

Digital Games: Possibilities and Limitations

The Spore Game Case

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Abstract: This paper discusses the educational value of digital games, its advantages and limitations. In order to present the educational potential of digital games, we proceed to the analysis and evaluation of a game, which was recently published by Electronic Arts Inc., Spore, a game that reached the market surrounded by controversy, due to the evolution of the cells that settle its universe. This game presents defensible characteristics regardless of the underlying moral bias, offering a strong educational potential and revealing itself as a valuable educational resource, as it promotes active, autonomous and participated learning processes.

1. Introduction

The use of games in educational contexts is a pedagogical strategy which strengthens autonomous and active learning, because games are one of the strongest sources of enjoyment among children (Vygotsky, 1989) and they also contribute to the organization and structuring of cognitive thinking. According to Huizinga (2001), gaming is one of the most important elements to the cultural genesis in the history of human being, since it has helped developing the cultural and social life. Huizinga (2001: 34) states that ‘The entertainment factor underlying the cultural processes is the creator of several fundamental ways of social life and the spirit of playful competition inherent to gaming is undoubtedly a very old social impulse’. Gaming is intimately connected with expression and competition. The definition of game, to this author, is associated with enjoyment and pleasure, playing and humor, but also with spirit and activities which involve wisdom and seriousness.

Gaming is therefore a primordial playful element to the discovering of the self, to the creation, experimentation and transformation of the world by the human being, one of the education’s aims, through a critical perspective.

Playing is conceptually identical to gaming (Huizinga, 2001) and Winnicott (1975) highlights its importance in the life of a child, by saying that playing is universal and to play is a way of communicating, making the growth easier, leading to group relationships and being a creative experience in a space-time continuity, finding itself between what is subjective and what is objectively understood.

According to Winnicott (1975), it is by playing that both children and adults enjoy their creative freedom, mobilizing their whole personality. It is through creativity that the human being finds itself, during a process of self-consciousness and independence.

It is assumed that society and gaming develop simultaneously. Once the daily life of the 21st century society is influenced by information and communication technologies, digital gaming (videogames or electronic games) presents itself as one of the prevailing entertaining factors which should be seriously taken into account.

2. Digital games

2.1. Definition and classification

A digital game (or a video game or an electronic game) is a generic expression that refers to electronic games to be played in a computer, in a console or any other technological device (Pivec and Kearney, 2007). It can be defined as a game through which a human interacts with a computer, by using technology (Gee, 2003).

Digital games can be analyzed according to the following criteria (Carvalho, 2005): Theme/activities; Duration; Used device; Number of players; Opponent; Access to game.

There are several ways of classifying digital games, like the one from BECTA (2003), which has outlined a classification that includes the several existing kinds of digital games¹ according to style, narrative, themes and activities, and the one from Grealls (2000), that establishes a typology² which considers the games' structure and the main skills (psychomotricity, reasoning, logic, strategy and memory) developed by the player.

2.2. The educational value of digital games

According to several authors, the usage of digital games in the learning process has a high potential, which resides in the level of motivation involved in the act of playing: making progress in the exploration and assimilating new knowledge in the context of a continuous and significant narrative line, inserted in a parasocial universe of characters (Malone, 1981; Ruben, 1999; Prensky, 2000; Gee, 2003; Pivec and Kearney, 2007).

Prensky (2000), followed by Gee (2003), supports and defines the learning processes through the use of digital games as *game based learning*: the use of digital games in learning contexts to improve and accelerate the learning process, by motivating the students.

Gros (2003) enhances that for digital games to be used for educational purposes they must be endowed with well defined learning goals, teaching contents to the users or promoting the development of important strategies and skills to increase their intellectual and cognitive abilities.

According to Malone (1981) and Garris et al (2002), the factors that contribute to the strength and consistency of digital games as educational tools are the challenge, the fantasy (imaginary contexts, themes and fantasy characters), the sensorial stimuli (visual and hearing, dramatic and new), the curiosity and the involved learning. Garris et al (2002) point out that games should include characteristics which enable quality learning. These elements must be incorporated on an integrated platform, to structure objectives and rules, a context of meaningful learning, an appealing story, immediate feedback, a high level of interactivity, challenge and competition, random elements of surprise and rich environments for learning (Garris et al, 2002; Malone, 1981).

