Videojuegos y habilidades del pensamiento

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Resumen

El presente documento es una revisión de artículos sobre los videojuegos y las habilidades del pensamiento que se trabajan cuando se practica este pasatiempo. Se revisó el trabajo de diferentes autores que se han adentrado en este tema. También se mencionaron las habilidades involucradas y se dio una breve descripción de las mismas. El punto crítico llegó con los trabajos de James Paul Gee, quien compara las habilidades del pensamiento y, por tanto, de aprendizaje, adquiridas y desarrolladas con los videojuegos y en la escuela, dejando una tentadora reflexión: ¿qué cambios se necesitan hacer para que los alumnos aprendan en la escuela al igual que como aprenden con los videojuegos?

Palabras clave: aprendizaje, creatividad, habilidades, pensamiento, videojuegos

Abstract

This paper is a review of articles on video games and the thinking skills that are worked out when practicing this hobby. The work of different authors who have gone into this subject was reviewed. The skills involved were also mentioned and a brief description was given. The critical point came with the work of James Paul Gee, who compares the thinking and learning skills acquired and developed with video games and at school, leaving a tempting

reflection: what changes need to be made to students learn in school just like they learn with video games?

Resumo

Este documento é uma revisão de artigos sobre videogames e as habilidades de pensamento que são usadas ao praticar esse hobby. Revisamos o trabalho de diferentes autores que abordaram esse tópico. As habilidades envolvidas também foram mencionadas e uma breve descrição delas foi dada. O ponto crítico veio com o trabalho de James Paul Gee, que compara as habilidades de pensar e, portanto, de aprender, adquirir e desenvolver com videogames e na escola, deixando uma reflexão tentadora: o que as mudanças precisam ser feitas para que Os alunos aprendem na escola enquanto aprendem com os videogames?

Introduction

Frequently, there has been talk about the use of video games by children and young people, generally, in their free time, and it is very common for them to have a lot of leisure time, which can affect or displace other activities or household duties. , school, or other. That is why parents and teachers have not finished accepting or understanding what the use of videogames can offer in people's cognitive abilities, since they usually see it as a waste of time and money, and, on occasion, as a danger due to games with a high level of explicit content.

Throughout life, the human being faces factors that negatively affect the performance of the body, specifically, of brain abilities, such as poor eating habits, blows to the head, not

getting enough sleep, consumption of harmful substances (alcohol, cigarettes, drugs, medicines), external factors (pollution, chemicals, industrialized foods, etc.), having a sedentary life, too much stress or lack of reasoning activities, among other factors. On the other hand, there are also activities that help to develop thinking skills. This is more efficient if, since childhood, habits such as reading, studying, playing a musical instrument or play activities are acquired. Here video games enter as recreational and recreational activity.

Definition of video game

Before starting to speak fully on the subject, it is necessary to have a clear definition of what videogames are and their practice; Likewise, in the present study a space was assigned to define leisure, since these terms frequently lose their value and potential.

A video game is an electronic game in which one or more people interact. Its interface is through a screen, hence its name, "video game", which has evolved thanks to the advancement of technologies, reaching greater complexity and robustness. It can be implemented in one or more platforms, such as a computer, a console, a portable device (a mobile phone, tablet), arcade (video game machines adapted for public places), etc.

Ana Sedeño (2010) mentions that:

> The most prestigious studies, such as those conducted by Greenfield and Cocking (1996), conclude that there is no evidence to confirm the negative effects of video games, nor to claim that they produce aberrations in children's behavior. It seems that the only really proven risk of his assiduous employment is that it prevents the dedication to other social activities (p. 184).

What exactly is leisure? According to the French sociologist Joffre Dumazedier (as quoted in Llull Peñalba, 1999):

Leisure is a set of occupations to which the individual can surrender completely voluntarily after having freed themselves from their professional, family and social obligations, to rest,

to have fun, to develop their information or their disinterested training, or to participate voluntarily in the social life of your community (page 3).

Classification of videogames

Video games, as well as movies, have a classification for their audience, which is defined by age - assuming a supposed average maturity that is obtained as a person grows, since the contents differ - as well as their complexity, for which Sedeño's classification is taken (2010):

- *Action games.* They propose activities to cause a precise, determined and rapid response to the player. They are games in which there is no need to plan any action, but interact in the environment as quickly as possible through simple actions such as shooting or hitting (quick decision making).

