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TEACHING AND LEARNING OF CARTESIAN PLANE FROM THE GAME "LOCATING ORDERED PAIRS"

ABSTRACT

The text aims to report the experience of a mathematical activity performed through the game "Finding ordered pairs". The game was held with 30 students from a class of the 8th grade of Elementary School. For this, in this text, aspects about games are discussed by authors who address the theme. The information on the experience report was based on Bicudo (1993). It was concluded that the game developed was relevant to the contribution of student learning by fixing and resolving doubts about the concepts of Cartesian Plane, ordered pairs and their coordinates.

Keywords: Teaching and learning of Mathematics. Elementary School. Game. Cartesian Plane.

ENSINO-APRENDIZAGEM DE PLANO CARTESIANO A PARTIR DO JOGO "LOCALIZANDO PARES ORDENADOS"

RESUMO

O texto tem como objetivo relatar a experiência de uma atividade matemática executada por meio do jogo "Localizando pares ordenados". O jogo foi realizado com 30 estudantes de uma turma do 8º ano do Ensino Fundamental. Para isso, neste texto, são discutidos aspectos sobre jogos por autores que abordam a temática. As informações sobre o relato de experiência basearam-se em Bicudo (1993). Concluiu-se que o jogo desenvolvido foi relevante para a contribuição da aprendizagem dos estudantes por fixar e sanar dúvidas sobre os conceitos de Plano Cartesiano, pares ordenados e suas coordenadas.

Palavras-chave: Ensino-aprendizagem de Matemática. Ensino fundamental. Jogo. Plano Cartesiano.

ENSEÑANZA Y APRENDIZAJE DEL PLANO CARTESIANO DESDE EL JUEGO "LOCALIZACIÓN DE PARES ORDENADOS"

RESUMEN

El texto tiene como objetivo relatar la experiencia de una actividad matemática realizada a través del juego "Ubicar pares ordenados". El juego se jugó con 30 alumnos de una clase del 8° grado de la Enseñanza Primaria. Para eso, en este texto, aspectos sobre los juegos son discutidos por autores que abordan el tema. La información sobre el relato de experiencia se basó en Bicudo (1993). Se concluyó que el juego desarrollado fue relevante para la contribución del aprendizaje de los estudiantes al fijar y resolver dudas sobre los conceptos del Plano Cartesiano, pares ordenados y sus coordenadas.

Palabras Clave: Enseñanza-aprendizaje de las matemáticas. Enseñanza fundamental. Juego. Plano Cartesiano.

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1 INTRODUCTION

This text aims to report the experience of a mathematical activity performed through the game "Finding ordered pairs". Its development was carried out with 30 students from a class of the 8th grade of Elementary School of Escola Estadual de Xingó I, located in the municipality of Piranhas - Alagoas, Brazil.

The choice for the experience report is justified due to the fact that the author of the text narrates the occurrence of a mathematical activity experienced and executed by himself, when teaching 8th grade students the object of Cartesian Plane knowledge through the game "Locating ordered pairs". The explanation of this activity is presented throughout the text.

The experience report, according to Bicudo (1993), becomes important because it allows the description of activities that are judged as relevant to the subject who applied and experienced them, being possible to report significant/pertinent situations such as the manner of their occurrence and results achieved.

The game "Locating ordered pairs" involves the Cartesian Plane as an object of knowledge and was elaborated based on the rules pointed out by the "Dots Game". The inspiration for the adaptation of such a pedagogical resource arose because of the need to teach students the concepts of Cartesian Plane, ordered pairs and location of coordinates.

