A Theoretical Framework for Serious Game Design: Exploring Pedagogy, Play and Fidelity and their Implications for the Design Process

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ABSTRACT

It is widely acknowledged that digital games can provide an engaging, motivating and “fun” experience for students. However an entertaining game does not necessarily constitute a meaningful, valuable learning experience. For this reason, experts espouse the importance of underpinning serious games with a sound theoretical framework which integrates and balances theories from two fields of practice: pedagogy and game design (Kiel, 2005; Seeney & Routledge, 2009). Additionally, with the advent of sophisticated, immersive technologies, and increasing interest in the opportunities for constructivist learning offered by these technologies, concepts of fidelity and its impact on student learning and engagement, have emerged (Aldrich, 2005; Harteveld et al., 2007, 2010). This paper will explore a triadic theoretical framework for serious game design comprising play, pedagogy and fidelity. It will outline underpinning theories, review key literatures and identify challenges and issues involved in balancing these elements in the process of serious game design.

Keywords: Design, Engagement, Experiential Learning, Fidelity, Game-Based Learning, Motivation, Problem-Based Learning, Serious Games, Situated Learning

INTRODUCTION

While games have been used for educational purposes for some time (Levine, 2006), they have attracted increasing interest among educators in recent times due to the exponential rise of digital gaming in popular culture, and claims regarding the potential of games for facilitating engagement, motivation and student-centred learning. Such claims have led to the coinage of the term “serious games”: a term which, although subject to some conceptual debate (Ritterfield et al., 2009), is used in this paper to denote digital games that have ulterior non-entertainment motives such as teaching, training and marketing (Johnson et al., 2005).

It is widely acknowledged that such games can provide an engaging, motivating and “fun” experience for students. However an entertaining game does not necessarily constitute a meaningful, valuable learning experience. For this reason, experts in the field espouse the importance of underpinning serious games with a sound theoretical framework which integrates and balances theories from two (often competing) fields of practice: pedagogy and...
game design (Kiili, 2005; Seeney & Routledge, 2009). While a sound pedagogical framework is considered essential to their effectiveness as learning tools, equally important is the integration of game play elements which harness and sustain player engagement. Additionally, with the advent of sophisticated and immersive technologies, as exemplified in the virtual worlds of contemporary games, and increasing interest in the opportunities for constructivist learning offered by these worlds, concepts of fidelity, and its impact on student learning and engagement, have emerged (Aldrich, 2005; Hartevel et al., 2007, 2010).

This paper will explore this triadic theoretical framework for serious game design, outlining underpinning theories, reviewing key literatures and identifying associated challenges and issues (Figure 1). The paper begins by reflecting on pedagogical theories commonly utilised to conceptualise game-based learning, focusing on three constructivist theories. Following this, attention switches to theories used to conceptualise players’ engagement with digital games, and thus inform effective, engaging and “fun” game design. As a key component of engaging and pedagogically effective game design, the concept of fidelity, and how it relates to game design and game-based learning, is discussed. The paper will conclude by reflecting on issues and challenges involved in balancing these components when designing serious games.

**Pedagogical Underpinnings**

Over recent years, a growing body of literature has emphasised the importance of underpinning serious game design and game-based learning strategies with established instructional strategies and pedagogical theories (Kebrirchi & Hirumi, 2008). According to this argument, serious game design (as an example of instructional design) should be underpinned by a clear conceptualisation of how people learn and what it means to learn (Lainema & Saarinen, 2010).

A wide range of theories have been proposed to explain the learning that takes place within games and as a result, to underpin serious game design. At a most basic level, it is argued that some games, for example casual games — which allow players to acquire knowledge and practice skills in an engaging environment — embody behaviourist principles (Kebrirchi & Hirumi, 2008). According to this epistemological perspective — which focuses on the measurable, behavioural outcomes of learning (Jarvis et al., 2003) — knowledge is conceptualised as an abstract decontextualised “substance,” with game play and the learning

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*Figure 1. A triadic framework for serious game design*
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