

Games: A Journey Through History to the Classroom

Gabriel Assumpção Firmo Dantas¹, Hellen Sandra Freires da Silva Azêvedo², José Marlo de Araújo Azevedo¹
(1. Federal Institute of Acre, Brazil; 2. Acre State Education Network, Brazil)

Abstract: The word game has different meanings, in different cultures, but there is always something in common to all meanings. The research searches the history of the origin of games, their use in the classroom and the differentiation between game and gamification, which have peculiarities that tend to confuse those who intend to use games within the educational aspect. When talking about the use of games in the classroom, it was argued that the game should be combined with the pedagogical need and the realization of feedback, to collect the results. Finally, some examples of games and gamification that could be applied within the technical course in buildings are exposed. The methodological choice was to harmonize the qualitative methodology with the basic strategic one, to acquire knowledge and, subsequently, seek a solution to the known problems, and through the triangulation of information combined with the analysis of discourses and praxis these authors completed the paths followed for the development of this article.

Key words: Federal Institute of Acre, game, soil mechanics, technical education, vocational education

1. Introduction

The use of different resources and methodologies in teaching emerges as a way to make educational institutions more interesting and motivating. Teaching practices that are closer to the universe of students make classes more attractive and improve student engagement.

Games are playful practices that date back to the dawn of humanity or even before the beginning of humanity, according to Huizinga (2019, p. 15), in his book on the origin of games, he affirmed that “[...] it is in the game and through the game that civilization arises and develops [...]”, and made a bisociation, which he calls man *Homo ludens*, that is, the ludic Man, emphasizing the importance as much as the nomenclature *Homo sapiens* and *Homo faber*.

When talking about the importance of games and their possibilities of use beyond playing, several authors have been researching, including in the most varied areas of knowledge, and Carneiro (2009) carried out a survey in which authors such as: Vigotski, Piaget, Winnicott, Elkonin, Buytendijk, Freud, in Psychology; Eigen and Wincker, Von Neuman and the Nobel John Nash, in the exact Sciences/Mathematics area; Pascal, Schiller, Rousseau, Leibniz, Gadamer, Aristóteles, Platão, Dewey, in the Philosophy area; Cazden, Weir, in the Linguistics

Gabriel Assumpção Firmo Dantas, Specialist in Occupational Safety Engineering, Federal Institute of Acre; research areas: learning and education. E-mail: gabriel.dantas@ifac.edu.br.

Hellen Sandra Freires da Silva Azêvedo, Ph.D., Acre State Education Network; research areas: learning and education. E-mail: hellenfreires@gmail.com.

José Marlo de Araújo Azevedo, Ph.D., Federal Institute of Acre; research areas: learning and education. E-mail: jose.azevedo@ifac.edu.br.

area; Huizinga, Caillois, Airès, inside the History area; Bateson, Henriot, Brougère, in the sphere of anthropology; Chateau, Vial, Alain, Froebel, Kishimoto, Brenelli, Camargo, in the area of Education, in general; and Freire, Bruhns, Marcelino, Paes, Scaglia, in Physical Education; who are explorers of this game world and its application in the most diverse areas of existing knowledge, these are some examples.

With the proposition of using games for instructional/academic purposes, authors such as: Brian Burke; Constance Kamii; Flora Alves; Jane McGonigal; Karl Kapp; Rheta DeVries; and Sharon Boller; and, by the more general aspect of the games, including a historical survey, the one mentioned above, Johan Huizinga, in which, when searching for academic papers, the result will always be one of these main sources.

During the master's research of the first author of this article, learning difficulties in his teaching practices were verified, with regard to the content of Physical Indexes, of the Soil Mechanics discipline, which made him need a methodological alternative for teaching, opting for the use of games as gamified practices. During his praxis, the first author has observed that one of the daily challenges of teachers who work in integrated and subsequent technical secondary education in Buildings, within a classroom, it is the lack of encouragement from students, which is often provided due to the abstract nature of some subjects and/or contents, which end up promoting low academic performance.

But, as a priority, the objective of the study was to understand what games are and how they crossed history to reach the classroom. But first, it is necessary to substantiate what games are and, thus, understand the variations that result from their meaning, so that a discussion can be made about their origin, their use in the classroom and the possibility of their application in professional and technology, which is the field of investigation of the first author of this article, within his professional master's degree.

1.1 Games, what Are They?

When consulting the literature, the definition of games by different authors is verified (Figure 1). By bringing light with your words, Huizinga (2019), considered the game as a predecessor to culture itself, as culture is something inherent to human society, and he considered that playful activity is also observed in other animals. And it brings the consideration that the ludic spirit is something inherent in man, as well as in other animals, and that when you manage to bring ludic into the material aspect is when the creation of the game occurs, as it is known. Feitoza (2021) he also defended games as part of a cultural process, therefore, something that can be inherent to human society, by mixing understandings above.

Thus, when defining game, Huizinga (2019) considers it as something phenomenal in the physiology of human beings or as a reflection of their psyche. He also affirmed that there are no limits that define that the game is a physical or biological activity, and considers it as being significant, enclosing a certain sense. Therefore, the author believes that there is something at play within the game, transcending all immediate needs through the meaning of what is being played, that is, every game means something. And he completes, affirming that if the essence of the game is something inherent to the spirit or the will, then it very defines the game, in contrast, if you say that it is just something instinctive, nothing is defined. And that in the end, when the game ends the meaning, in other words, when the game ends, it is that there was present a non-material element of the very existence of the game, its essence.