The teaching of this object of knowledge emerged when the author of this report was teaching, before the development of the game, the subject of equation of the 1st degree with two unknowns, which has as its definition to be "every equation that can be reduced to an equivalent equation in form ax +by = c, with a, b and c $\in$ R e a $\neq$ 0, b $\neq$ 0" (GIOVANNI JÚNIOR; CASTRUCCI, 2018, p. 148). Still according to these authors, depending on the universe set, this type of equation can have infinite solutions, each of which is indicated by an ordered pair in which "the first number represents the value of the unknown x; The second number represents the value of the unknown y. This order needs to be respected. Hence the name **ordered pair**" (GIOVANNI JÚNIOR; CASTRUCCI, 2018, p. 148, authors' emphasis).

Through the resolution and elaboration of problem-situations in Mathematics classes on the mentioned subject, as a form of continuity, the need arose to teach how to make the representation of an equation of the 1st degree with two unknowns in the Cartesian Plane. This object of knowledge, according to the norms of the National Common Curricular Base (BRASIL, 2017), must be studied by students in previous years, such as in the 5th, 6th and 7th years of elementary school. However, due to the shutdowns

of in-person classes and the adoption of remote mode throughout the education system due to the impacts of the novel Coronavirus (Covid-19) pandemic between 2020 and 2021, these students did not gain such knowledge.

Because it´s a teacher who seeks to teach Mathematics classes in an attractive and fun way with the purpose of trying to facilitate, motivate and demystify negative beliefs about this discipline, the author opted for a mathematical activity that allowed students to learn in an active and fun way, in this case, through a game.

The game is a pedagogical resource that BNCC (BRASIL, 2017) recommends to be used in the teaching of Mathematics because it has the ability to contribute to student learning through the understanding of mathematical notions. However, for this to occur, it´s necessary that its development is related to situations that allow the student systematization and reflection on the formative process to, only thus, develop the construction of their knowledge.

The proposal of the use of game for the teaching-learning of Mathematics is also defended by Muniz (2021), Grando (2015; 2004) and Borin (1996), because, according to these authors, this resource, when used appropriately, has the ability to develop cognitive, affective, social and moral aspects in those who are playing it. These aspects, during the action of the game, contribute, for example, to the creation of hypotheses, the use of different elaborations of strategies for solving situations-problems of the game, creativity, criticality, attention, concentration, socialization, awareness, respect for colleagues and the rules of the game, et cetera.

In this way, the games, when applied, can be worked according to the teacher's look at the student, through different perspectives: To motivate the students from a new learning; for the fixation of an object of knowledge already studied; or simply for recreation (MACHADO *et al.*, 1990).

In view of the discussion mentioned, to substantiate the text, we sought to adopt as theoretical references: Bicudo (1993) for the basis about the experience report; Giovanni Júnior and Castrucci (2018) to define the concept of equation of the 1st degree with two unknowns; BNCC Brasil (2017) to reflect on recommendations related to skills concerning this object of knowledge; and the notes of Muniz (2021), Grando (2015; 2004), Borin (1996) and Fiorentini and Miorim (1990) that deal with games.

Thus, for a better systematization of this work, it was organized as follows: The following is a brief theoretical foundation on the games through characteristics, contributions and methods of the game; in the sequence, it´s recorded "Report of the idea for the emergence of the game 'Locating ordered pairs'" and the "Report of the

development of the game 'Locating ordered pairs'" in the Mathematics class; and the approach is concluded with the formulation of the final considerations and the indication of the references that supported this text.

2 FEATURES, CONTRIBUTIONS AND METHODS OF THE GAME

"It´s common to associate the idea of game with a concrete material, which we often use in the classroom as a motivational instrument for Mathematics classes" (GRANDO, 2004, p. 7). However, as the author points out, the game goes beyond that: It´s a potentially ludic activity, because it constitutes in children, or rather, in the people who play it, at any stage of their life, happiness and pleasure.

Grando (2004) also emphasizes that the ludic is inherent to the human being, which arises through activities constituted by the individual from a relationship with an object of knowledge. In this perspective, Muniz (2021) states that the ludic should be something that gives or causes happiness, pleasure and meaning to life and the performance of an activity. The ludic experience can be felt from a reading, when listening to a song, when playing with a certain object, when playing a game, et cetera. However, not every game is ludic. As much as there are games and fun, for such an activity to be ludic, the pleasure and what gives it meaning must be perceived by the player or individual, so that if he does not feel this situation, then the game will not become ludic.

