Chapter 78
Serious Games Effect Analysis On Player's Characteristics

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ABSTRACT

"Serious games" refer to games that go beyond pure entertainment and promote learning. They are utilized within a variety of learning environments enabling students to acquire knowledge and skills, while they offer wide benefits. The authors' team measured and analyzed various factors related to the gameplay and educational content when 2D and 3D serious games are introduced in the educational process. The main objective focused on the correlation of the University students' views that were sharing common characteristics, like gender, information and communication technology skills, game playing experience, and specific scientific background with factors that related to the gameplay as well as the learning effectiveness. The results revealed that game-playing experience had a more positive impact in the case of males, while perceived learning effectiveness of 2D was higher compared to the 3D serious game for both genders. Moreover, there are differentiations among females concerning the scientific background, Information and Communication Technology skills and game-playing experience.

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INTRODUCTION

Serious Games (SGs) are defined as "games that do not have entertainment, enjoyment or fun as their primary purpose" while the "seriousness" of these games refers to content that may clearly be used as learning material by teachers (Djaouti, Alvarez & Jessel, 2011). Although there is a perception that SGs are lacking fun or their primary purpose is other than amusement, Abt who was the first that used this term systematically, continued, arguing that, "this does not mean that serious games are not, or should not be, entertaining" (Abt, 1970, p.9). The main research aim of this work is to examine University students' views towards SGs features. Especially, we focused on a variety of factors such as gender, Information and Communication Technology skills, game-playing experience and specific scientific background i.e. natural and social, and their possible impact on game design (2D or 3D) regarding perceived learning effectiveness.

Well-designed SGs can boost learning outcomes and this can be expressed in a measurable way (Erhel & Jamet, 2019; Girard, Ecalle & Magnan, 2013; Granic, Lobel & Engels, 2014; de Freitas & Liarokapis, 2011). SGs learning and gaming components are ought to be well balanced in order to provide an immersive educational experience. Additionally, to the leaning and gaming balance, fun is also a very important feature of a good SG because it is supportive to engagement and motivational processes (Franzwa, Tang, Johnson & Bielefeldt, 2014; Kaimara & Deliyannis, 2019; Westera, 2019). SGs promote conceptual understanding through direct interaction and feature immediate feedback generated by the game environment (Boyle, Connolly & Hainey, 2011; Stapleton, 2004). The educational experience within an SG can be contrasted to actual game experience where the player assumes the role of the key character. Game-based environments are more immersive and engaging in terms of both technology and game design (Arnab, Berta, Earp, De Freitas, Popescu, Romero, Stanescu & Usart, 2012; Deliyannis & Kaimara, 2019). The game environment is enhanced with narration, hidden backstory and adventure or exploratory features (Faizan, Löffler, Heininger, Utesch, & Krcmar, 2019). Game interaction and feedback elements allow players to play and progress at their own pace (Federoff, 2002; Sweetser & Wyeth, 2005). On the other hand, SGs offer teaching tools to educators that motivate student's interest in the educational content. However, there are different challenges when SGs introduced into the classroom.

One of the major research fields is to understand how students interact with games and how learning occurs (Freire, Serrano-Laguna, Iglesias, Martínez-Ortiz, Moreno-Ger & Fernández-Manjón, 2016). Moreover, at the back-office level, learning analytics allow instructors to monitor students' activity and provide insight into their progress. Active use of this type of games to complement teaching can increase interaction and provide information that improves the contact time between students and teachers through personalization (Arthars, Dollinger, Vigentini, Liu, Kondo & King, 2019; Illanas, Gallego, Satorre & Llorens, 2008). Hu and Liu (2010) noted that users perceive mobile game differently with regard to computer game experience and gender differences. Most studies have indicated that males enjoy playing digital games more than females do. Moreover, they differ in their gaming motivations and content preferences while females dislike competitive, violent, or 3D digital games (Tsai, 2017). A recent report showed that gender differences in terms of how much time players spend playing games tend to disappear. However, this report did not provide any further details on the type of games that players prefer to play according to their gender (Statista, 2018). Taken into consideration the fact that the design and development of SGs are based on the adequate integration of educational and game design principles, as well as several studies provided evidence that students perform better while they are playing SGs, however, far fewer examined their effectiveness in the educational settings (Bellotti, Ott, Arnab, Berta, de Freitas,