Hazinski (2001), in their article "Education in Resuscitation", stated that "repeated practice in realistic role-playing scenarios with situations and environments students are most likely to encounter" (p. 2578) can increase confidence and the willingness to respond to an emergency.

To the best knowledge of the authors, up until now there are no mobile simulation games for health or resuscitation training in existence that drew upon these findings. Several game approaches for resuscitation training do exist that directed the user's attention to correct performance of chest compression, correct arm position, and performance of basic life support in general. Empirical results with regard to the behavioural outcomes of game-based CPR instructions are largely missing, however, and need further evaluation (Papastergiou, 2009).

The location-based, collaborative role-playing game introduced in this paper builds upon previous research. In the following we outline the main pillars of the game design.

<sup>2</sup> Games for Health. Exploring the intersection of videogames + health <http://gamesforhealth.org/>. Last visited 18 February 2013.

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