- *Arcade* (platforms, labyrinths, adventures). The user must overcome screens to continue playing. They impose a fast pace and require minimum reaction times. They need focused attention and memory. They contribute to psychomotor development and spatial orientation.

- *Strategy games.* They emphasize the need to plan and establish strategies to advance the game, with which they develop especially logical thinking and problem solving. They demand concentration, know how to manage resources, think and define strategies, draw action plans and foresee the behavior of the rival. They help the development of the amount of mental and spatial organization.

- *Adventure games.* The adventure is the fundamental element of the game, which incorporates a high interactivity and the need to make constant decisions.

- *Sport games.* You play with real players, you negotiate with them and you manage the teams in different leagues. They require skill, speed and precision. Their future and their immediate present tend towards strategy and action games, with which they share potential in skills training, information processing and the development of sensomotor skills.

- *Simulation games.* Simulation has been one of the important challenges for video game developers and, in itself, it is a type of game, but it also strengthens as a transversal component to the rest of the genres. They allow experimenting and investigating the functioning of machines, phenomena and situations and assuming command (not only of handling an airplane, for example, but of simulating a flight). They demand complex strategies. They need and provide specific knowledge

- *Role playing games.* They are similar to adventure games, but, instead of being based on solving puzzles, they depend on the evolution of the characters. Its success is supported by an outstanding technical power never seen before, which allows an absolute immersion in the game. Role plays develop mental calculation, vocabulary and stimulate creativity, as well as certain attitudes or values of socialization such as empathy, tolerance, conscience and responsibility, together with teamwork.

- *Mass games.* Also called a role-playing video game, massively multiplayer online, or MMORPG for its acronym in English (Massively Multiplayer online role-playing game), are role-playing video games that allow thousands of players to enter a virtual world simultaneously through Internet and interact among them.

- *Survival or survival.* Its very name describes it: the protagonist has to escape or solve problems in a situation or enemy to survive and move forward with the game. This classification is mixed with others such as role, strategy, adventure, among others, most of the horror games include this category.

Video games and simulations will be the tools to use to prepare the workers of the century XXI (Lippenholtz, como se citó en Sedeño, 2010).

Skills developed by videogames

Critical thinking

Critical thinking can be defined as a complex and significantly demanding logical form of higher order reasoning. Critical thinking assumes a repertoire of faculties: the articulation of ideas; meaning of deduction; consideration of divergent arguments and search for evidence to evaluate the legitimacy of each one; the formulation of hypotheses; justification of personal arguments and beliefs; the decision making; Problem resolution; monitoring and evaluation of cognitions and personal actions (Almeida and Franco, 2011).

Some games develop critical thinking based on a social theme, such as the game Up to the neck, developed to reflect the reality of some Latin American countries. The player acquires a vision about social inequality, using critical thinking about the decisions that must be taken according to the rules and argument of the game, thus being able to obtain a critical reflection among those who interact with the game. (Mejía Ramírez, 2015)

They improve logical thinking and problem solving. Peñalva, Ysunza and Fernández (2009) refer that logic represents the fundamental basis for the development of mathematics. It can be said that, in turn, mathematics allows the development of logical thinking. Mathematical logical thinking is understood as the set of skills that allow to solve basic operations, analyze information, make use of reflexive thought and knowledge of the world, to apply it to everyday life.

Another very important skill that develops, and that is very useful in solving problems, is lateral thinking. De Bono (1970) mentions that lateral thinking is a method of thinking that can be used as a technique to solve problems in an imaginative way. The term was coined by the author in 1967. It refers to the technique that allows the resolution of problems in an indirect way and with a creative approach. Lateral thinking is a specific way of organizing thought processes, which seeks a solution through unorthodox strategies or algorithms that would normally be ignored by logical thinking.

Video games also improve the mental abilities of older adults. A team of researchers from the University of California, San Francisco developed a video game that promotes brain function and improve cognitive performance and well-being in older adults (Quijada,

2013). According to the research, the brain of an older person is more flexible than what is believed and, with a specific training, it could be avoided that skills such as attention, memory or the ability to multitask at the same time decrease with age. These studies consolidate the argument that some video games favor mental health and can shape the brain of an older adult. (Anguera *et al.* 2013).

Digital literacy

It is the process of acquiring the necessary knowledge to know and use infotechnologies properly and to be able to respond critically to the stimuli and demands of an increasingly complex information environment, with a variety and multiplicity of sources, media and services. (Married, 2006).