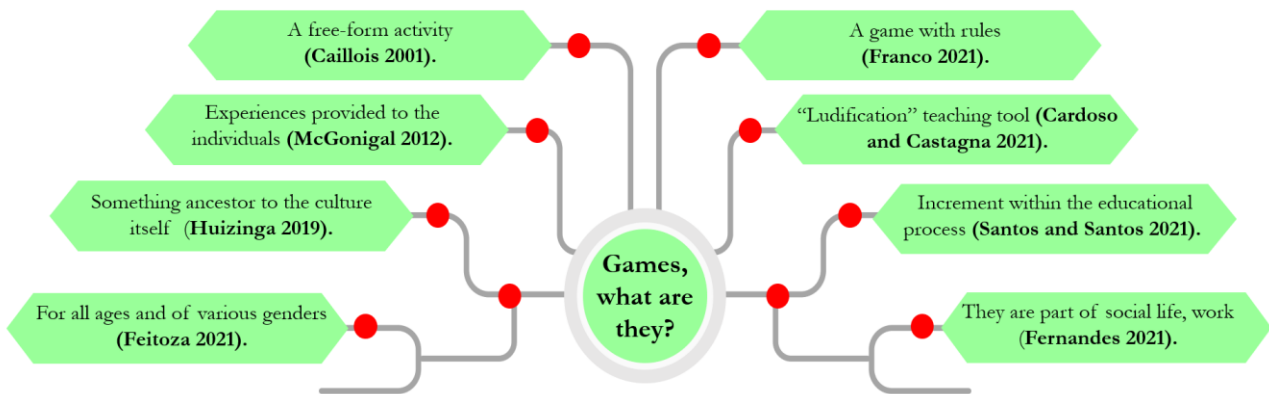


Figure 1 Definition of Games in the Eyes of Different Authors

Caillois (2001, apud Baldo et al., 2021) defines game as: an activity of free nature, that is, there is no obligation to play, otherwise, it would lose its attractiveness and fun; something separate, that is, not present within the current space-time, something like a parallel dimension, into which players will immerse; of uncertain nature, in other words, there is no predictability of the path taken, you will know the objective, the goal, but the path is uncertain; of an unproductive nature, as it does not generate something material, such as wealth and/or goods, so that the player starts and ends in the same condition, of course, outside the game world, in which he has several imaginary productive interactions; an activity governed by rules, that is, in this parallel dimension new rules will emerge, which will be different, or not, from the rule of the world we live in, from the real world; and something that works with the imagination, make believe, in which there is a whole alternative reality, which may or may not be contrary to the reality in which we live.

Indeed, Caillois (2001), when defining the concept of game, made it similar to what Huizinga (2019) proposes as the fundamental characteristics to conceptualize games, defending the following propositions: i) The fact of being free: That is, people have to choose to want to play, want to participate. ii) Escape from real life: The game is something different from what surrounds people, from the real, from everyday life, and when you play, you enter another world, a fictional world. iii) Isolation, limitation: Thus, considering the fact that it is practiced outside the real world and there is a limitation, in which, when reached, the game ends, and while the game occurs, everything is possible, within the limits of space, of the time, and other pre-set limits. iv) Create order and be order: Basically, they are the rules, which, pre-established, must be respected, at the risk of mischaracterization of that fictional world. Such propositions help in a more coherent understanding of what a game is, helping you to define.

And Franco (2021) decided to simplify the meaning of the game by saying that it is a game with rules, in such a way that it promotes engagement through the link of union, pleasure and challenge, in order to then achieve the goals. Feitoza (2021) on the other hand, related games with movies, books and music, in which there are for all ages and of various genres, such as adventures, strategies, action, among others, which was also explored by Batistella (2016), resulting in a ranking of games in 10 different genres.

When talking about games in education, the theme gamified practices arise, in which Santos and Santos (2021) declare their increase within the educational process, especially from 2010. Fernandes (2021) affirmed the use of games within learning and students learning their future professional activities and social participation in the players' lives. And, Cardoso and Castagna (2021) clarify the motivation to achieve the goals arising from the

instigation provided by the act of playing within the educational process.

Therefore, defining what games are, a brief historical path will be made to discover their origins until their implementation in the classroom, as well as distinguishing between game and gamification and explaining why to use games in the classroom. Finally, report some cases involving gamified practice in professional and technological education.

2. Methodological Way

The purpose of this qualitative research is the strategic basic, in which, the first author, sought to acquire new knowledge to solve a practical problem (Gil, 2017) within his master's thesis, that is, to propose a gamified practice for the content of Physical Indexes, as a different solution from his methodological teaching practice.

The choice of bibliographies was made through readings, making a triangulation (Costa and Costa, 2015) of the information combined with the analysis of the authors' speeches (Orlandi, 2020) and the praxis experienced by these authors.

To achieve the purpose of this research, the available bibliographies were used, firstly searching Google Scholar and Scientific Electronic Library Online (SciELO) platforms and Thesis & Dissertation Catalog — CAPES with terms, in portuguese: “história dos jogos”; “jogos na sala de aula” games; “jogos AND edificações” games; jogos AND “profissional e tecnológica”; being the main terms and with the best results after the analysis of the results, which had no restriction as to date or language, only the selection of those that would contribute the most, in the opinion of these authors.

Therefore, the search led to names that, among the authors, stood out Huizinga as a true scholar of the origins of games and McGonigal, Kapp and Boller as important names in gamification. Consecutively, it was decided to search for books, for acquisition, by these authors, and, using platforms from the “Estante Virtual”, “Amazon” e “Livrarias Saraivas” for later purchase.

In parallel, computational algorithms, present in current technologies, showed several suggestions relating games, gamification and teaching, which resulted in an advertisement by Dickmann, a Brazilian author, who proposes gamification as a methodological alternative, in which he first created several digital content audio and video, a community for those interested in this area, and, finally, literary works, on which this bibliographic research is also based.

3. Games' Origin

The search for the origin of games revealed, according to Huizinga (2019), that they are antecedents to the culture itself and that there are traces of their contributions in the construction of the bases of the main civilizations. An interesting fact is that Huizinga (2019) also comments on the fact that the animals themselves play, play in a ludic way, establishing the relationship between the game coming before culture. Further on, Huizinga (2019, p. 22) reports that games were present as activities of great importance in humanity, always, from the beginning, marked by games, and exemplifies the creation of language, with the purpose of communicating, the man he played when designating the names of things and relating them to writings, and complements that by “[...] behind every abstract expression a metaphor is hidden, and every metaphor is a play on words [...]”¹.

¹ Translated from Brazilian Portuguese.

So much so that the game can be seen in primitive society, as well as in children and animals, in which ludic characteristics are found and, later in society, games would be associated with something related to life, nature, and the “[...] which was a game devoid of verbal expression, now takes on a poetic form”² (Huizinga, 2019, p. 39), in your expression!

Poyatos Neto (2015), reported a game that used the joints of sheep as data and that was invented by the King of Lidia, where, due to the time of food shortage that his reign was going through, he stipulated that, on alternate days, his population would eat, but I wouldn't play. On another day they would play but not eat, so they were so entertained on game days that they forgot their hunger. Accounts deal with the game with origins from at least 2,500 years ago. Figure 2 shows what would be the first artifacts for man-made games.

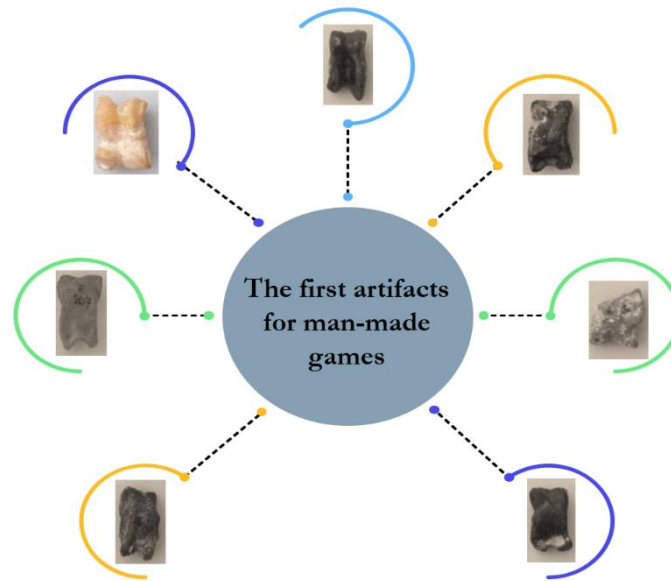


Figure 2 The First Artifacts for Man-Made Games

Source: Adapted from Poyatos Neto (2015).

