



Designing social videogames for educational uses

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ABSTRACT

In this paper we analyze the main areas of research into educational videogames and in the evolution of the technologies and design methodologies that are making these interactive systems increasingly natural, immersive and social. We present the design and development of a prototype for a collaborative educational videogame based on a Massively Multiplayer Online Role-Playing Game (MMORPG) engine for use in various educational contexts in (a) university education and (b) secondary education.

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1. Research on educational videogames

Scientific research into videogames has been rather scarce, only coming into its own in the 80s, when videogames first started to proliferate. This research has focused mainly on the negative effects of videogames, namely aggressiveness, addiction and withdrawal, and was based on previous research into the effects of TV (Calvo, 1997; Goldstein, 1993; Healy, 1998; Huston, 1999; Irwin & Gross, 1995; Welch, 1995; Flood, Heath & Lapp, 1997; Cesarone, 1998; Wellish, 2000). The result has been a social discourse that has uniformly discredited videogames and, by extension, games, platforms and players, producing a negative effect on its perceived educational potential. In reality, research has demonstrated the practical non-existence of negative effects, along with the presence of some positive ones, including those of an instructional nature (McFarlane, Sparrowhawk & Heald, 2002). Already in 1978 the first findings on the subject were being published (Ball, 1978), laying the foundations for subsequent research – especially in terms of the motivational aspect for learning, as well as its cognitive potential. But its most solid foundations began to be laid in the 80s, while the 90s, especially the second half, saw the proliferation and fruition of that research. Estallo (1995) states that “videogame players tend to exhibit a higher level of intellect than their non-playing peers”. He highlights, among other virtues, their benefits in terms of motor skills and intellectual development, areas in which players excel above non-players. Also of importance are the perceptive and deductive elements, as well as a parallel or simultaneous processing and, closely linked to this, spatiality and visual perspectives (Jackson, 1993; Okagaki & Frensch, 1994; Jordan, 1998). And let us not forget the importance of selective attention to stimuli from a perceptive standpoint (Dorval & Pepin, 1986).

Scientific research has already managed to establish a connection between videogames and various arenas of the human psyche – affective, cognitive, conative (Malone, 1981; White, 1984; Ricci, 1994; Kafai & Resnik, 1996; González & Blanco, 2008a). Science has also examined their relationship with the complex socializing process familiar to young people today (relationships with peers – playing together, talking about videogames and exchanging them, building identities, obtaining knowledge and experiences vicariously, developing a sense of self and of one’s surroundings) (Lewis, 1997; Garitaonandia, Juaristi & Oleaga, 1999; Croson, 1999; Buckingham, 2000). Associations have also been made between types of videogames and cognitive, affective, motivational and intellectual development, as evidenced by how arcade, action, role and platform games foster the development of motor skills, manual dexterity and reflexes in cognitive terms, and provide a release for stress in affective and motivational terms. These are usually associated with machines like Gameboy, Playstation and

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Nintendo, while the more complex games played on computers, like strategy and simulation games, are more relevant to intellectual development (Fisher, 1995; Moral, 1996; Acevedo & Álvarez, 2007). This research into videogames has made advances in different areas, such as: (a) access and use (differences by gender, age and socioeconomic status, contextual studies, relationships between their use and that of other media, as well as with other leisure activities); (b) content (themes, structure, background and precursors, technical effects); (c) social perceptions of the phenomenon (meanings attributed to the technical devices, models for spreading technology); (d) positive and negative effects (aggressiveness, addiction, sexism, social and cognitive skills, school performance, teaching potential, effect on social and family relations); (e) other applications and consequences (use in medical treatment – oncological, recovery from burns, alcohol and drug addiction, as a didactic tool – and for special educational needs, as an aid in technical research into artificial intelligence, in the development of technologies and their adaptation to users, effect on the development and implementation of technology in society) (Gros, 1998; Blanchard & Stock, 1999; Grupo F9, 2000; Botella, Quero, Baños, Perpiñá & GarcíaPalacios, 2004; Becta, 2006; European Schoolnet, 2009).