Development of creativity

Video games make both boys and girls tend to be more creative, according to a new study from Michigan State University (United States). In an experiment with 500 twelve-year-old children, scientists found that those who played video games were more creative when performing tasks such as drawing or writing stories (Jackson et al., 2012).

Socialization skills

The game is the means by which the subject learns to develop in society. These technological instruments (videogames) are agents that transmit content, reinforce values, attitudes and rules of social control. According to G. H. Mead, who provided an interesting theory of child development and with great impact on sociology, organized play is what allows learning to grasp the values and norms in which the individual is developing (Revuelta, 2004).

The application of videogames in the didactic field responds congruently to the operant conditioning of Skinner, in which learning is given by the connections between stimuli and responses, in other words, reflections conditioned by stimulus - response - reinforcement.

Delgado and González (2014, p.6) cite Keller and Schoenfeld (1950) The principle of conditioned reinforcement is the following: "a stimulus that is not originally reinforcing can be reinforced by repeated association with another that is"

That is, through conditioning, a stimulus acquires the power to act as a reinforcer, which is often designated by expressions of secondary reinforcement or acquired reward. (Bower, 2006), citado por Delgado y González (2014, p. 6).

> The laws of operant conditioning are similar to those of classical conditioning; both include a law of conditioning and a law of extinction. In Skinner's law, operant conditioning can be compared with the law of the Thorndike effect. If the occurrence of an operant follows the presentation of a reinforcing stimulus, its strength increases (Delgado y González, 2014, p.6).

The principle of trial and error with reinforcements and repetition is the same applied to the use of video games and, therefore, when an action obtains a positive reinforcement it tends to repeat itself.

Learning, in many cases, is done through associationism, also called "mechanical memorization". The result of the application is the programmed teaching when the contents are very structured and a rote learning is required (Delgado and González, 2014).

What James Paul Gee says about videogames

Gee (2005), who when having his first contact with videogames when playing with his son realized his potential and began to inquire about them, he makes the following reflection:

> Many young people pay a lot of money to participate in an activity that is difficult, extensive and complex. As an educator, I realized that this was just the problem facing our schools: How to get someone to learn something difficult, extensive and complex and still enjoy it? I was intrigued by the good consequences that videogames could have for learning inside and outside of schools (p. 1).

Since then, the author has conducted multiple investigations and published articles that deal with the good consequences that videogames leave when playing them responsibly. Below, some ideas are mentioned, product of their work.

Good video games incorporate good learning principles, supported by current research in cognitive science. what is the reason for the previous topic? If nobody could learn these games, nobody would buy them and the players do not easily accept short or diminished games. At a deeper level, challenge and learning are a big part of what makes good video games motivating and entertaining. Humans really enjoy learning, although sometimes at school you do not know. (Gee, 2005).

Likewise, the author defends the idea that, when learning to play video games, children learn a new literacy, especially if it is considered that it is not always related to language. In this sense, the author understands videogames as a semiotic field or a field of signs that represent different meanings (principle of semiotic fields). Semiotics is understood as the discipline that studies signs, their languages, systems and possible structures within a communication system (Pedraza, 2011).

Video games do not punish for mistakes made and, rather, learn from them. Even more important, for Gee, video games stimulate the adoption of a new identity by taking on the role of a character in the game and, therefore, allowing users to see things from a different perspective.

Regarding the situation of video games compared to other media, Gee considers that video games are different from books and movies because of their interactive nature; in them the player feels more involved in the development of the story.

According to Gee, a good science education would have many of the characteristics of video games: interactivity, possibilities of constant practice, tolerance to error, incorporation of a new identity and sense of achievement, among others.

Gee (2004) proposes that video games are:

An immensely entertaining and attractive interactive technology built around identities [...] work with good learning principles, that is, include them in their designs and encourage them; these are principles that are better than those applied in many of our schools, based on routinization, the return to basics and the submission to exams (p. 248).

Characteristics of a good game

In the same way, Gee (2006) lists a series of characteristics that he considers necessary for a videogame to be very good, striking and brilliant. These deserve to be implemented for learning:

1. Motivation: it is clear to see how deeply motivating video games are for players, who concentrate intensely on the game for hours while solving complex problems along the way.

2. Role of failure: when players fail, they can, for example, start over from their last saved game. In front of a boss, the player uses initial failures as ways to find the boss's pattern and get feedback on the progress made. In school, very often, the space for risk, exploration, and failure is underestimated. These characteristics of game failures allow players to take risks and test hypotheses that may be too costly in places such as classrooms, where the cost of failure is greater, or when there is learning that results from failure.