This fact was also observed by McGonigal (2010), who even emphasizes that this reign proceeded like this for 18 years and that, given the food crisis that did not cease, she proposed a last game of dice, in which the losing half should leave the reign. And she confirms it by claiming that evidence, based on DNA, has been found to support this story. Poyatos Neto (2015) also reported that there was evidence of the use of games during the construction of the pyramids in Egypt.

In remote times, games were also associated with religiosity and ancient cults, in order to help in the human integration with the divine (Bernardes, 2006; Huizinga, 2019). Baldo et al. (2021) affirmed that the game has been used since the earliest eras and that several peoples used games with the purpose of betting, punishing, entertaining, demonstrating power, among others.

In ancient Greek civilization, stone sets have been found, dating back to the 3rd century BC, known as pentha litha and in Rome by astragalus. The kite, originated in the 16th century by the Portuguese, has its oldest history, still with the Chinese in the year 206 BC, in which they used it to calculate distances, all games/jokes, were reports of research by Bernardes (2006).

² Translated from Brazilian Portuguese.

In the middle age there are also signs of use of games, especially associated with age groups, such as Top, which were related to 3 to 7 years old (Bernardes, 2006).

Bueno (2009) also wove his considerations about the origin of games, relating it to the culture and ancient civilizations, and, in the meantime, he emphasized that traditional games have been passed on from generation to generation, in which older people play with the newer, keeping the tradition of the games. Interesting fact, which was also noted by Huizinga (2019).

The author Bernardes (2006) contributes by reporting the arrival of “toys” in Brazil, of course, of European origins, in which it resembles games, and also the fact that Native Americans themselves already play, noting in his research, reports of games (jokes) of the Indians with the bow and arrow, always loaded with playfulness.

For Feitoza (2021), the commercialization of computers in 1951 was part of the history of electronic games, dating back to the 70s-80s, when there was its popularization with videogames, consoles that could be played at home and highlights the difficulty to date the appearance of the first electronic game.

Batista et al. (2007) reported that the first electronic game appeared in 1958, created by physicist Willy Higinbotham and named Tennis Programming, in which the simplicity of the game was the use of an oscilloscope inside an analog computer. In 1961, at the Massachusetts Institute of Technology (MIT), Spacewar! was created.

Below, the research by Batista et al. (2007), spoke of the creation of Arcades, which consisted of game machines, still present in some game stores, in which they needed to use tokens, and the most modern ones had a prepaid card system.

In 1971, the research by Batista et al. (2007) pointed to the creation of the first console, named Odissey 100, which is precisely the creation of the first arcade. And, in 1972, Atari, launched its first game for arcades. Atari later becomes a forerunner in home videogames.

In 1981, Batista et al. (2007) reported the birth of the first Mario game, still known as Jumpman, created by Shigeru Miyamoto, at Nintendo. Such a company, currently, emerges as a company with family games appeal.

As of that date, several home consoles were released by Atari, Nintendo and Sega. Later, there was the insertion of Sony in the market, and, later, Microsoft joined. Currently, now as participating authors of the story to be told in the future, the big home console companies are Microsoft, Nintendo and Sony, although the research by Batista et al. (2007) stop in the 7th generation of consoles, currently, companies are in their 9th generation, launched in March/2017, by Nintendo, and December/2020, by Microsoft and Sony.

The use of games also involves the creation of Smartphones, phones with multiple functions, which, with their popularization, have dozens of games in which students play daily, facts found by Martins (2015), Alves (2018) and Capistrano (2020), among other authors.

Finally, with the use of games, whether traditional or digital, their arrival in classrooms was inevitable, first it was traditional games, which during the researches made by Aires et al. (2018) found its use in the classroom, and the research by Martins (2015, 2020) who proposes the use of gamified practices in the classroom using digital technologies.

Games as pedagogical practices also date back to ancient times, with their use as teaching strategies, Kishimoto (1995a) reported their use as physical preparation and discipline for the Romans, later for use in learning letters, including with teaching schools fundamental being called ludus, reference to the ludic that must be present in teaching. So much so that, Cerqueira et al. (2018) and Silva (2019) discussed the use of games in educational environments, where the union between game and education is not something recent, and confirmed that within the Greek and Roman culture, in the fourth century BC, this relationship already existed in the

educational environment.

The decline in the use of games, as explained by Kishimoto (1995a), occurred in the Middle Ages, with teachings under the domain of Christianity, which considered games to be impure, and the use of masters reciting and reading materials was adopted, it is up to the students to memorize. Only in the Renaissance did the use of games in pedagogical practices begin, with the support of Ignácio de Loyola, a soldier who understood the importance of exercise games for human training, around the 16th century (Kishimoto, 1995a).

Card games, in the 16th century, also began to be used as pedagogical practices, through the philosopher Thomas Murner, due to difficulties that students had with the discipline. In fact, it was this teacher, helped by the replacement of wood engravings by copper engravings, who helped in the preservation of the images as well as the increase in didactic games, such as alphabets, goose games, card games, always applied in education (Kishimoto, 1995a).

In the 17th century, a greater movement in the use of games in education began, and Madame de Genlis, in 1781, built a chemistry laboratory so that she could put into practice a more ludic education, in addition to the emergence of several researches with the use of this practice, as well as the popularization of educational games, previously restricted to princes (Kishimoto, 1995a).

Later, in the 20th century, Piaget, Bruner and Vigostky, began to produce papers and conduct research investigations on the adequacy of teaching and the methodologies to be approached (Kishimoto, 1995a), which influences, until the present day, the teaching practices, within the field of learning theory, and, including Piaget, was one of the defenders of the use of games in the classroom as a way to build knowledge (constructivist teaching).

Currently, terms such as serious games, educational games, gamifications are used, being the main terms, which will be discussed later. Therefore, from the first games, which preceded the culture/humanity itself, to the present day, it has the power to captivate and engage players and this tool should be used within the academic space, in order to enhance the teaching and learning process.

4. Game or Gamification: What's the Difference?

Game or gamification: what's the difference? At some point, during the researches there was this doubt and in the search for researches that address the theme, several definitions are given, with the two words being at times the same and at others different.