Papert (1998), Gee (2003), Gee & Hayes (2009), Prensky (2001), Whitton & Hollins (2008), Marty (2011) and Carron, Marty & Mangeot-Nagata (2009) espoused the benefits of computer gaming and note the skills and attributes that they promote in learning. So, videogames have been used in school to promote and to assess reasoning abilities (Bottino & Ott, 2006; Bottino, Ferlino, Ott & Tavella, 2007; Facer, Ulicsak & Sandford, 2007; Bottino, Ott & Benigno, 2009). However, the impact of the serious games on knowledge and practices has been studied with encouraging results (de Freitas, 2006; Shute, 2009; Pivec & Pivec, 2009; Gee & Shaffer, 2010; Ulicsak & Wright, 2010).

Of note is Jane McGonigal's assertion that "videogames can make us better persons and help to change the world" (Macgonigal, 2010). She states that there is a lack of research regarding the skill set that is acquired in immersive environments and why players, who often feel frustrated and are marginally integrated in real life, feel successful in these types of settings where they spend a great deal of time cooperating with others to achieve common goals. One example of this is provided by the online game World of Warcraft, which has a Wiki with over 80,000 pages and 11.5 million players who devote 22.7 hours a week to engage in epic quests and work as a team (Corneliusson & Walker, 2008). Taking into account the previous research, this paper considers the last line of research mentioned, that of the design, development and evaluation of technology, in this case for the development of educational and social videogames for collaborative learning.

In the following subsections we present some examples of uses of videogames in classrooms and some educational uses of 3D games related to our work. Then, the evolution of technology and videogames and the game based collaborative learning background is presented. Finally, the educational experiences carried out by us are described and conclusions are presented.

1.1. Some examples videogames activities in classrooms

Commercial videogames can help in the developing of different skills of students. These potential formative benefits have been studied under the project "Educational Games in the Classroom" (Felicia, 2009). Table 1 shows these games and the potential benefits to be gained during your play.

In order to describe in depth some experiences in classrooms with videogames, we cite below some examples of uses of commercial videogames (Padilla Zea, 2011):

1.1.1. Age of Empires III in the social environment subject

Age of Empires III was used in the primary school's 6th year social environment subject (Gros, 2008). From this experience, the authors have found that, through the use of a videogame, has developed a set of new skills, like for example, understanding the complex multimedia environment, achieving read, write, speak and listen depending on the changes occurring in the game. Also, they have learned to manage the information the game provides them with the resources of each civilization, using it to improve and make more advanced civilization, for what they need to master four core competences: information management, digital asset management, management and development of design strategies and planning and management of information and variables of the game. Regarding communication skills, have improved both verbal and written, and electronic media related. It has encouraged debate, since all students have to manage their civilizations but also have to manage alliances with other civilizations so that everyone can achieve their goals. Finally, the dialog that occurs between students leads to a critical analysis of the proceedings which results in resistance to the manipulation of individuals. We see that seeks to promote such important skills as planning, resource management, communication, debate and criticism, all skills that are acquired and improve while students have fun with the game.

Table 1
Examples of commercial videogames and their formative benefits.

Game	Formative benefits
Age of Empires II	History, strategy and resource management
Age of mythology	Mythology, strategy and resource management
Bioscopia	Zoology, cellular biology, human biology, botany and genetics
Chemicus	Chemicals
Civilization III	Planning and troubleshooting
Making history: the calm and the storm	History, World War II, economic management and negotiation
Nancy drew: message in a haunted mansion	Investigation, puzzle solving and deduction
Oregon trail	History, geography, mathematics, logical reasoning, strategy, resource management, and reading
Return of the incredible machine contraptions	Problem-solving skills and physics
Roller Coastre Tycoon 3	Administration, kinetic and potential energy
Toontown	Social collaboration
Where in time is Carmen Santiago	Discovery and logic
World of Warcraft	Collaborative learning
Zombinis logical journey	Logic and algebra

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