

Chapter 9

Educational Serious Games Design

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ABSTRACT

Serious games are defined as games in which learning has priority over entertainment. While the entertainment industry is characterized by an established game design paradigm, the foregrounding of learning in serious games creates new demands. The design of effective serious games requires the pooling of expertise from both game design professionals and learning sciences professionals. One of the main problems the field of serious game design faces concerns the disconnect between game design and learning design. Several serious game design models have been proposed to bridge this gap. As these models have not been systematically reviewed, their contribution is not known. The chapter presents the state of the art for the field of serious game design and outlines five principal challenges. Next, 11 serious game design models are briefly introduced and reviewed. It is concluded that the degree to which the models meet the five challenges varies and that the field of serious game design is in a pre-paradigm state.

INTRODUCTION

Initially, digital games targeted mainly entertainment. The idea of combining fun and learning led to edutainment, the pairing of entertainment with education. The latest trend, serious games, marginalize entertainment and brings education into the spotlight. Serious games are games not exclusively designed for fun, serving non-entertainment goals in many diverse fields such as military, government, corporate, health-care, and education (Michael & Chen, 2006).

Digital games have become a defining phenomenon of contemporary culture. Over the last two decades, the educational interest in digital games has skyrocketed. This interest has taken two main forms. First, game-based learning that is entertainment-driven. This trend involves the use of commercial games for learning. Second, education-driven game-based learning that is currently manifested in trends such as gamification and serious games. The former refers to the application of game design elements to educational settings (Deterding, Khaled, Nacke, & Dixon, 2011; Kapp, 2012). The latter refers to the ad

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hoc development of games that bring education in the spotlight without excluding entertainment. Serious games are games not exclusively designed for fun, serving non-entertainment goals in many diverse fields such as military, government, corporate, health-care, and education (Michael & Chen, 2006).

Game design is an inherently interdisciplinary endeavor, involving experts from various disciplines such as graphic, audio, product, and interaction design, programming, animation, writing, and content area expertise (Salen, 2007). The game industry has developed highly sophisticated narrative, artistic, and technical methodologies for creating engaging and immersive games (e.g. Salen & Zimmerman, 2004; Schell, 2014; Adams, 2010). Currently, the field of digital game design is mature, being in a paradigm state (Kuhn, 1996).

As the emphasis has gradually shifted to serious games, however, new requirements emerged. Compared to traditional digital game design, the main complication that emerges in the case of Serious Game Design (SGD) is that learning has priority over entertainment. Consequently, in addition to all other types of expertise required for digital game design, SGD necessitates professionals whose expertise is related to learning. Such professionals include educators, content experts, and learning sciences professionals in general. To design effective serious games, game design professionals would need to collaborate with learning sciences professionals (Charsky, 2010; Lim et al., 2014; El Mawas, 2014). Such a collaboration, however, might not be directly possible because a common vocabulary is missing (Arnab et al., 2014). As it has been stressed, the main limitation characterizing the field of serious game design pertains to the disconnect between established game development models and the design of learning (Arnab et al, 2014; Bellotti, Berta, De Gloria, D'ursi & Fiore, 2012; Van Staalduinen & de Freitas, 2011). To address this limitation, Moreno-Ger et al., (2014) argued that serious game development methodologies are needed that will eventually help systematize the creation of games. To bridge the game design - educational design gap, a number of serious game design models have been advanced over the past few years. To date, there has been no systematic review of such SGD models. Consequently, the extent to which these models address the major challenges the field of SGD faces is unknown. The present work has two main objectives. First, it presents the state of the art in SGD by briefly introducing 13 models. Second, it acknowledges contribution these models make and identifies 5 principal challenges that remain open for the field of SGD. The chapter is concluded with an examination of the extent to which every model meets the design challenges and an outline of the road map ahead.

BACKGROUND: SERIOUS GAME DESIGN MODELS – STATE OF THE ART

In this section 13 SGD models that have been advanced in recent years are briefly introduced. An overview of the models is given in table 1.

While all models aim at SGD, they have different origins and constitute different solutions to the problem of design. For convenience, the SGD models are presented in chronological order.

Kiili, (2005) proposed the Experiential Gaming Model (EGM) for designing SGs. The EGM is based on Kolb's experiential learning cycle and the corresponding four stages of experiential learning. The starting point for the development of this model was the observation that the creation of educational games often fails because the emphasis on educational dimensions of games has displaced fun, resulting in unengaging games. The main idea underlying the EGM is that the link of gameplay with experiential learning will facilitate the state of flow and, eventually, lead to learning.

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