3. Competition and collaboration: it is striking that many young players see the competition as enjoyable and motivating in video games, but not in school. Why should this be an important issue for research in games and learning? What seems obvious is that the competition in videogames is considered by the players as something social and, often, they are organized in ways that allow people to compete with people at their own level or as part of a social relationship that is it's about playing as well as winning and losing.

4. Game design: some of the design features of videogames seem to be closely associated with well-known learning principles, which are mentioned below:

I. Interactivity: players feel that their actions and decisions, and not only the actions and decisions of the designers, are co-creating the game world and the experiences they are having. All players participate in a form of simultaneous reading (interpretation) and writing (producer); The more open the game, the more is the case. All deep learning involves students who feel a strong sense of ownership and agency, as well as the ability to produce and not passively consume the knowledge.

II. Customization: in some games, users are able to customize them to suit their learning and playing styles, for example, by adopting different levels of difficulty or choosing to characterize different characters with different abilities.

III. Strong identities: identities are often connected to a specific virtual character, sometimes to an entire civilization. When players are playing roles, strong identities are achieved through the character. It is so intriguing that players want to inhabit the character and can easily project their own fantasies, desires and pleasures into the character, or through the player who has to determine the features of the relatively empty character, so that he can create a life story deep and consistent in the virtual world for the character.

IV. Well-sequenced problems: in particular, some problems are introduced early in the journey in order to lead the players to form good guesses about how to proceed when facing the most difficult problems in consecutive moments.

V. Pleasant level of frustration: good games adjust challenges and give information in such a way that a series of players can experience the game as challenging but feasible and feel that their effort is paying off. Players get feedback that indicates whether or not they are on the right path to success later.

VI. Specialization cycle: with repeated cycles of extended practice and domain tests before a new challenge, new practices and new domains are conducted. This is part of what constitutes a good rhythm in the game. At school, sometimes the slowest students do not have enough opportunity to consolidate and good students do not receive enough real school challenges based on mastery.

VII. Deep and fair: a game is fair when it is difficult, but set on a path that leads to success, rather than building a fault over which the player has little or no control. A game is deep when its elements (for example, a combat system in a game turns), which at first seems simple and easy to learn and use, become more complex; in the process, the player understands and dominates. (Gee, 2006).

VIII. Just in time and on demand: games almost always give information exactly when the players need it and can use it; or a la carte, that is, when the player feels he needs it, wants it, is ready for it and can make good use of it.

IX. Located meanings: Gee menciona a Barsalou (1999) and Glenberg (1997)

> The words have different meanings located in different contexts of use (consider: The coffee spilled, go find a mop, in front of: The coffee spilled, go to find a broom, difference that coffee is liquid or solid). Games always place the meanings of words in terms of the actions, images and dialogues with which they are related, and show how they vary through different actions, images and dialogues. Not only do they offer words to say, just as the school should not (p. 8).

X. Systemic thinking: games encourage players to think about relationships, in non-isolated events, events and skills. In a game like Age of Empires (1997), for example, players have to think about how each action taken

could have an impact on their future actions and those who play against them, as each of their civilizations develop through the ages.

XI. . Exploring, thinking laterally, rethinking objective: in school it is taught that being smart is moving as quickly and efficiently to the goal as possible. The games encourage a different attitude. They encourage players to explore thoroughly before moving too fast, to think laterally and not just linearly, and to use that exploration and lateral thinking to re-conceive the goals one at a time.

XII. Smart tools and distributed knowledge: virtual characters have the skills and knowledge of their own that lend themselves to the player. For example, in Full Spectrum Warrior (2004), the player uses the buttons on the command to give orders to the two squadrons of soldiers. The soldiers that the player controls know how to move and adopt various battle formations. Therefore, this is something he does not have to know, but when and where to ask for each formation so that the soldiers can move safely from start to finish. The instruction manual explains that it is a result of careful planning and years of experience in the real battlefield. This frees part of the cognitive load of the student to intelligent tools that can do more than what the student is currently able to do by himself.

XIII. Multifunctional teams: when you have a massive multiplayer game, it is often done in teams (matches), in which each player has a different set of skills (for example, a wizard, a warrior or a druid). Players must each master their own specialty (function), since a magician plays very different from a warrior, besides understanding enough of each one's specialties to integrate and coordinate with them (interfunctional understanding). In addition, in these teams, people are affiliated by their commitment in a common effort (Gee, 2004).

