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Serious games in education: Transformation of teaching and learning methods through active pedagogy

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Abstract

This article is in the intersection of pedagogy, learning psychology and educational technologies. It is aim at educational researchers, pedagogues, as well as educational game developers, with the aim of providing an analysis of the potential benefits of serious games in teaching and learning. The issue we are exploring: how can serious games transform traditional teaching and learning methods to promote active and engaging pedagogy? To answer this question, we will set ourselves several objectives. First, we will define the concept of the game and its historical applications in the educational context. Then, we will analyze the implicit and explicit learning associated with the different forms of play used in education. We will also evaluate the impact of the game on pedagogy and its usefulness in the school setting. Finally, we will identify the convergences between the principles of active pedagogy and the characteristics of serious games.

Keywords: Active pedagogy; Engagement; Serious game; Learning; Skills

1 Introduction

The world of information and communication technologies is changing since the rise of digital simulation, virtual reality, 3D, video games, etc. These multimedia media make it possible to rethink the relationship of the individual with all the constituents of his world, in particular with those of information and knowledge, by modifying his space-time, the relationship between the real and the virtual, the place of the body and the gesture. Video games are very popular and often associated with recreation for young people. The serious game, the subject of our article, as an application that uses video game technology and expertise reasons for other than entertainment, pushes us to focus our problem on its contribution to education and teaching [1]

1.1 Play and Learning

The theory that you can learn while having fun is not new. The relationship between learning and children's games has existed since ancient times. Nevertheless, what do we mean by the word "game"? Little Robert tells us that the word game, introduced in the 12th century, comes from the Latin word «jocus» which means «banter, joke». As for the etymological dictionary of the French language, he specifies that the word «jocus», in Vulgar Latin, had taken all the uses of «ludus» to mean «amusement and entertainment» [2]. The word «ludus» gave as a learned derivative the adjective ludic, which means «relative to the game». These notions of fun seem to fit in with other conceptions of the game. Such as those of Nicole De Grandmont for example, the game in pedagogy is designated as a: «Physical or moral activity, purely gratuitous, generally based on convention or fiction which has, in the conscience of the one who engages in it, no other purpose than itself, other than the pleasure it provides». The game is a free activity without a predetermined goal

since it consists in making find and make provide pleasure through its fulfillment. In this sense, Caillois Roger [3], in his work on games and men, attributes the following characteristics to the activity of the game, which must be free; separate; uncertain; unproductive, settled; fictional. However, he goes on to say, "These various qualities are purely formal. They do not prejudge the content of the games" [4]. Nicole De Grandmont adds that "to [...] (contribute) more to the development of the individual" [5] and "to meet the satisfaction of its intrinsic and extrinsic needs" [6], it is possible to bring, the different features of the game: [7] superficial modifications, concerning the modes of operation such as the modification of the statement of the instruction, the number of players. Or major transformations affecting the action of the game (stakes structures: gain, glory), rules of the game (from simple to complex, constant, predetermined, random), its objectives, its organizational structure (alternating, free, spontaneous, organized), spatial, temporal (limited, unlimited, fast) or psychological (pleasure, cunning, imagination, valorization, spirit of initiative)

According to Nicole De Grandmont, these intrinsic needs are those inherent (innate) to the existence of life, such as sleeping, eating, moving, acting, learning [8]… etc. The extrinsic needs are, on the other hand, the needs requested by factors coming from outside: to dress, to work, to educate, to compete, to challenge… etc.

It is an innate need to learn from which arises the behavior of exploration that we can qualify as a spontaneous and free need to play that only action can satisfy. This need to play responds to social, emotional, psychological, irrational, simply playful motives. Nicole De Grandmont, based on the work of Henriot [9] , specifies that playing [10]is an observable act that can in turn influence «the educational and pedagogical behavior of each individual» [11] "the act of playing can be observed, measured and codified…[which makes it] an activity accessible to several specialties in the humanities. [It can] be applied in education and pedagogy." [12]

So the player freely engages in a chosen act, in an unreal world "… in which he wants to impose his laws, to change them according to his whim." [13], in a random time because «the game is not an exercise that can be ordered on a fixed date» [14] according to the rules of the game to which he freely chose to comply. However, why play? Play to learn, to evolve, to progress towards the transformation of «data (internalized) from the environment, sensory simulations, situations, action» to become visible in the player's achievements, ideas and theories about life.   That is, "acquire new behavior. […] (Either) in the absence of the learner's consciousness […] [or] by a conscious intervention on his part [15]." In addition, according to his rhythm [16]. However, Bettelheim warns us against the intervention (except in case of danger) of the adult who wanting to structure the game by eliminating the gratuity and spontaneity of the action of the player. Causes this "a disagreement between parents and children, which begins at the time of the playful activities, (for) [...] to end later in what was called the conflict of generations [17]".