In this theme, the research by Martins (2015) when asking closed questions about the gamification concept showed that 14.8% were unable to define, 11.1% believed it was to create a educational game or play a educational game, 25.9% considered the use of game elements in pedagogical activities and 37% chose "all below", which included the other three previous options.

Therefore, it was necessary to make a deeper search, to conceptualize both, aiming to help both these authors, as well as readers and professionals who wish to work with this approach. The conclusion? Both words have different definitions. And then it will be defended.

Huizinga (2019) himself reports the different definitions for game, which vary even with the language, and Santos (2014, p. 25) affirms that there are different conceptions for the word game and that several authors envision different concepts in order to explain what it is a game.

In the search for game definitions, Kishimoto (1995b) affirms that there is difficulty in seeking the game

definition, and that people tend to interpret and respond differently to this concept and, therefore, cites different types of games, with other definitions other than playing a game itself. Doubt? In fact, the author talks about political games, adult games, children's games, animal games, among others, which may have different concepts. And that's where the word game comes in, this one wouldn't have any concept outside of playable games, in other words. The difficulty of the conceptualization exposed by Kishimoto (1995b) revealed the reason for so many confusions, especially when differentiating a game from a gamification.

Carneiro (2009) also found difficulties in conceptualizing the game, and his research, in which he consulted several authors, also with the same difficulty.

When reading these three authors (Santos, Kishimoto and Carneiro) and their sources, the difficulty encountered involved, therefore, the adoption of other concepts for games, which were not related to the act of playing itself, as something linked to entertainment, fun. And so, they generated these confusions, which seems to be common in the various authors used as their sources. Which, once again, highlights the importance of game definition in light of the games themselves, in their origin.

Boller and Kapp (2018) also reported the difficulty of conceptualizing what a game is, but simplify, along with McGonigal (2012), by finding something common to all of them, that is, the game has an objective, challenge, rules, interactions, voluntary participation, game setting, feedback mechanism and, to reach the end, there are numerous paths that can be followed, but with the same ending, either win or lose.

As well as Eugenio (2020) affirms that the game is the use of elements and thoughts in a strategic way combined with the interaction within the game, which causes a change in personal behavior and Dickmann (2021), through the "pillars of games of fun", extracts the goal, dynamics, mechanics and elements present within the games as a way of conceptualizing.

In the pages of the Encyclopedia Americana (1957) you will find the following definition of games:

In games (...) there are prescribed attitudes, subject to rules; there are usually penalties for disobeying the rules, and the action proceeds in an evolutionary way, until it culminates in an outcome, which is a victory of skill, time, or strength³ (1957, p. 266, *apud* Kamii and DeVries, 2009, p. 23).

And, at this point comes the separation of game and gamification. For Boller and Kapp (2018) games can be considered as: entertainment, learning, simulation and gamification games. That is, gamification comes in as a branch of games.

Poyatos Neto (2015) makes the affirmative that gamification is something very new and that there is still no consensus on what gamification is and what is not and that it can be confused with the "Game Theory", created by John Nash.

Cardoso and Castagna (2021) consider that the term — gamification — is not yet so well known. In Brazilian Portuguese, the word "gamificação" is a verb conjugation from the English word "game" and it was a literal translation of "gamification". Although the word "game" is not present in the Portuguese dictionary, it is part of the everyday word and is used as a synonym for its literal translation, "jogo", which is the translation of the word "game", in English.

Gamification is understood by Boller and Kapp (2018), Santos and Santos (2021) and Lima (2021) as the use of part of games, or elements present in the game for the purpose of learning. And Vianna et al. (2013), Kapp et al. (2014), Burke (2015) and Alves (2018) affirm the power of gamification to involve people, at an emotional level,

³ Translated from Brazilian Portuguese.

motivating them to achieve the objectives (goals) established using elements present in the games for an activity that it's not exactly the game itself, a gamified activity, with the purpose of solving problems or engaging a certain audience in some activity.

Gamification is something recent, a phenomenon that emerged from cyberculture (Martins, 2015) and, in the ideas of Martins (2015) and Fardo (2021), it is something that emerged in the early 2010s due to the need for alternative and didactic methodological proposals, inside - and outside - active methodologies, to the detriment of traditional methodologies in order to adapt to new students, increasingly integrated into the teaching and learning process, through engagement and, thus adapting, alternative methodologies to new students that schools are receiving, the 4.0 generation (Führ, 2018) and the digital natives (Prensky, 2001; Capistrano, 2020).

It is worth emphasizing what Eugenio (2020) calls buzzword “goumertization”, where he comments on the fact that the word gamification is something new and leads people to confusion, alerting to the importance of differentiating the concepts, including using the image, below, to help explain better (Figure 3).

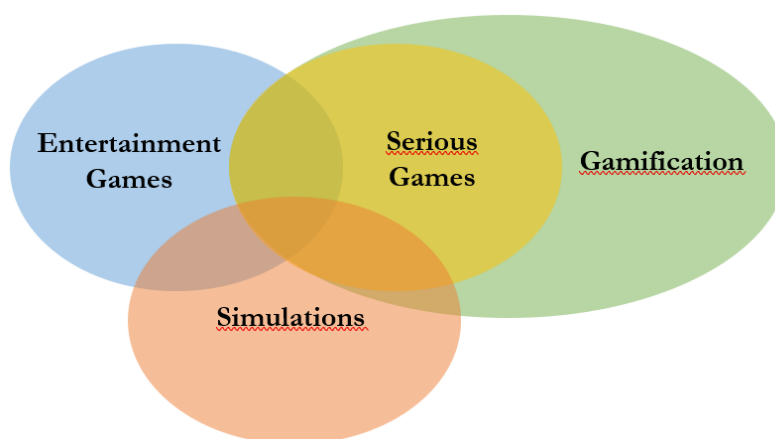


Figure 3 Difference and Similarity Between Games

Source: Adapted from Eugenio (2020).

Fardo (2021) and Fernandes (2021) also clarify that the act of gamifying is not related to game production, but taking advantage of game elements, in which players engage, and using the same strategy and thoughts in other activities. That is, bringing the elements of games into an activity or disciplinary content, in a way that engages students and they can learn in a more pleasurable way.

A definition of gamification, given by Capistrano (2020), refers to “[...] use of game element in non-game situations, including education! Thus, game features are used to engage and motivate our students. Let’s play together!”⁴.

Next, in the next topic, the use of games in the classroom will be addressed, as in this (topic) the difference between game and gamification was explained, and these authors understand gamification as a derivation of games, it will be only the games, although at times there will be talk of gamification, but the reader will already know how to correctly differentiate.

⁴ Translated from Brazilian Portuguese.