[1] BECTA typology (2003) contains action / adventure games, fight games, First Person Shooter (FPS) games, management games, platform games, racing games, real-time strategy (RTS) games, role playing games (RPG), simulation games and World-building games / 'God' games.

[2] Grealls typology (2000) refers to the following: Arcade, Sports, Adventure Games, Simulations and builders; strategy games, puzzles and logic games, trivia games.

These factors determine the motivation to play and learn at the same time (Malone, 1981; Ruben, 1999; Prensky, 2000; Garris et al, 2002), being also important for an effective and successful learning, through the offer of contents like interactivity, feedback, solving problems and the effects of context, which promote reflective behaviors' among the players (Pivec and Kearney, 2007). Games make the learning process possible by allowing the development of critical thinking that will be outlined during the act of playing.

Garris et al (2002) consider that an important part of learning through the usage of games is made outside the game cycle, through a reflection about the experience, and present a scheme which summarizes this reasoning:

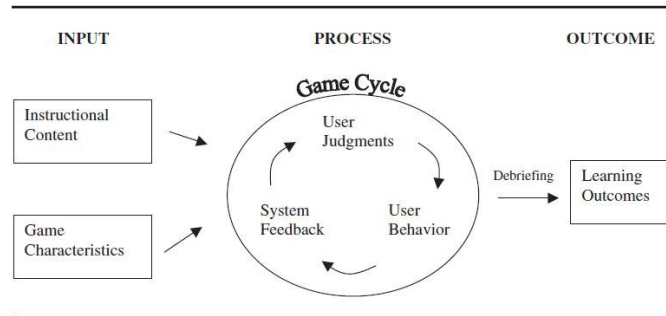


Fig. 1 – The learning processes made through games (Garris *et al*, 2002:5)

2.2.1. Advantages

Digital games provide amusing alternatives, more active and autonomous, opposing to the traditional methods used in the process of teaching and learning, making possible the materialization of a Prensky (2001b) statement, which predicts that today's students, the digital natives, will teach themselves.

Digital games are a new challenge to the teaching community, providing the development of cognitive skills and making possible the socio cultural interactions stated by Greenfield (1996), to whom videogames (or digital games) play an important social and cultural role and at the same time favor the cognitive regulation.

Some types of games and technologies associated to digital games are already being used as supporting tools to achieve learning goals in formal education environments, either directly or as an attractive tool for unmotivated students (BECTA, 2003).

According to Prensky (2000) and Gee (2003) games allow the development of new learning strategies, based on new interactivity patterns, like feedback, reflective and critical learning, target levels of understanding semiotics, learning through discovery and exploration, situated learning, role-playing and constructivist learning. Regarding this problem, Grealls (2000) refers that digital games enable the assimilation and the appropriation of information, the construction and the application of cognitive strategies, developing various skills such as psychomotor ability, decisions making and perseverance.

To Prensky (2000), the main benefits of gaming are the users' capability of processing simultaneous information, leading to the development of awareness of non linear information, which is typical from digital natives (Prensky, 2001a, 2001b), as well as enabling the sense of belonging to a non geographical community, which should broaden the players' horizons.

Gee (2003) suggests that the didactic principles involved in *game based learning* can change the learning processes in educational institutions, either in the relation between teachers and students or in the institution itself, by turning the learning process into something critical and active. To Gee (*Ibid.*), games are structured in a way that encourages this kind of reflexive, non passive learning, through its design, the areas of semiotics involved, which encourage the player to understand and to establish interrelations between semiotic areas, developing a meta level of comprehension on these areas, enabling autonomy, reflection, appropriation of meanings, self learning and the improvement of skills. This process is characterized for its cooperative environment and for the establishment of relationships between affiliated communities, which share one or more common interests.

Malone (1981), Ruben (1999), Garris *et al* (2002) and Pivec e Kearney (2007) point out the development of cognitive, visual, space and memory skills that is provided by the usage of digital games.

2.2.2. Limitations

Gee (2003) considers that digital games are sophisticated teaching tools as well as complex, long and hard. They demand different types of previous and distinctive knowledge, making its utilization hard in the school context.