As for his observations and interpretations, he must "record them and reinvest them ... in new explorations of his environment, his environment and the objects that compose him." [18]

Indeed, the little ones have confidence in themselves, they like to meet problems at their level to be able to solve them, and meet this joy of learning. This is what De Graeve Sabine says: «Learning is the result of continuous exchanges between an individual and his entourage in a given situation and time» [19]. Every day, we interact with the components of life, and we accumulate knowledge, acquire skills and integrate behaviors.

Among the different forms of learning a child can go through is experimentation. In concrete and transient situations, the child structures his learning as follows: «problem or unbalance→ attempt to→ solve it should be tentatively tentative solution→integration of the idea (= learning) »→ . This form of learning draws our attention to the importance of failure or error during the stages of learning. This leads us to the form of reflective learning, where the child remembers and records past mistakes. Therefore, intelligence develops and begins to predict and "conceive the causes and consequences and [to] reason by analogy.→" De Graeve Sabine also specifies that: «The little one is the physical and sensory presence» [20]. To look, listen and imitate is the most important form of learning of childhood, the child begins by copying the movement, the mimic, the noise, a word or an attitude that he receives either from an adult, children, animals, actors on television and then identifies with the appreciated model he chooses (mom, teacher, etc.). Hence, the importance of communication and group play that can only cause enriching situations such as verbalization, confrontation, frustration and valorization. This allows the child to assert himself and readjust his achievements, to discover the differences, his qualities and his difficulties. [21]

The desire to discover can give rise to other faculties such as «Creativity». The latter conditions «the autonomy, the possibilities of adaptation and the power to transform the social and material environment» [22]. , As it is the case of the child who pushes his hand in the wet sand so that a hollow or a pond are formed, or the child who discovers a sequence of sounds by striking, shaking… and creates new sounds.   Through the pleasure of research, discovery and

experience, one will contribute to psychological balance, the development of mental faculties and the development of the child.

1.2   Pedagogies and games

The term «pedagogy» came from the Greek «PAIDOS» which means «child», and «GOGY» which means, «lead, lead, accompany, raise». Jean Houssay defines pedagogy as "the mutual and dialectical envelopment of educational theory and practice by the same person, on the same person." [23]. This definition refers to what the pedagogue seeks to conjoin the theory and practice that are in a back and forth movement, to the extent that it is from theory that we design a practice to confirm and verify that knowledge or theory subsequently, in order to produce pedagogical knowledge.

We can cite as an example the model of the «pedagogical triangle» that Houssay considers as a pedagogical knowledge among many, resulting from a pedagogical practice that favors a model of theoretical understanding. This model seeks to define how works "The pedagogical situation [which] can be defined as a triangle composed of three elements, knowledge, the teacher and the pupils, two of which are constituted as a subject while the third must accept the place of death or, failing that, begin to play the fool"[24]:

- The subject is the one with whom we have a privileged relationship to exist reciprocally.
- The dead is this minor although indispensable whose place is defined and unfolded by the real subjects of the situation.
- The mad man is the one who disturbs and generates situations difficult to control and refuses to recognize the subject as such.

The «teaching» process favors the teacher-to-know axis, which assigns to the students the place of the dead; "train" focuses on the teacher-student axis; «learning» depends on the privilege of the student-knowledge relationship and the attribution of the death seat to the teacher since he will prepare and accompany the learning situation. In addition, it is towards this last «learning» process that the pedagogy of the game depends. Indeed, the game is the very object of the action of the player who leads him to learning freely in accordance with his rhythm, his needs and his ability to assimilate new achievements. "In a child's life, learning and playing go hand in hand. Learning is living, and for the child, living is playing.[24]" In this sense, an individual, who feels pleasure in doing so, will more easily carry out a task. What could be more opportune then for an educator or a pedagogue than the game to use it as a support or means of learning, «this is how the most serious and boring of the games was born: the pedagogical game» [25]

The educational game appeals to the knowledge] and skills of the player but it risks being simply a pedagogical tool. If we modify its substance, which consists in finding pleasure in the accomplishment of a free action, "it is for these reasons that it must also be part of the arsenal of the intervention provided it can resist the normative temptation. We should avoid it in closed and masterful pedagogy. [26]" That is, the stakeholder must demonstrate "neutrality and non-defectiveness" by refraining from proposing a model for players' actions to diversify and multiply, belong to and come from them. It must also use «pedagogy of the indirect» and «discretion» without value judgment so that the players do not seek its approval and do not lose their motivation.