5. Use of Games in the Classroom

Why use games in the classroom? This is a question that finds an answer in another question, by Capistrano (2020, p. 67), which is “Can you do it differently?”⁵ In other words, it is possible to do things differently in the classroom and achieve the same goal: education; which, according to Lima (2021) has stirred educators towards improving the quality of teaching and learning.

Martins (2015), in his research, worked on gamified practices with a focus precisely on teacher training, so that they can use games as another pedagogical strategy that can help in the motivation and engagement of the student, bringing or not innovative and creative elements, and, in addition, found that teachers already use gamified practices in the classroom, defending the ease of teaching and learning.

Some realities are posed by Capistrano (2020) which indicates: development of students' skills and competences, creative classes; engaged students; and differentiated activities; which she considers the “tip of the iceberg” and then further suggests: dedication; a lot of planning; curiosity; research; motivation; many mistakes; uncertainties and fears; and a lot of study; that is, the rest of the iceberg.

Therefore, every teacher who thinks about innovating started from the assumption of wanting to do something different, and thus enters into this reality exposed by Capistrano (2020) and then Fardo (2021) asks about what lessons can come from the games and how to apply in fact, the engagement proposed by the game, and, in sequence, reports that such problems have been moving academic research and production for years around the use of games in classrooms.

Alves (2018) also invites reflection to motivate students within the autonomy, domain and purpose, such a feeling shared by several research professors.

Thus, it is noted that many professors are seeking to reformulate their pedagogical practices, and, among alternatives, they can find something to help them in games. In the words of Capistrano (2020) “Creativity + Resources = Incredible Class”. As Franco (2021) believes in the potential of games as a pedagogical tool and Dantas et al. (2021) confirmed the need for educators to break educational barriers and escape traditionalism to culminate in the ultimate goal of education: student learning.

And Piaget (2017) brings considerations about the teaching methodologies in which teachers must decide to make a traditional educational transmission or through methods that benefit assimilation, accommodation, and balance, which was also explored by Dantas et al. (2021) by proposing gamification as a methodological alternative.

Dantas et al. (2021) and Fernandes (2021) reported that in many surveys students have shown dissatisfaction with the traditional classroom methodology and their difficulties in learning and that the use of games is part of a reformulation of these teaching methodologies, in tune with youthful needs. It adds to the fact that “[...] The use of games is increasingly present in Brazilian homes, and at different ages, including those in universities and in the job market.”⁶ (Fernandes, 2021, p. 93).

Piaget (2017, p. 140) drew attention to the neglect of traditional schools in not using games “[...] dado o fato de parecerem destituídas de significado funcional. Para a pedagogia corrente, é apenas um descaso ou o desgaste de um excedente de energia (given the fact that they seem devoid of functional significance. For current pedagogy, it is just a negligence or the wasting of a surplus of energy) [...]” and, also, rebukes these simple thoughts while

⁵ Translated from Brazilian Portuguese.

⁶ Translated from Brazilian Portuguese.

talking about how important the game is for individuals, due, among others, to the symbolic and fictional involvement that a game can have.

Huizinga (2019) affirms that the game can bind and at the same time detach the player. He is fascinating, conjures, that is, captivates, and possesses two of the most remarkable qualities in the entire universe: rhythm and harmony. So much so that Piaget (2017) argued that the game is such a powerful force as to transform education, and can be inserted in reading, calculating, or spelling, promoting an engagement for such “boring” activities, so he believes.

Therefore, there are no limits to the use of games in the classroom, it is just that the means are fully adequate, and teachers want to transform their teaching methodology, after all, games are older than literacy itself and can be better than traditional teaching methodologies, which are also old, but not so much!

After all...

5.1 Games Are Better Than Exercise Sheets

As much as the knowledge acquired is either learned from someone or is experienced, whether in error or right, there will always be tacit knowledge (Cardoso & Castagna, 2021), and, it is convenient to remember the process of assimilation, accommodation and balancing that is included in this knowledge acquisition process (Dantas et al., 2021)

Despite being something new, the use of games in the classroom is gaining ground within the academic world, facilitating student learning, in order to give dynamicity to the contents and bringing them closer to the reality of the students themselves (Cardoso & Castagna, 2021), especially given the difficulties that educational institutions have encountered, in the most diverse teaching modalities (Fernandes, 2021). A motivating factor for students, according to Alves (2018) and Dantas et al. (2021) suggest, is the use of ludic, and, in addition to the relationship of games with the ludic.

Therefore, “Games are better than worksheets [...]”⁷, and this was the phrase said by Kamii (1995, p. 147) when defending the use of games in the classroom, in which in several books she works with the inclusion of games in pedagogical practice. As well as Piaget (2017) and Bock et al. (1999) made a deep reflection on the teacher working with the student’s desire to want to learn by themselves. Therefore, this would be one of the possible answers that teachers have been seeking when researching and producing materials that use games in classrooms.

In the considerations of Poyatos Neto (2015), if the person can choose between: studying; work; or play; the last will undoubtedly be the winner. Likewise, Lima (2021) considers the proposition of games as a way to combat students' lack of interest in the current traditional education.

An interesting fact, explored by McGonigal (2010), that, in the United States, a young person who has a strong culture with games will have spent, by the age of 21, around 10,000 hours playing, and she links to the fact that 10,08 thousand hours is the time a student spends studying from fifth grade to college, if he is a regular student. And then she adds that there is a parallel educational path, where the player proposes to learn about the game, dedicating himself and everything else that is necessary.

Elsewhere, McGonigal (2010) also affirms that players are always ready to seek that epic victory, and that it is always worth trying and trying now. Besides, when playing, a social relationship is created in a way that even the loser feels good, after the challenges, before the winner, most certainly coming from his inner awareness that

⁷ Translated from Brazilian Portuguese.

something valuable happened, even in defeat. In the studies by Lima (2021), 86.1% of students showed interest in gamified practices.

Cardoso and Castagna (2021) also defend the use of games because they believe that the learning process is enhanced with the use of ludic, which motivates them to learn through greater engagement in an environment conducive to learning, in a natural and pleasurable way, through stimuli to creation, self-expression and competition.

Fernandes (2021) emphasizes that games can be applied as teaching strategies for a generation that is naturally immersed in the world of games, in which they will present positive results.

So, the proposition of didactic games as an alternative methodology, mainly to worksheets, goes against a constructivist teaching that can provide new skills (Dantas et al., 2021), what has been defended throughout history, whether in the field of entertainment or in the field of learning.

5.2 Constructivist Teaching and the Birth of New Skills

As for educational aspects, the importance that Kamii (1995) believes in games is that they are, in essence, part of a constructivist teaching. And, the author lists the development of players' autonomy, as there is the involvement of rules within the game, which help in the development of players through personal decision-making, and may or may not make the necessary changes in the rules, if so allowed.