At the Online Educa Berlin 2006 (Pivek and Kearney, 2007), the potential of the process of learning based on gaming was discussed and several difficulties were identified:

- Difficulty in finding games that include contents from curricular programmes;
- Low tolerance from the community to games, as the act of playing is understood as a less serious activity;
- The available technical resources at schools are insufficient to support this kind of learning

Kirriemuir and Mcfarlane (2004) consider that the main obstacles to the use of digital games in a classroom context are the lack of relevance for the curriculum, the lack of scientific precision of the contents and the lack of consistency between the duration of games and the schedule of computer rooms.

Balasubramanian and Wilson (2006) refer that there is a certain apprehension from the teachers in developing computing activities, since they can expose their technological vulnerabilities to the students.

3. Spore – a case study

3.1. Characteristics and structure

Created and edited by Electronic Arts Inc. in 2008, Spore is a multilingual, massively single-player online game and is aimed for people over 12 years old.

The themes of this game are History, Sociology and Biology, and its goal is the creation of a universe and forms of life, from a unicellular organism until its evolution as an intelligent and social specie, creating tribes, building civilizations and exploring space.

According to BECTA's (2003) typology, Spore is mainly a World-building game / 'God' game, since the player manipulates both the unicellular organism and the civilization, aiming for the development and the progress of the creature/civilization, modeling and controlling environments/worlds. According to Grealls' (2000) classification, Spore joins the category simulators/builders.

Spore is an endless game which can be installed in several platforms: computers (Windows, Macintosh, Linux), Nintendo DS and mobile phones. It can only be played individually, each player interacting, however, inside the virtual Spore universe, with the creations of Maxis team³ and with creations of other players. The narrative is placed in an open community; the players are online and interact, asynchronously, through their creations and their avatars.

Once the game begins, and after a brief introduction, we face up with a simple and pleasant interface, with nine planets and the options *Play*, *Create* and *Share*. We can then choose to start the game, start building a creature or share our creations. On the lower left corner of the main menu are the *Options* and the *Sporepedia* iconic buttons. As the game consists of five phases, there are several presentations for each level that cannot be interrupted by the player. After that, the menu for the correspondent level appears.

Besides the tutorials and the tips for the games available at the *Settings* menu – Game Settings and Capture, the game has very interesting functions, such as the possibility of uploading videos directly from the game, the *Sporepedia* and the *Creator* of creatures, buildings and vehicles.

[3] Electronic Arts agency responsible for the development of games.

Spore allows the direct upload, in the game context, from a video of a player's creatures directly into YouTube⁴, through the menu *Settings – Online Settings*.

Sporepedia is a catalogue and an encyclopedia of the Spore universe, which presents the following menus:

- Creations - Where the user can find a list of all creatures, plants, vehicles, buildings, planets, stars and solar systems available and created that a player has found and exploited during the course of the game. When consulting *Sporepedia*, all creations found are available, with the name of the creation, image and creator. Each player may place a highlight or blacklist certain creator. Within this feature, important in the development of the game, the user can comment and vote on content, send messages to other players and look for content by name, content not seen and familiar content.
- My things – Spore personal page, where users can see statistics of the use of their creations by other players as well as its ranking in the Spore community. It allows observing how other players interacted with one's creatures, civilizations and universes and read the comments made on creations. The player can also see his creations and correspondent personalities, dependent on choices made during the course of the game and of each phase. The personality characteristics provide special skills to the species. In this functionality the player may also consult the achievements earned throughout the game.
- Friends - Where the user can see friends raised and with whom he can interact during the game, asynchronously.
- Sporecast - A Spore Podcast, a collection of creations of a player or of a group of players, being grouped under a specific theme and available to other players by subscription. Players can, within the context of the game, download content for Spore, based on one Sporecast or a default set of Sporecasts.

The *Editor/ Creator* at the Spore interface was published before the game, as a trial version. This *Creator*, that offers user generated content, present at the main menu, allows the player to create creatures, buildings and vehicles, and has two functions, the 'construction mode', where the creature, building or vehicle is planned, with specific abilities (e.g. social, battle, health), presented in different menus and the 'painting mode', also with several possibilities and painting effects. As the game is progressing, it is possible to personalize and give more powers and abilities to the creature by buying different artifacts with DNA points gathered along the game.

