

Accepted Manuscript

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PII: S1875-9521(18)30021-1

DOI: <https://doi.org/10.1016/j.entcom.2018.08.001>

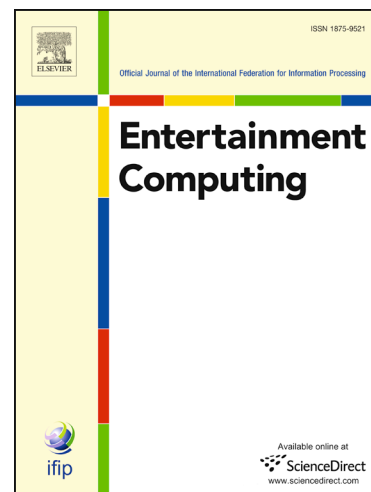
Reference: ENTCOM 271

To appear in: *Entertainment Computing*

Received Date: 31 May 2016

Revised Date: 9 April 2018

Accepted Date: 17 August 2018



Please cite this article as: J.R. Fanfarelli, R. McDaniel, C. Crossley, Adapting UX to the Design of Healthcare Games and Applications, *Entertainment Computing* (2018), doi: <https://doi.org/10.1016/j.entcom.2018.08.001>

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Adapting UX to the Design of Healthcare Games and Applications

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Abstract—Games and simulations are used in healthcare for purposes including training, education, and promoting wellness. However, there is often disconnect between content creators and the healthcare providers or patients who use their products. This can result in negative experiences and perceptions. This article investigates research in user experience (UX) to examine how games and applications designed for use in healthcare are impacted by considerations such as design practices and users' attitudes. By exploring the design of healthcare games and applications through the lens of user experience, the authors analyze current practices and develop specific design recommendations to improve future game-based scenarios. These six design recommendations are then applied to an example game, Medulla, to investigate their utility in framing a real-world example.

Keywords— *user experience; ux; serious games; simulation; medical; user centered design*

Abstract—Games and simulations are used in healthcare for purposes including training, education, and promoting wellness. However, there is often disconnect between content creators and the healthcare providers or patients who use their products. This can result in negative experiences and perceptions. This article investigates research in user experience (UX) to examine how games and applications designed for use in healthcare are impacted by considerations such as design practices and users' attitudes. By exploring the design of healthcare games and applications through the lens of user experience, the authors analyze current practices and develop specific design recommendations to improve future game-based scenarios. These six design recommendations are then applied to an example game, Medulla, to investigate their utility in framing a real-world example.

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1. INTRODUCTION

Technology health applications and game-based training (GBT) software are now commonplace in medical and healthcare contexts. Games in particular have been useful for many purposes, including assessing the interaction skills of children with autism spectrum disorder [1], teaching surgeons knee replacement surgery procedures [2], encouraging physical activity and proper personal hygiene [3], developing cognitive activities to combat dementia [4], and assisting patients with difficult decisions, such as making informed decisions when choosing between treatments for specific forms of cancer [6]. These games for health are part of a wider genre of games called serious games, “games whose primary purpose is to promote wellbeing, train and educate rather than provide pure entertainment” [7, pp. 94]. While many serious games are successful in teaching or improving treatment (e.g., [8]), others have fallen short. Further, even when games are effective, they are not always perceived this way. This is a problem because the perceived reputation of a training intervention is positively related to pre-training motivation [9]. This factor is positively related to learning and subsequent performance [10], [11].

There may be many reasons for the lack of acceptance toward a technology, including perceptions of ease of use and usefulness [12], computer self-efficacy, and system complexity [13]. Negative user experience (UX) may be another factor. UX encompasses a wide variety of considerations and has recently been studied in relation to game design from the context of entertainment computing [14], taking into account player experience and expectations as key factors in the evaluation of product success. While usability may be a more familiar term to some readers, and addresses topics like ease of use and system efficiency, UX also considers users' emotions and attitudes as they apply to a game or application. When these emotions and attitudes are negative, poor experiences often result, overshadowing the game's positive attributes.

Similarly, UX studies can yield surprising findings. For example, in their research analyzing two different field studies of gamers playing Super Monkey Ball and Bejeweled 2, [14] found that in regards to immersion, gamers earned significantly higher

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