Lima (2021) ponders the use of didactic tools alternative to the traditional ones, affirming the possibility that they are also effective to develop the competence and skills that will help in the omnilateral formation of these individuals, especially in the labor market.

Constructivist teaching, according to Bock et al. (1999), it must challenge the student, instigate the student to discover, bring out the student's instinct for investigation, stimulate the search for knowledge as a lifestyle, and, furthermore, it is up to the teacher to have clarity and accessibility in language when talking to students and present — contextualizing or otherwise analogous — the usefulness of the knowledge in which they are teaching students.

So much so that, through the game, Huizinga (2019, p. 30) affirms the effort made by the players to go all the way to reach that goal, that success, using their own efforts and exemplifies “A child reaching for a toy, a kitten playing with a ball, a little girl playing ball, everyone is trying to achieve something difficult [...]”⁸, ready to gain and make use of their mental faculties and psychomotor skills to achieve, in their own scheme of assimilation, accommodation and balance.

Although it is not the topic discussed here about Education 3.0, which are the students currently, still in transition to 4.0, Feitoza (2021) affirms that students can be characterized by: Connectors, that is, students who are connected to what it happens in your reality; Creators, being part of the process of creating their environment; and Constructivists, in which they build their knowledge. Thus, the teacher is the intermediary of this process, in which knowledge hovers over the air and must help students tune the correct frequency to capture such knowledge, and, it is worth remembering, that each student has his/her frequency to be tuned with the knowledge.

Reaffirming, the exploration of mental processes (assimilation, accommodation and balance) that the individual carries throughout life and develops them within academic environments, interfering in their learning processes. Therefore, cognitive structures combined with constructivist teaching help such students, who need something new that goes beyond traditional teaching methodologies. This audience that is at the same time

⁸ Translated from Brazilian Portuguese.

constructivist has plenty of information in front of it, and the educator needs to become that guide. What's more, games can even stimulate new mental abilities, skills, as noted by several authors.

Such constructivist developments are addressed both by Moreira (1999), Piaget (2017) and Bussmann et al. (2017) emphasizing the proactivity that the teacher must have, as much as the student, and, through the creation of “disorganizations” — challenge — can help students in constructivist learning.

Franco (2021), proposed a game as an educational product when realizing the development of skills beyond didactic content as the improvement of motor and psychological functions, allied as a facilitator of the teaching and learning process. Such skills found by Franco (2021) are related to the student's linguistics, being pictorial or naturalistic, as well as others, and the observation that students learn to follow rules, communicate, listen to each other, wait their turn to play. Finally, there are countless contributions to the formation of an individual that the game can offer.

Other skills developed by the games, suggested by Quadros (2015), Capistrano (2020) and Feitoza (2021) are: creativity; teamwork; logical reasoning; Problem solving; behavior transformations; Communication; motor coordination; and persistence. And Poyatos Neto (2015) and Fernandes (2021) reported that playing is not a waste of time, that the player can acquire skills such as creativity, increased problem-solving capacity, improving interpersonal relationships and teamwork, and complete by affirming that the irony of teachers talking about the importance and valuing of these skills, and underestimating these possibilities arising from games.

Other interesting points to note is that when playing together, players will develop bonds, feelings of trust and teamwork (Mcgonigal, 2010) and encourage competition, collaboration, competitiveness and recognition (Poyatos Neto, 2015), as well as that learning based on games, whether digital or traditional, according to Melendez and Eichler (2019) is an opportunity to explore the potential and build new knowledge, which the student will have when interacting with games, including pointing out that even the mistake or defeat, during the game, can help in learning.

Fernandes (2021), Cardoso and Castagna (2021) and Feitoza (2021) comment on the positive aspects arising from games, such as cognitive, cultural, social and affective learning, as well as Ramos and Anastácio (2018) reported the various cognitive skills present in games, such as improving attention, memorization, problem-solving skills and promoting self-control, which occur during the process of playing. It so happens that the fictional world is a world that escapes reality in which the player immerses himself and, there, removes his psychological limitations, and, thus, achieves an increase in skills, previously suppressed by reality. Ramos (2013) also affirms the increased cognitive ability arising from games, in the triad game, fun and cognition.

Machado (2021) affirms that the act of playing opens possibilities for the student to understand more universal concepts, understand the importance of rules, learn to wait and respect their moment, the construction of realities, expression of feelings and freedom of creation. Fernandes (2021, p. 90) reports the principles of learning from games that help in the student's development, recognizing their true identity, helping them to interact, produce, understand risks, problems, face challenges, then consolidating their knowledge, everything occurs through contextualization and engagement, making them interact both with the environment in which they live and with the people around them.

Ethical values are also acquired when playing, as, as explained by Huizinga (2019), although there is a burning desire to win a game, they always seek to obey the rules, that is, above good and evil, ethical values arise, in which they are demonstrations of their qualities in the effort to achieve a goal, always in the sense of observing and respecting the rules.

Cardoso and Castagna (2021) affirmed the use of games as the exploration of a world of opportunities that can reach all audiences and levels of knowledge, especially in the facilitated acquisition of new techniques.

It is also important to emphasize the notoriety by Kamii (1995) for games, making use of them within arithmetic, which has been used for a long time together with the four basic operations as real motivators of practice. In fact, Kamii (1995) reports the interest of students, in which they do not ask for more exercises, and, otherwise, beg for games that involve math and protest if teachers refuse.

Consequently, Kamii (1995) and Alves (2018) described the importance of autonomous work and learning deriving from the student's wishes, without any manipulation of external motivators, that is, they feel at ease and want to learn.

Because, when using the game properly, and this is the word that best describes the success or failure of a didactic game, a serious game, it is that, according to Piaget (2017) and Dantas et al. (2021), they may offer a process that will occur the assimilation of the intellectual reality in which, without this, it would remain outside the intelligence and, after, the complete adaptation will occur in the process of assimilation and accommodation. Therefore, the internal evolution will occur within the individual, that is, the games will transform, as explained by Piaget (2017, p. 141), in which, “[...] little by little in adapted constructions, always demanding more effective work, to the point that, in the small classes of an active school, all spontaneous transitions occur between play and work. [...]”⁹, and, thus, the game will contribute to a constructivist teaching combined with the birth of new skills, as long as they are approached in appropriate ways.

Therefore, in order for the didactic game to be distorted from its essence and become just an entertainment game, without didactic purposes, it makes the pedagogical need important and it must be taken into account to combine constructivist teaching with the birth of new skills, as mentioned above, in addition to the fact that the history of the games shows that they were used for the acquisition of skills, through their constant practices, in which they activated new skills.