It is possible for the player to know where he/ she is, as far as the creature phase is concerned, or through the indication on the map, at the lower left corner, of the different phases of the game. The player can also explore the map in a way that will allow him/ her to go to a certain place and perform a certain task. There are no arrows that allow the player to move forward or backwards in the game, because he/she needs to achieve certain goals to go to the next phase. The player can however go to the main menu, through an iconic button (Options), which will allow him/her to go to the next phase as far as the goals of the previous one have been achieved. If the player has not yet achieved a step, the button containing the image of that phase appears, but it's blocked.

Spore presents a hybrid structure, combining the tree structure with the net structure, being the last one the prevailing one.

[4] Electronic Arts also has a channel on Youtube for the game Spore, 'The Spore YouTube Channel', displaying the most popular videos created through this procedure.

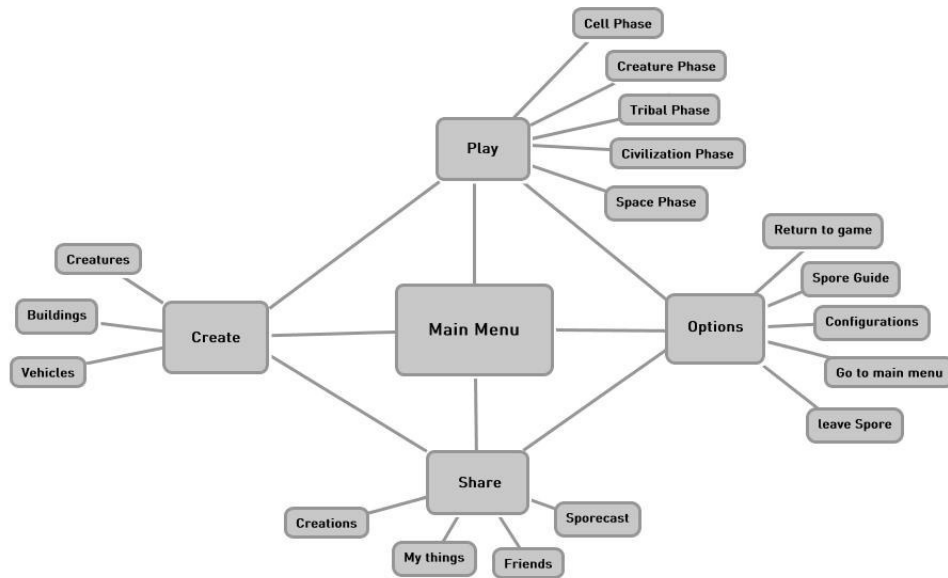


Fig. 2 – Scheme of the Spore game structure

3.2. Game's Description

Spore consists of five phases: Cell, Creature, Tribal, Civilization and Space.

Each phase has a menu containing the consequential abilities which will be unblocked on the following steps. Each step also presents a group of goals and missions available in specific menus, which have three levels of complexity: easy, normal and hard.

The choices and actions made at a game level have consequences in the following steps. The player is confronted with several options that define his/her characteristics, giving unique skills to the cell/ creature/ tribe/ civilization, and will be useful for the upcoming generations. This means that the path travelled as a microscopic cell will affect its skills as a creature or civilization. At the end of each stage, a feedback is given to the user on his/her performance, in the form of a line of evolution of the creature, which shows his context of evolution. As the player reaches goals and milestones in one phase and accumulates DNA points, the progress bar fills up, and when it becomes full, the user can choose to move to the next stage.

At the Cell Phase, the player begins the journey of a life as a unicellular being and goes through several evolutionary phases, in a residual pool until it grows to the point it reaches earth. In order to achieve that, it has to eat plants and other cells to obtain DNA and make the cell grow.

At the Creature Phase the cell evolves and changes into a creature, leaving the aquatic environment to install itself at the beach, together with the other earthly species of the planet. As it explores the world, it will find a wide variety of other species, some friendly and other more bellicose. It needs to develop its social skills, to make new friends, and its battle skills, to handle enemies. Along this path, it will win DNA points, which the player can use to make his/her creature evolve, gaining intelligence and completing the journey to become an intelligent creature and move forward to the Tribal Phase.