This situation, of non-perception of playfulness, occurred with four students at the time of performing the activity that will be reported below, because they had no interest in participating in the proposed game. Although the author (teacher) explained the activity and questioned them about it, they did not want to play. Faced with such a situation, the lack of will is not determinant, since, as Grando (2004, p. 32) affirms, one of the disadvantages of the game as a pedagogical activity is "the coercion of the teacher, demanding that the student play, even if he does not want it, destroying the voluntariness belonging to the nature of the game".

Another relevant requirement of the game, according to Huizinga (2007), is the fact that it´s a cultural element that arises from aspects of nature and cultural phenomena, in such a way that it´s a "fact older than culture, because this, even in its less rigorous definitions, always presupposes human society; but the animals did not wait for men to initiate them into ludic activity" (HUIZINGA, 2007, p. 3).

The author also argues that, for the game to exist, it´s necessary to have rules, rules that are relevant and do not allow disagreement on the part of the participants. In

addition, Huizinga (2007) also points out as one of the main characteristics of the game competitiveness, justifying that the more such a condition occurs, the more the game will become exciting. It´s from this emotion that players will continue on the course of the game until the occurrence of the winner.

This process of characterizing the game is also highlighted by Grando (2015, p. 398):

> The game has its own characteristics that give it a differentiated status. The game has rules that need to be respected throughout the match, it´s necessary to be clear who the winner is or if there is a draw, has a movement (beginning, middle and end) and this guarantees you an order, in addition to being a voluntary activity.

Thus, the game can not be developed in any way, because, as Grando (2015) states, it must have rules, beginning, middle and end and be a voluntary activity. And this need for regulation increases even more when it comes to a pedagogical activity of the discipline of Mathematics, requiring the teacher to create an adequate plan to approach a game in his class, having as main purpose the learning of mathematical contents by the students.

> The use of didactic resources in mathematics classes needs to be intentionally planned by the teacher and this knowledgeable of the limits and possibilities of pedagogical action of each of these resources. We already know that the simple handling of materials does not lead to learning, but an action mediated and problematized by the teacher. It´s necessary to consider whether the resource comes to facilitate, to offer a manipulative help to the students, instead of generating a conceptual or epistemological problem (GRANDO, 2015, p. 415).

Therefore, the game, before being developed in class, according to Muniz (2021) and Grando (2004), must be researched and studied to only then be executed. In addition, according to Borin (1996), a care that should also be put into practice and reflected by the teacher who wishes to perform activities with games is to study the entire game to be applied, before taking it to its development in the classroom. This, according to Borin (1996), is only possible by playing. This same thought is also defended by Smole, Diniz and Milani (2007), who mention that, before using a game as a pedagogical resource, it´s necessary for the teacher to know it, read "the rules and simulate plays verifying if the game presents challenging situations to your students, if it involves concepts appropriate to what you want them to learn, leading to the development of reasoning and cooperation among students" (SMOLE; DINIZ; MILANI, 2007, p. 14).

Fiorentini and Miorim (1990) emphasize that the use of games and materials can be fundamental for learning to occur with more meaning for students, so that, when participating in these activities, they develop reasoning, understanding and re-elaboration of concepts produced, thereby overcoming a naïve and partial view of reality.