5.3 Pedagogical Need

The pedagogical need is precisely the crucial point that will divide a serious game from an entertainment game, and this care when creating/applying a game with educational purposes will result in the success or failure of gamified practice. So much so that Kamii (1995) brings this concern to light in the fact that games, as a gamified practice, are just a means of fun and “kill time” in class, and, for this not to happen, it is necessary that the teacher understands his role in this process of using games, and then directs his students to the learning that is expected of them, otherwise, it will be just a class without a pedagogical purpose.

In fact, Dickmann (2021) talks about the interaction that games, players (students) and teachers must have, which he calls the “Gameducation Triangle”, an important triad that makes up the necessary elements to make gamified practices happen. Just like Melendez and Eichler (2019) exalted the importance of the teacher in the creative process of games, helping to identify the pedagogical need to be addressed, so much so that Cardoso and Castagna (2021) affirmed the existing approximation between a more direct contact between the student and the teacher, that is, the teacher needs to be attentive to make the gamified practice happen properly.

As a matter of fact, Fardo (2021) reports that sometimes games can be approached through the teaching bias, through the teaching of didactic, academic content - such as mathematics and physics - and, in the past, their approach is based on the bias the development of skills and competences, which are not provided for in

⁹ Translated from Brazilian Portuguese.

educational guidelines — such as logical reasoning. Another bias is also entertainment, in which the game is only for fun, without educational purposes, and from this type of game elements should be taken to gamified practice, in which allied to didactic content and skill development and competences are potential educational artifacts, which, in addition to teaching, entertain students.

And, as Eugenio (2020) highlighted the fact that teachers are the professionals who most create gamification systems, even if basic, and, in fact, there is only a greater connection with the language of games, in which he cites the example that when creating an assessment, it is necessary to assign procedures, rules for it, that is, within this process of creating an assessment, which stipulates, grades, types of questions, number of questions and/or assessments, among others, and, at the end, there is a “winner”, that is, a grade is assigned to that student, there is a teacher creating a gamification without knowing what a gamification is, using elements present in the games, adding to the teacher’s professional activities, transversal to a process that is more immersive and propositional, using the contextualization of the didactic content.

In fact, teachers are the ones who most create gamified practices, including, in the words of Dickmann (2021), they can be used to make an assessment, content reinforcement, an initial class of new content, among other possibilities. That is, gamified practices occur daily in classrooms, without teachers noticing this, of course, that they always do it through their pedagogical needs.

Poyatos Netos (2015) and Fardo (2021) raise the question of how games teach and credits the ludic present in the challenges and problems proposed to students. And, in fact, as Fardo (2021) agrees, there must be a balance between fun and learning, so that this ensures the effectiveness of learning games.

Lima (2021) also made considerations towards the development of students' skills, aligned with the transmission of knowledge of teachers, and that the methodologies to be used should be used in order to complement the pedagogical need and not just for fun, such as so that it is a learning facilitator. And it is the teacher's responsibility to be the conductor, and must be prepared to carry out the gamified practice.

A point to consider about the creation of games or gamification is when Eugenio (2020) asserts that gamification is not just a means in which game elements are inserted in academic activities, but a more in-depth approach is needed, remembering that the focus is the pedagogical need and not the game itself. Likewise, Lima (2021) was concerned when saying that the real challenge of applying a gamified practice is the coherent balance between fun and education, not just being a game whose stamp is entertainment or a content focused only on traditionalism academic, and yes, with the combination of both to provide that the player can be a researcher, within the fictional world in which he will carry out his studies.

Regarding the pedagogical need, one must pay attention to the choice of what kind of gamified practice the teacher wants to do, and for that, Dickmann (2021) questions which game to use, how to use the game, which audience will play, how to adapt the game to the students, will it be a serious game or a gamification, among many others, which denotes the numerous considerations that must be made to seek a gamified practice combined with the pedagogical need, so that this is a really significant practice, in which the pleasure of learning is the focus.

However, even the game invested in the pedagogical needs of the teacher/student, being fun and captivating, engaging and motivating, among other benefits, it is necessary to reflect on what was presented, together with the students, in addition to verifying the possibilities of implementation given the availability of necessary materials.

5.4 Feedbacks and Restrictions

Feedback is another opportunity to make gamified practice find success rather than failure, to combine

everything that is played with learning and the teacher needs to find ways to make this happen in an integrative way, game and learning.

One way to take advantage of games, as a pedagogical practice, is supported by the words of Kamii (1995) and Dickmann (2021) in which they suggest a round of dialogues with the groups for each one to report their point of view, how many points the other groups scored and who won, thus bringing responsibility to the students. They also report the possibility of social conflicts arising, which will be a great opportunity to help them in conflict resolution.

It may be that sometimes there are restrictions on the creation and application of a gamified practice, and Dickmann (2021) sheds a lot of light when commenting on such challenges, exemplifying with the case that a practice is not possible inside a school with wooden walls with a lot of movement in order to cause trepidation, or make an electronic game in which part does not have access to a video game or computer, but the most important thing is to start, in the historical retrospect where starting by playing with dice made from sheep's joints until the days nowadays that there are several electronic games, there is a whole in between that can be used, through traditional games, or even more simplistic ones, a deck of cards, use of white paper, etc. The important thing is always to be willing to change and start.

As a matter of fact, Cardoso and Castagna (2021) recall that games can facilitate and excite students for the learning of didactic contents, and that, if it has greater support from the institution, it would provide its effectiveness and, Martins (2020) emphasizes that gamified practices give the teacher the ability to meet the emerging needs of their students, in such a way that it is necessary to be aware of specific and necessary interventions, personalizing learning.

Therefore, combining games within the classroom must necessarily go through the motivation of teachers to want to innovate in their classes, so that they motivate students to stay, and, it must be agreed, that games are better than worksheets, mainly in the pleasurable way of engaging students, in which they help in constructivist teaching and in the development of other extra-class skills, however, it must be combined with the pedagogical need to focus the game in the educational sphere, and therefore face restrictions with creativity and make an assessment at the end to enshrine the potential of gamified practice within the academy, living up to the entire historical path that the games had until their arrival in the classroom.

6. Games in Professional Education

Fernandes (2021) reports the use of gamified practices within the teaching of mathematics and physics, both important for teaching the content of physical indices, in the discipline of Soil Mechanics, in which the first author teaches at the Federal Institute of Acre, in the course of Building Technician, Integrated and Subsequent modalities.

The studies by Melendez and Eichler (2019), in vocational education, showed that more than 95.00% of students like games and that almost half of the students play daily.

At the level of knowledge retention, the survey carried out by Fernandes (2021) obtained a total of 78% of respondents claiming to have had good knowledge retention and 22% claiming average retention.

Franco (2021) created and used the game *Physicool* in the application of the discipline of Physics in which he tries to establish the language used in the discipline with its uses — in formulas — through a board game. In the present case, although the students were afraid at first, it proved to be a great success, with acceptance of a good

part of them and the improvement in the learning of physics concepts greater effectiveness in the learning process.