By advancing to the Tribal Phase, the creature joins a species that dominates fire and has already formed a tribe. But other tribes will come up and they will all fight in order to rule the planet. With the newly conquered intelligence, the creatures from the tribe can start building and using tools that can help collecting more food to support a much larger population and expanding the tribe's influence through the interaction with other tribes. This interaction can be accomplished through a battle or in a friendly way, with chants and dances.

At the Civilization Phase the player starts with a city, from which he/she will begin conquering the world. Before entering the Civilization Phase, the user can choose the type of power he/she wants for his/her civilization, between military, economic and religious options. As the nation is being expanded around the globe it is necessary to obtain spices as resources to support the development and conquer, converting or buying other

civilizations before giving the big step into space. There are other tribes that have joined the civilized world with their own cities. By unifying the planet under the military, religious or economic flag the player can build vehicles and obtain the necessary technology to send the people into outer space.

At the Space Phase, the cosmos belongs to the user. He/she can use the technologies of 'Terraformation' to turn planets livable for his/her population and establish a new colony. As the empire spreads through the galaxy, the player will find other space people with similar ambitions. He/she can then choose to be a friend or turn them to ashes. The user can search for richness in the neighbouring planets or travel to the centre of the galaxy in a huge and mysterious quest. The future of the race is in the player hands and the immensity of the galaxy is at his disposal.

3.3. A pedagogical approach to the game

With Spore, the user, at his/her individual and learning rhythm, has the possibility of building, exploring and finding the functions of the game, promoting creativity and developing the simulation of an imaginary world, facilitating the comprehension of phenomena that are not a part of formal teaching.

The player places himself/herself in an active learning situation which is self controlled and self regulated – God games are games through which the player is in charge of the operations and situations. The user has the advantage of creating, building and exploring the creatures he creates. This game enables the reading and interpretation of a progress bar that appears at the bottom of the screen containing different information, among which are the time and scores that can be helpful to acquire mathematic skills.

The description/explaining of various concepts is useful to acquire skills related to science. One of the greatest benefits of Spore is without doubt creativity. Each user will develop his/her creativeness: there are numerous possibilities in the invention of creatures which will increase along the game – elements that can be added to creatures get unblocked as the user advances and conquers, motivating the player to commit himself/herself and to develop his/her esthetical and imaginary senses, since he/she is totally autonomous in his/her creations. The user will also be lead to moments of reflection about the best strategies to get DNA, which is the main characteristic in order to acquire new skills for the creature and consequently to achieve new levels.

The fact that the user can choose the level of difficulty can be considered an educational advantage. It would be uninteresting for the user not to be able to play in a unique pre-established degree, which would probably lead to withdrawal. This way, the player has what can be called an ascending path of experimentation – from the easiest, passing through medium and finally to the hardest.

The game also allows the interaction between the affiliate community, creating dynamics, exchanging contents and knowledge, thus becoming a social aggregation that facilitates the development of a web of social relationships in the cyberspace (Rheingold, 2000), allowing the user to 'perceive the structures defined by engagement in practice and the informal learning that comes with it' (Wenger, 2007:3) and granting the opportunity to contribute in a participated process of collective learning in a shared domain, interacting in a regular basis.

The Spore virtual community addresses the elements that Preece (2000) defines as requirements for the emergence of online communities, being the existence of individuals that interact socially, a shared goal, tacitly assumed rules of interaction and the mediation of technology.

3.4. Critical Evaluation

Spore is an exciting experience, as it gives the player the power to make his/her own game, having as a main characteristic an extensive freedom of action, offering a wide variety of options in the creation of characters. The user has the possibility of exploring his/her creativeness and populate the universe with unique creations.

The game allows the player to start again from the beginning, after reaching the end. Then, the story lived in the game will be totally different from the previous one, due to the numerous options available.

The majority of the game's controls are very simple and intuitive and the game's interface is extremely friendly.

The explanatory messages appear very often to guide the player and there is permanent feedback about his/her performance, as the player is accomplishing missions.

