Section 1
Chapter 5 - The Role of Video Games In Education

Theoretical Framework

5.1: General characteristics of video games

Information and Communication Technologies (ICT) are part of everyday life, which is why video games are among the most straightforward ways in which young people are directly influenced by computer culture. In fact, some of its components such as interaction, narrative, playability, sense of immersion, aesthetics and its ubiquity have signified a radical change in the current digital ecosystem.

As for interaction, Filigrana, Solano and Collazos (2016) assert that the intangibility of objects in video games as opposed to what happens with physical games provides two styles of interaction: social interaction mediated between players and between the player and the interface. The first one refers to the linking of users through dialogue mechanisms based on a common linguistic domain through multimodal resources that provide an added dynamism to the communication between players and that effectively goes beyond conventional interaction. On the other hand, the interaction with the interface enables the user to act, react and modify the content in which an experience generated by the automatic and systematized response of the platform is manifested. Both interfaces are necessary and increasingly essential elements to be included in video game design, as they construct a register and enable the traceability of the ludic processes generated by the experience.

Regarding playability, it is understood as a set of properties upon which the player's experience relies. In other words, it is that layer of design that grants functionality attributes to the video game, supplying objectives, rules, atmosphere, identity, transitions, rhythms, mechanics, narratives, behaviors, among others. Basically, playability is the sum of the computer and

psychological aspects of a video game that are intertwined in order to convene under the logic of fun and entertainment.

In turn, the sense of immersion is described as the loss of the sense of time, place, and self. This sensation can occur while watching a movie, reading a book or playing a video game, causing the user, reader, player to pay maximum attention and find themselves emotionally absorbed by the experience. In video games, the notion of immersion is further produced through interactive processes and virtual reality, causing greater engagement and levels of concentration by removing the barriers between the player and the interface.

Consequently, the architecture of video game aesthetics also surrounds singularities associated with the quality and artistic adaptation of all the elements of the video game to its nature. Highlighting graphic and visual quality, sound effects, soundtrack and melodies of the game, the story, and its narrative form, among others.

Finally, ubiquity refers to the omnipresence and mobility generated by new technological devices, obtaining a networked society in which the systems of creation, management, distribution, display and dissemination of information also change. The re-contextualization of the ludic ecosystem produced by the ubiquity perceived with the use of mobile applications and the internet has resulted in a transmutation in art, in player typologies, in the inputs-mechanics and in the design of interfaces that adapt to the interests and needs of new generations and to the modes of consumption of modern society. The portability of online games accompanied by advanced multimedia capabilities, cloud services, three-dimensional graphics and touch screens allowing access at any time to any type of ludic content, with no storage space constraints.

5.2: Transition from Video games: From Leisure to Education

While the current technological mirror represents reality forming an interactive experience that fuels the perception of culture, leisure, information and education; the collective mind has positioned video games exclusively within leisure, amusement and entertainment (de Arroyabe

Olaortua, Arrillaga, & Sesumaga, 2018). Even worse, they have situated them as some of the most damaging agents of mental and physical health (Felicia, 2009). Despite this, from the end of the 20th century until today, theorists such as Garmen, Rodríguez, García-Redondo and San-Pedro-Veledo, (2019) and Prado (2018) show positive advances in cognitive abilities, such as memory, development of attention, understanding, problem solving, creativity; and psychomotor skills, including visual dexterity, perceptual discrimination, spatial coordination; as well as patterns of coexistence and conflict resolution, that is, civic social competence, decision-making and empathy. As a result of technological evolution, new tools for leisure are available, but they also have enormous potential for educational use. Leisure time can become a moment of personal relaxation while simultaneously promoting intellectual development, as long as a critical capacity to enjoy virtual environments is maintained.

5.3: Educational games

The pedagogical value of the video game is often determined by the beliefs, values, aptitudes, attitudes and predisposition of the teacher towards video games. The way in which the teacher approaches the game as an educational resource, taking advantage of the students' willingness to acknowledge that technology is going to be part of their academic training and which have rendered plausible the incursion of video games into the classroom, in fact Marin (2012) states that direct applications of video games to the learning process lead to the enhancement of creativity, social and psychomotor behaviors, as well as strengthening and consolidating teamwork.