From these precautions (research, studies and testing) in the act of planning is that the games, if well oriented, when applied, have the ability to contribute to the development of students' Mathematical learning. According to Grando (2015), the game can be carried out in two ways:

> We believe that there are two ways to propose the use of games in mathematics classes: one of them in which the teacher, when planning to develop a certain content, creates a game or search for some already existing, which was created with the objective of teaching mathematics (dominoes of forms, bingo table of operations, et cetera); and another in which the teacher seeks in the ludic activity of his students, entertainment games, which were created for this purpose or even games created for pastime in a certain culture and plans an intentional action in order to explore, also, the Mathematics from this game, a Mathematics that makes it possible to give meaning to the strategy of the game (GRANDO, 2015, p. 398).

In this text, the Mathematical game addressed is based on the first proposition pointed out by Grando (2015): The game "Locating ordered pairs", adaptation of an existing game, "Dots Game", was used by the author of this research as a pedagogical resource in his class with the objective of fixing the concepts of Cartesian Plane, ordered pairs and location of coordinates, content that should have already been studied by students in previous years, that is, it was intended to help students better fix previously known topics, only to improve them after that with the geographical representation of equations of the 1st degree with two unknowns in the Cartesian Plane. It´s recommended that this object of knowledge be taught and learned by students of the 8th grade of elementary school. Such a method of fixing concepts through games is classified by Grando (1995, p. 65) as:

> Games of fixation of concepts - are those whose purpose is expressed in their own name: "to fix concepts". They are the most common, widely used in schools that propose the use of games in teaching or "apply concepts". They present their pedagogical value to the extent that they often replace the lists and more lists of exercises applied by teachers so that students assimilate the concepts worked. It´s a game used after the concept (GRANDO, 1995, p. 65).

The content was taught by the author of the text in a class with exposition of images through slides that illustrated the Cartesian Graph with the numbers and their axes of abscissas and ordered and locations of drawings in their coordinates presented between the four quadrants. The teacher, when explaining, asked for help from the students to tell

him the coordinates of the drawings, that is, their ordered pairs, starting with the number of the axis of the abscissa x followed by the number of the axis of the y ordinate. After this explanation of the subject with the help of the students, it was highlighted, explained and applied the game "Locating ordered pairs", reported in the next topic.

The game performed in class, as mentioned, was an adaptation of the spontaneous cultural game "Dots Game", and the way it was developed in the classroom conceives the mediation of the learning of Mathematics, from one of the six proposals presented by Muniz (2021):

> 5. **ADAPTATION OF THE TRADITIONAL GAME WITH INSERTION OF MATHEMATICAL KNOWLEDGE:** The teacher adapts the game that was initially spontaneous and present in children's ludic culture (often miniculture of the adult world, in which Mathematics is a participant). The adaptation is carried out according to educational objectives, seeking to ensure certain Mathematical activities in the ludic activity: What matters is learning (MUNIZ, 2021, p. 330, author's emphasis).

The author also points out that, during the development of this activity, the teacher should not establish intervention in his action. However, due to the changes made due to the insertion of Mathematical knowledge, it´s the prescriber of the game, acts as an observer and suggests a game that the players know in a partial way. In addition, the teacher can also be called by the players to solve possible doubts, and they are free to play it.

Therefore, after exposing a brief theoretical presentation about games, explaining their characteristics, contributions and methods to be used in the teaching-learning of Mathematics, the following topic reports the methodology composed by the narrative of the idea for the emergence of the game "Locating ordered pairs".

3 REPORT OF THE IDEA FOR THE EMERGENCE OF THE GAME "LOCATING ORDERED PAIRS"

The methodology chosen for this text was taken as a theoretical basis the understanding of the experience report undertaken by Bicudo (1993) to describe Mathematical activity developed in class of the 8th grade of Elementary School, taught by the author of the text. Moreover, on the deepening of the games, it´s based on the understandings adopted by Muniz (2021), Grando (2015; 2004) and Borin (1996).

The idea for the development of the game "Locating ordered pairs" in the Mathematics class was based on two situations. The first refers to the object of knowledge that was being taught to the students of the 8th grade of elementary school: the geometric

representation of an equation of the 1st degree with two unknowns in the Cartesian Plane. This content should not be taught in any way, because, as the BNCC points out (BRASIL, 2017, p. 271), it´s recommended that "The techniques of solving equations and inequalities, including in the Cartesian Plane, should be developed as a way to represent and solve certain types of problem, and not as objects of study in themselves".