XIV. Performance before competition: players can play, develop and experiment before they are competent, supported by game design, smart tools, game offerings and also the support of other more advanced players.

This is how language acquisition works, although not always in schools, which often require students to acquire skills through reading texts before they can perform (experiment) in the domain they are learning. (Gee, 2005).

Discussion and Conclusions

The use of video games has many advantages in the development of thinking skills in people of all ages, children, youth and adults. The use of video games in teacher learning is still an untreated topic in most educational institutions. In order for video games to be able to be implemented, parents and teachers must be oriented and advised to continue acquiring the necessary skills for their development. Teachers must have clear selection criteria, taking into account aspects such as age, time, content, dynamics, etc., to develop an instructional plan for the integration of these tools in the classroom. Videogames are effective tools, for their interactivity and high motivating content, to achieve the development of certain thinking skills, facilitating and optimizing the acquisition of new meaningful knowledge.

Video games incorporate activities that are similarly carried out at school, such as collaborative work. In both video games and at school, teams work to achieve common goals. In the same way the leadership is worked, since the player frequently has the role of the boss or leader who manages or leads a set of characters or other players who follow their orders to complete the objective. Also, video games handle constructivism and connectivity, thanks to the communication tools that incorporate consoles or computers in video games can communicate with other users, share information and learn from each other, whether about the game or any other topic . In addition, by not being able to solve a problem of the game, the player looks for the solutions on his own initiative and, of course, for the motivation of the game, in different media. This is very important, since these activities generate self-learning. Many games incorporate complex problems; to solve them, the user searches for the solutions in the media that can be achieved at their own pace, since motivation moves them to generate and be responsible for their own learning, which often is not achieved in school.

The games reinforce the responsibility in handling tasks in a timely manner. For example: in games that are handled online, or that handle the real time (although sometimes accelerated, to name a case, one hour can be equivalent to one day in the game), you have to perform activities in which the Time is a vital factor and not manipulated by the user; it has to be respected, and if the activities are not carried out within the established time range, there are consequences.

Videogames generate significant learning, since they learn what they have played because they live it within the simulation of the video game, taking into account that videogames are a representation of reality with fictional variants, but, in the end, they always start from reality . Meaningful learning is established when the experience (what is experienced) is related to what is taught. In the video game, it is possible to practice the desired times without fear of being wrong, since the failure does not represent great losses, unlike the reality, in which, if mistakes are made, for example, in a practice of a chemistry laboratory , the error would represent great losses of material and other consequences for the student mainly.

Video games are efficient because they learn based on their own experience, which is given at the moment, along with the tools and information necessary to keep moving forward. This situation does not always occur in schools, where students are asked to learn based on the text without first having experimented or explored and, of course, without the option of risk or of learning from mistakes.

Players feel a true sense of unfoldment and control, they have a sense of ownership over what they are doing, which is unusual in school. So the question that arises is not how to use videogames in school, but how can you make learning, inside and outside of school, based on the same principles of learning and motivation that young people have in their games? daily, under a reflective and strategic approach.

Another alternative of implementation in education are the so-called serious games, which have had a great development in recent years. They are developed in different areas -including education- and are implemented to train, develop skills or competences, strengthen knowledge, etc. They differ from educational games in that the latter contain a large educational content and users lose interest and motivation while those take as a model

elements of commercial video games and can have elements that are based on fantasy. However, they must include a link to the real world.

Serious games take the structure of conventional video games. This consists of setting standards, goals and objectives, results and feedback, problems, competencies, challenges, interactivity and representation of a story. It may or may not contain all the elements that are used to achieve the desired objective in the user, which depends on the organization that implements it; may have an educational, labor, awareness, military, medical, commercial, social or political purpose (Barajas, Álvarez, Muñoz y De Luna, 2016).

The serious games simulate a reality or some real event, in which playful elements are integrated to achieve the education of the players. This modality has been implemented in several fields, for example, in the treatment of depression, in health care professionals, in education as a developer of skills or generate skills and knowledge (Dessers, Pless, De Kort and Van Hootegem, 2015).

Videogames manage to develop in the users skills of thought, competences and generate knowledge; In other words, its benefits are clear. However, there is also a small gap with the disadvantages, which consist of addiction and sedentary lifestyle, which leads to other side effects. The essence of videogames must be incorporated into the teaching-learning process, as is already happening in some educational institutions.

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