The camera angles are free and the player chooses the best view to play, just by clicking and spinning the mouse until he/she finds the right position. Besides that, the combination of images and audio is very involving and transports the player to the context of the game's environment.

The music is very interesting (from Brian Eno) and is coherent with the development of the action, containing sounds of joy, satisfaction, friendship and constant music giving the feeling of exploration and discovery along the path.

In terms of installation, however, is not as good as it was expected. Besides demanding an internet connection, it is not executable in a computer with a graphics card inferior to 128MB, which is unthinkable for schools. The available computers are only for research, meaning that they contain inferior graphics cards. Besides that, it is also necessary to have at least 4,7GB available in the hard drive, and even more space for future creations.

A huge debate has been installed in the scientific community over the scientific validity of the game. Science magazine has even put together a team of scientists to classify it, publishing the results in October 2008 (Bohannon 2008). The game has scientifically failed, especially in the area of Biology⁵. Spore contents reflect prejudices and stereotypes, namely as far as gender is concerned, as all the creatures are believed to be male. The female creatures only appear in the mating and procreation period. This is also verified in linguistics as the language is not inclusive of the two genders.

The game also reinforces the idea of domination relationships and the quest for power, whether religious, military or economic, encouraging physical and psychological violence, illustrated, in terms of ideology, by the ethereal image of a 'God' of the civilization trying to dominate other civilizations. These domination interactions, power struggles and the idea of authority associated can be useful, by allowing the user to critically judge and question the dynamics inherent to the relationships established in the 'real' world, in comparison to the dynamics presented in the Spore virtual world, thus offering the hypotheses of making the game a vehicle for the development of a critical consciousness and for the awareness of social and political contradictions. For this critical thinking to happen, however, we think it is necessary for younger players to be questioned by older people or to be faced with opportunities for peer discussion about the game. These opportunities can be provided by the school in various contexts, such as in classes devoted to civic education. Without this kind of confrontation, as in any game, the path of violence and domination may be the dominant trend and alienation is the most obvious result.

There is an important socializing component in the dynamics of the game that promotes friendships between cultures, a vital factor to the development of the game narrative, highlighting the importance of human interactions and allowing the avatars and the players, as owners of the avatars, to interact and learn together. Again, this component can only have positive results, in terms of acknowledgement of the social value of friendship between nations, cultures and individuals, if highlighted and discussed among peers and between generations (teachers, parents, brothers, neighbors, etc.).

As far as the attitudes towards the nature and environment are concerned, the evaluation is really negative, mainly in the Space Phase, as it is necessary to destroy cities, civilizations and planets and kill creatures. Counterbalancing these attitudes, but not forgiving them, in the last phase of the game the user has to collect rare fauna and flora. Still, if one can promote the discussion of the possibilities and options that the game allows, all the virtual destruction can serve as a *medium* of awareness of the consequences of such acts in the real world.

4. Conclusion

Games have always been present in the development of the human society, facilitating ways of social interaction and contributing to the maturation of culture. Today, digital games present themselves as one of the most common forms of entertainment, especially for children and teenagers, combining the ludic factor with

[5] 'Spore clearly has little in common with science, especially evolution' (Bohannon, 2008).

pedagogical advantages, promoting changes in terms of cognitive, behavioral and psychomotor skills in its users.

The use of digital games in educational contexts encourages active, critical, autonomous and participated learning processes, overcoming some of the limitations presented in more 'traditional' methods, engaging players in non-passive forms of acquiring knowledge and skills.

To substantiate these statements, we have proceeded to the analyses and evaluation of a fairly recent game, Spore, presenting its educational potential and limitations.

In conclusion, and overcoming the controversy generated by the dynamics of the game and of the evolution of the species, Spore has numerous educational advantages, as revealed by the analyses of the game, in light of the principles associated with *game based learning*, making this game a valuable educational resource. The big challenge remains the same throughout the history of curriculum integration of this kind of resources, not designed for educational purposes: a creative educator always finds ways to teach and to promote creative learning! 'Evil' and 'good' are two sides of the same coin. The analysis of what we may deem 'evil' induces, eventually, the formulation of what we understand as 'good'. This leads, depending on the way one explores and interacts within the Spore universe, to the shift of negative aspects into positive ones.

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