Thus, during the explanation of the content, the teacher asked the students if they had ever seen on TV, in movies or in other disciplines the locations of coordinates. Examples of radars that are displayed on ships and planes were mentioned, as well as the coordinates of the locations on maps, latitudes and longitudes, a topic covered in the discipline of Geography. However, they pointed out that they had not studied this in Geography, in the same way, they were also beginning to study in Mathematics a content that should have been learned in previous years by the students. However, they did not get to know him due to the pedagogical consequences of social isolation as a way of coping with the Covid-19 pandemic experienced around the world. However, as the BNCC states, thematic units, skills and objects of knowledge will always be resumed.

> All thematic units, the delimitation of the objects of knowledge and skills considers that the Mathematical notions are resumed, expanded and deepened year by year. However, it´s essential to consider that the reading of these skills is not done in a fragmented way. The understanding of the role that a given skill plays in the set of learnings demands the understanding of how it connects with skills of previous years, which leads to the identification of the learnings already consolidated, and to what extent the work for the development of the skill in question serves as a basis for later learning (BRASIL, 2017, p. 276).

This is what happened in this study, because the object of knowledge was resumed, since the students had not studied it, considering that the National Common Curricular Base guides the subject as follows:

Table 1: Cartesian Plane and its skills from 5th to 8th grade.

THEMATIC UNIT	YEAR OF ELEMENTARY SCHOOL	OBJECT OF KNOWLEDGE	SKILLS
Geometry	5th grade	Object of knowledge: Cartesian Plane: Cartesian Coordinates (1st quadrant) and representation of displacements in the Cartesian Plane.	(EF05MA14) Use and understand different representations for the location of objects in the plane, such as maps, cells in spreadsheets and geographic coordinates, in order to develop the first notions of Cartesian Coordinates (BRASIL, 2017, p. 297). (EF05MA15) Interpret, describe and represent the location or

			movement of objects in the Cartesian Plane (1st quadrant), using Cartesian Coordinates, indicating changes of direction and direction and turns (BRASIL, 2017, p. 297).
Geometry	6th grade	Cartesian Plane: association of the vertices of a polygon to ordered pairs.	(EF06MA16) Associate ordered pairs of numbers with points in the Cartesian Plane of the 1st quadrant, in situations such as the location of the vertices of a polygon (BRASIL, 2017, 304).
Geometry	7th grade	Geometric transformations of polygons in the Cartesian Plane: multiplication of coordinates by an integer and obtaining symmetrics with respect to axes and origin.	(EF07MA19) Perform transformations of polygons represented in the Cartesian Plane, resulting from the multiplication of the coordinates of their vertices by an integer number (BRASIL, 2017, p. 309); (EF07MA20) Recognize and represent, in the Cartesian Plane, the symmetrical of figures in relation to the axes and the origin (BRASIL, 2017, p. 309).
Algebra	8th grade	Association of a linear equation of 1st degree to a line in the Cartesian Plane; System of polynomial equations of 1st degree: algebraic resolution and representation in the Cartesian Plane.	(EF08MA07) Associate a 1st degree linear equation with two unknowns to a line in the Cartesian Plane (BRASIL, 2017, p. 313); (EF08MA08) Solve and elaborate problems related to their close context, which can be represented by systems of equations of 1st degree with two unknowns and interpret them, even using the Cartesian Plane as a resource (BRASIL, 2017, p. 313).

Source: Author's elaboration from BNCC data (BRASIL, 2017).

In view of the above, it´s perceived how much the Cartesian Plane is taught in Mathematics and its relevant contributions to the skills that students need to acquire to improve with the knowledge addressed that will be more developed and taught in later years, in fact with each year that passes this object of knowledge, according to BNCC (BRASIL 2017), is being resumed, enlarged and deepened.