 It is thanks to such attitudes that players can master the rules of the games discovered and not inculcated by subsequently mastering the world and its structures because the players themselves understand the concepts and concepts deemed necessary for their learning. The success of the game and its purpose depends not only on the didactic task of the intervenor to organize space and time flexibly, to gather and classify the material. It is also determined by the «pedagogical climate», that is, the reflection of his personal development, his happiness, his love for life and others: a teacher who approaches his students with confidence stimulates positive behaviors in them and vice versa. [27]

Being neutral and non-directive on the part of the participant, by focusing learning on the learner, allows the latter to become an actor in his actions. The learner discovers the rules of the game, becomes creative and inventive, and thus develops his fulfillment and self-confidence. It is also important to respect the learning pace of each learner, allowing individualization of learning. This implies that the learner must play freely, in a climate of mutual respect between the learner and the speaker, promoting a harmonious and encouraging teaching environment. Such active participation of learners is precisely defended by active pedagogy.

1.3   Active pedagogy and serious games

As we have already pointed out, all pedagogy is based on the privileged relationship between two elements of the pedagogical triangle and the exclusion of the third. When the process is «teaching», the pedagogy is called traditional and masterful since it consists in transmitting content, which maintains a privileged relationship with the teacher, which

puts the learner in the place of the dead who passively receives this knowledge. Scientists criticize the «training» process because pedagogy remains passive. Even if the teacher and the learner are the privileged subjects here, the learner remains guided without being able to take real initiatives since the teacher assists him to help him solve problems. As for the third «learning» process, it focuses on learning/ knowledge subjects, which positions us in an active approach to pedagogy, in the sense that the latter should take initiatives inspired by real situations. The aim of this process is to arouse enthusiasm among learners and desire to learn why we call it active pedagogy since it is at this level that:

"New Education, Self-employment, Certain Forms of Differentiated Pedagogy" [28], in an unsteady atmosphere between teacher and student, giving priority to the methods and means that will allow students to grasp knowledge directly. We can affirm, at this state, that the game represents well these means since it proved able to structure the learning of the learner safely and harmoniously. At the same level is also: "Computer-assisted teaching programmed teaching, […] and differentiated pedagogy…. However, the means implemented then tend to become much more structured and in advance. This brings them closer to the logic of "teaching" [29]. Which will allow us to move from gambling in general. As a means of learning, serious gaming is central to our study. As a computerized method, it has the potential to resist the structuring and exaggerated organization of other informative means, since it is built for a specific purpose. For instance, "Patricia Greenfield and her collaborators find that mastery of an iconic code is significantly acquired through practice of a specially designed game" [30].

As for the differentiation of learning, serious games is able to respond to this kind of active pedagogy insofar as it mobilizes all the senses of the learner, auditory, visual, kinesthetic, when it comes to «to integrate, store and restore recorded data» [31]. In addition, mobilizes the development of certain skills. Cadence rapid games exert a pressure of rhythm on the subject, which mobilizes «his mode of visual-spatial action» of which three skills were studied by Okagaki and French: [32]

- "-spatial perception, which is the ability to infer the situation of an object from one's own.
- Mental rotation, which is the ability to imagine the rotation of a visual stimulus. [As is the case with positioning maps in the game].
- Spatial visualization, which is a complex multi-level procedure that integrates the two above and organizes them through various strategies." [33]

The convergences between the principles of active pedagogy and the characteristics of serious games open new perspectives for the design of innovative and effective learning methods.

2   Conclusion

Nicole De Grandmont defines the game as a moral or physical activity, free and free, aimed mainly at providing pleasure. However, the game cannot dispossesses of its rules, objectives and organizational structures, temporal or spatial, because these elements are essential to its existence.

The innate need to learn arouses a spontaneous desire to play, a need that only action can satisfy. According to De Grandmont, play is an observable, modifiable and measurable activity, making it relevant to disciplines such as teaching and education. Learning results from exchanges and interactions between the individual and their environment, often through play, such as experimentation and discovery, which can encourage creativity and turn failures into learning stages.

Active pedagogy, centered on the learner and knowledge, invites the learner to take initiatives based on real situations to arouse enthusiasm and desire to learn. The game, by structuring learning in a secure and harmonious way, adapts well to this pedagogy.