A fundamental factor for the incursion of video games to generate good results is the constant preparation of the teacher in terms of new technologies and digital practices, due to the theoretical elements that this implies. All of the above leads to a pedagogical structure that involves knowledge areas, the digital resource (in this case the video game), through the application of strategies and tools that establish communication channels and motivators for learning. In this topic, the research and analysis of Sáez and Domínguez (2014) should be

highlighted, showing the results of the application of video games in the classroom, indicating that in the academic field there are no positive results but that in fact creativity and discovery are promoted while favoring teamwork by establishing networks of interaction and work between students. In this aspect, the methodology used by the researchers (play, reflect and create) through the use of video games for teaching, yield results obtained by introducing The Sims video game to high school students, which enables the creation of educational scenarios in order to foster social skills. Thereby, the how and why of video game integration into the curriculum is validated. In addition to commercial video games with educational effects, there are also edugames or serious games for education, which are designed with the aim to develop a skill by applying a learning exercise intrinsically incorporated into the dynamics of the video game.

Specifically, Gee (2012) considers that video games have special properties that develop comprehension skills, generating new applied meanings in reading and writing. According to studies conducted by UNESCO (Grizzle, 2011), the knowledge and skills focused on access, processing and conversion of information in the media environment from the audiovisual tradition, transcends the instrumentalization, search, processing and dissemination through digital literacy technologies, promoting skills consistent with reading and writing processes in the field of semiotics towards social interaction and critical thinking. In short, video games are structured towards a process based on action, on the task, associating the combination of the basic concepts of "reading" in video game action (Torres-Toukoumidis et al., 2016).

Education has always paid attention to electronics (or video games). Some relevant milestones:

- The first significant milestone is actually a programming language. LOGO, memorable for its turtle-shaped cursor, enabled users to program it to draw lines. From the 70's (and for many more years) it was implemented in schools to demonstrate some basic programming concepts.

- In the United States, Oregon Trail (1971), developed by three history teachers, became a significant landmark in schools during the 1970s and especially the 1980s. Oregon Trail resembled an adventure, integrating an American history lesson into it.

- Little Professor, from 1976, can be considered the first portable electronic game in history... and it was educational. It worked like an inverse calculator; the teacher proposed an operation and the player had to answer it correctly.

- The Learning Company has been bought and sold multiple times, but since its founding in 1980 it has become the leading educational video game company, also in the wake of Apple II.

- At the beginning of the 80's the term "edutainment" appears to speak of the fusion between entertainment and education.

- The games of Carmen Sandiego (Where is Carmen Sandiego?) for geography and history, Math Blaster, for mathematics, SimCity, Civilization or the games of Dr. Brain emerge between the late 80's and early 90's. They tend more and more to be commercial but the educational element is used as a marketing strategy.

- In 2005, with the Nintendo DS, Brain Training and several other Touch Generations' games are released, promising everything from teaching languages to improving vision.

- The smartphone has also been a source of "playable" applications for training purposes.

- Minecraft, an absolutely commercial game, has also been adapted for education, either using the basic game or taking advantage of the recent educational version.

The relationship between video games and education, however, has not been a success. Many video games have used it more as an excuse to be seen favorably than with real results. Egenfeldt-Nielsen (2007) characterizes the general problems of educational video games (or edutainment):

- Low intrinsic motivation. Edutainment is based on external and arbitrary rewards, rather than the player's experience.

- The learning experience is not integrated. Thus, the learning is subordinated to the game and what eventually happens is that the student skips the texts, for example, to play the mini-games.

- Low budgets. They pale in comparison to their commercial counterparts, displaying technical deficiencies.

- Learning by repetition. They are based on repetitive learning and not on understanding or comprehension.

- Separate distribution and marketing. They are neither sold nor distributed in the same way as other games. They are sold in bookstores, kiosks or schools.

- Simple mechanics. They usually steal ideas from well-known arcade titles or involve adventures in simplistic scenarios.

- No teacher present. It is important to note that none of them requires the teacher or the parents; it means placing the student in front of the computer and everything is self-contained.

Egenfeldt-Nielsen (2007) is especially critical of edutainment games and related studies because of the methodological problems they present. The conclusion is that it is possible to learn from video games, but that the evidence to be able to say something more is weak. However, research by authors such as McGonigal (2013) and Zagalo (2010) on the inclusion of video games in the educational system goes beyond knowing whether it is good or bad and focuses on the characteristics and elements that motivate the use of video games and their application as a potential educational resource in schools. A video game can propose pedagogical principles that focus on logical thinking, problem solving, social skills and teamwork.