The Technological Infrastructure Axis is regulated by the Ministry of Education (MEC) and services 15 courses, among which is the Building Technician (National Catalog of Technical Courses, 2021).

The qualification of the available axes is due to the fact that searches have been made for games that operate within the axis, and, if possible, within the scope of Technical in Buildings, as this is a deeper study about the games and their applicability within the course.

Lima (2021) conducted a study with the use of games in the Construction Materials (I and II), Technical Drawing and Rural Constructions subjects, taught, the first in the architecture course at the Federal University of Paraná, and the second and third in the School of Agronomy at the University of Goiás, where they are found, the first and second subjects, also appropriate, in the Building Technician course.

The studies conducted by Lima (2021) sought to increase cognitive skills, to ensure a better assimilation of learning, encourage creativity, encourage research and teaching, increase technical production and dissemination of knowledge. The results stand out that 36.4% of the students considered the game interesting, 45.5% an adequate methodological proposition of learning and 54.5% would go back to playing to learn more, as well as would recommend it to their peers. What are very relevant data in order to achieve public acceptance for the games.

Other points found in the research by Lima (2021) were that there was an acceptance of 45.5% when they discovered that they could use in practice the learning provided by the game, which 72.8% of the students believed they had learned with the game; that 54.5% used their personal efforts; that 63.6% perceived a contribution in the learning process in the subject and that their learning in other subjects was also efficient. In other words, students were able to learn concepts and use them in practice, all in a more pleasant and autonomous way. In fact, the students thought it was negative that the practice of the game was only once during the curricular semester.

Machado and Oliveira (2020) proposed a professional orientation in the building technician course at the Federal Institute of Education, Science and Technology of Sertão Pernambucano (IF Sertão-PE) in which they used a game, entitled *GamIFique*, with students from the 1st and 3rd year of integrated high school. Thus, the students had the opportunity to experience the professional reality of which they study, and the authors believe that the result was satisfactory in terms of tangency and encouragement of exploratory behavior, thus expanding the knowledge process in relation to the profession.

The game *GamIFique*, proposed by Machado and Oliveira (2020), brought a dynamic in which students had to answer questions and carry out challenges, always relating to the attributions of the building technician. Composed of 3 phases, and as you progress, the levels of complexity were increased. There is also a time forecast for the questions/challenges presented.

The studies by Machado and Oliveira (2020) led to results in which there was an increase in students' interest in knowing about the attributions, professional qualification, the course opportunities in employability, the possibility of verticalization of training, self-knowledge about their skills. and knowledge that will be developed and, even students who do not want the technical part, could rethink, and mature their future plans.

Research by Menezes et al. (2015) conducted a case study using BIM (Building Information Modeling) and gamification in the teaching and learning process of building students, integrated modality, from the Federal Institute of Education, Science and Technology of Rio Grande do Norte, Campus Santa Cruz, in which he was part of the content of the discipline "Architectural Project Elements".

In this case, a gamification was proposed by Menezes et al. (2015), which consisted of using game elements to apply content on BIM. And they were made step by step, in which: there was assistance between students and groups of students, the search for errors, the answer to questions, the evaluation of academic performance; in a second moment, the definition of the objectives and target tasks, through one of the game elements known as XP (Experience) so that when a colleague was in difficulty, he would help the other and would accumulate the XP's in the form of bimonthly notes; there was the award, the bonus through small caresses, such as chocolates, bonbons, etc., for the highest XP's scorers; levels were established that the player would only unlock the superiors if they satisfactorily performed the activities and objectives of that level in which they are; and there was a progress bar for students to track their academic achievement throughout the school year.

Therefore, it is clear that the proposal was a gamification rather than a game, in view of the use of some elements of the games, explored by the authors Menezes et al. (2015).

The promising results showed that 81.4% of students felt they were able to learn more and better, that 74.6% observed a more organized, inductive and deductive learning, that 94.9% preferred the implemented methodology and that 91.6% they felt more motivated in the face of the difficulties imposed by the discipline.

Therefore, when analyzing some games implemented in professional education, it can be concluded that they in fact arouse the interest of students and motivate them to continue within the academic space, which may contribute, among others, to the mitigation of dropouts. Furthermore, the historical journey of games, culminating in the classroom, can be enjoyed with satisfaction and success within professional and technological education, as long as there is an alignment between the game and the didactic content, otherwise it will be just a game of entertainment.

7. Final Considerations

What are games? Difficult question to answer, as there are several definitions in different languages, however, in summary, games have something in common: the fact of being free; escape from real life; create order and be order; and isolation and limitation; and, with these four components, it is possible to identify what a game is.

The other question, which also generate confusion, is about what is a game and what is gamification, and it was clear that the game is the whole and gamification is part of the game, in which some elements of the games are used to teach something.

Games have their origin before culture, a culture that arises with humanity, therefore, games are older than humanity itself, and are also explored by other beings, such as dogs and cats that play instinctively.

Why are games so interesting? As seen, the game has been part of human culture for at least millennia. When looking at McGonigal's (2010) report that there are at least 500 million online players in the world, that is, excluding other types of games, and that the trend for the next decade, or rather, the current one, will be 1.5 billion online players. So a lot of people are playing these days, and that's only on online platforms.

Allied to the fact that the teachers, at one time or another of their didactic practice, brought some game in the form of a gamification of the class or a really learning game, without knowing that that class of theirs was a gamified practice. Therefore, awakening to this new world, where there are more and more student players and taking content to them in their language is the way that education should attract the student.

McGonigal (2010) makes a great contribution by saying that players are people full of hope and that they are people who feel with the ability to change the world, and thus, the first author feels, and, therefore, proposed to

develop a gamified practice, through games, in his discipline of Soil Mechanics. Well, he thinks he can change the world, but he is aware that small steps must be taken, and thus, planting the same feeling in students, so that they are the voice of change in the world - the world we want depends on us.

That is, gamified practices - those that use games in classroom teaching - are well accepted by students, but the teacher cannot forget to combine the game with a pedagogical need, which will help in the construction of knowledge, especially in the process of assimilation, accommodation and balancing. And in order to obtain an efficient result in this process, feedback is sought to assess the potential of the gamified class, as well as to impose future improvements.

The success of the games is attested by several researchers, and their potential for use by these authors within the technical course in buildings, integrated modality, at the Federal Institute of Acre, is promising, as other professors also applied it. in the same course and obtained positive results, motivating, engaging and contributing to the permanence of students in the institution.

Therefore, it is necessary to further investigate the gamified practice in the classroom as a methodological alternative, so that afterwards, it is necessary to seek the creation of a game, as an educational product, part of the dissertation defense of the first author, and a script can even be prepared that helps other teachers to seek to create their own games or gamifications.

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