Serious games, in particular, is effective for active pedagogy by mobilizing the learner's senses and developing specific skills such as spatial perception, mental rotation and spatial visualization. It offers a computerized and well-structured method for learning, meeting the requirements of modern pedagogies while avoiding excessive structuring.

In summary, serious games are powerful tools in education and training, because of their ability to improve engagement, motivation, and learning effectiveness.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

References

[1]   Numerical simulation, also called computer simulation, is one of the tools to simulate real phenomena. It refers to a process whereby a computer program is running on a computer to simulate, for example, a complex physical phenomenon.

[2]   Robert Paul, Le petit Robert 1, Paris, Dictionnaire Le Robert, 1989.

[3]   Bloch Oscar and Wartburg Walter Von, Dictionnaire étymologique de la langue française, Paris, Presses Universitaires de France, 5th ed. Revue et augmenté, 1968.

[4]   Caillois Roger: is a French writer, sociologist and literary critic.

[5]   Caillois Roger, Les jeux et les hommes, Paris, Gallimard, 1958, p.43.

[6]   De Grandmont Nicole is a supporter of playful pedagogy. This Canadian, author of several books, is a source of inspiration. She is part of the great family of researchers in better pedagogy.

[7]   De Grandmont Nicole, Pédagogie du jeu (Québec: Logiques, 1989), p.56.

[8]   De Grandmont Nicole, Pédagogie du jeu (Québec: Logiques, 1989p.58

[9]   Henriot is a philosopher and writer.

[10]   De Grandmont Nicole, Pédagogie du jeu (Québec: Logiques, 1989. p.61.

[11]   Education, according to De Grandmont, seeks for the individual the acquisition of behavior in relation to the society in which he lives.

[12]   Pedagogy seeks to make the individual acquire academic notions.

[13]   De Grandmont Nicole, Pédagogie du jeu (Québec: Logiques, 1989. p.74.

[14]   De Grandmont Nicole, Pédagogie du jeu (Québec: Logiques, 1989 p.71.

[15]   Paré André, Creativity and Open Pedagogy, Tome1, Laval, NHP, 1979, p.70.

[16]   Houssaye Jean, La pédagogie une encyclopédie pour aujourd'hui, Paris, ESF, 1993, 7th edition.2007, p.315.

[17]   Bettelheim Bruno, Pour être des parents acceptables: psychanalyse du jeu, Paris, Laffont, 1988, p.254.

[18]   De Grandmont Nicole, Pédagogie du jeu (Québec: Logiques, 1989, p. 74.

[19]   De Graeve Sabine, Apprendre par les jeux, Brussels, De Boeck, (Collection: teaching tools), 2006, p.13.

[20]   By Graeve Sabine, Apprendre par les jeux , Brussels, De Boeck, (Collection: teaching tools), 2006,.14

[21]   De Graeve Sabine, Apprendre par les jeux, Brussels, De Boeck, (Collection: teaching tools), 2006, p.14.

[22]   De Graeve Sabine, Apprendre par les jeux, Brussels, De Boeck, (Collection: teaching tools), 2006, p.15.

[23]   Houssaye Jean, La pédagogie une encyclopédie pour aujourd'hui, Paris, ESF, 1993, (seventh edition, 2007), P.13.

[24]   De Graeve Sabine, Apprendre par les jeux , Brussels, De Boeck, (Collection: teaching tools), 2006 , p.125

[25]   De Grandmont Nicole, Le jeu pédagogique: conseils et activités pratiques, Montréal, Les éditions logiques, 1995, P. 17.

[26]   De Grandmont Nicole, Le jeu pédagogique: conseils et activités pratiques, Montréal, Les éditions logiques, 1995 p18.

[27]   De Graeve Sabine, Le jeu pédagogique: conseils et activités pratiques, Montréal, Les éditions logiques, 1995p.26.

[28]   Houssaye Jean, La pédagogie une encyclopédie pour aujourd'hui, Paris, ESF, 1993, (seventh edition, 2007p.23.

[29]   Houssaye Jean, La pédagogie une encyclopédie pour aujourd'hui, Paris, ESF, 1993, (seventh edition, 2007, p.24.

[30]   Ad hoc is a Latin phrase that means formed for a specific purpose.

[31]   Houssaye Jean , Paris, ESF, 1993, (7th edition, 2007 p.305

[32]   Cadence: refers to a regular and cyclical rhythmic movement, concerning sounds and accents.

[33]   Perriault Jacques, La communication du savoir à distance, Paris, L'Harmattan, 1996 p.103.