Due to the degree of importance of learning this object of knowledge and the fact that students still do not have the proper knowledge about it, the author, because he likes to work differently in his Mathematics classes, reflected and decided to make use of a game with the purpose of fixing the highlighted content so that students would actively learn it, fun and pleasurable. This is precisely one of the recommendations for the use of

games, because as stated by Grando (2004), it has the ability to make the student an active agent in the construction of his knowledge, in addition to creating the interest to learn. In addition, it has the potential to develop in those who play it their creativity, critical sense, spirit of participation and the practice of healthy competition, among other factors.

In this sense, the game chosen by the author aimed to work with the students the relation of the Cartesian Plane, the ordered pairs and their coordinates. The idea of using it arose from a game that the teacher played with his colleagues when he studied in Basic Education, known as "Dots Game". Its rules are described below:

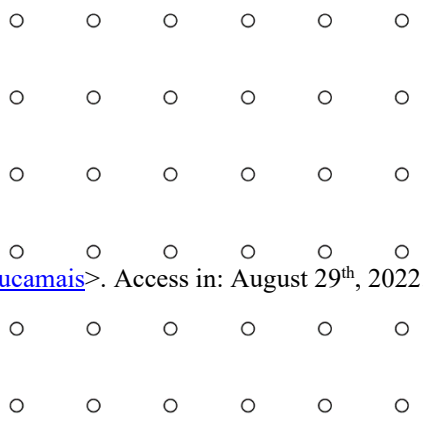
Table 2: Dots Game.

Rules of the Dots Game.
The ultimate purpose of this game is to complete the largest number of squares. The rules are general for all ages, but the degree of difficulty varies with the size and amount of possible squares, which also directly influences the time of the game and the number of players:
1. Each child chooses the color they will use;
2. The game [starts] with the first player connecting two neighboring points (it´s only allowed to connect vertically or horizontally);
3. Then the other player chooses two other neighboring points to connect and repeats the process;
4. When one of the players makes a dash that closes a group of four points (forming a square), he places his initial inside (or drawing/mark in the case of the little ones);
5. The child who makes a square can play again;
6. When connecting the dots you need to pay attention to leave squares in which only one side is missing and so the other player can close and win the square for himself;
7. The game ends when there are no more possibilities to connect the dots;
8. The winner is the participant who has closed more squares.

Source: Dots Game. Educamais (2009-2022).[1]

Through the above, the rules of the "Dots Game" are known. For a better understanding of its rules, images of simulations of plays are presented below.

Figure 1: Dots Game.

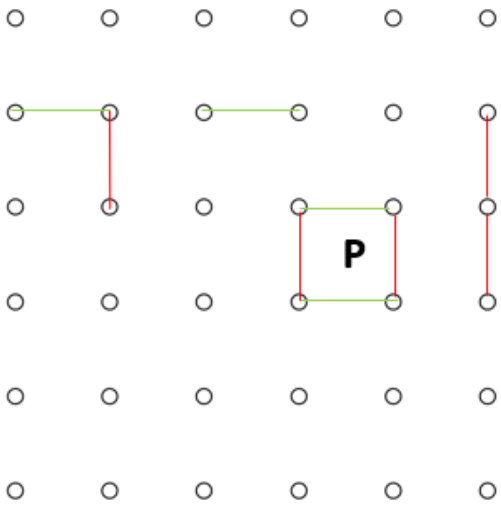


[1]Available in: <Jogo dos Pontinhos - Educamais>. Access in: August 29th, 2022.

Source: Elaboration of the author through the Geogebra[2].

In the example exposed, it turns out that the "Dots Game" is made only by aligned points. After this initial part explained, it´s that the players discuss and understand the rules, so that they can play it, competing and making the traces that connect the points vertically or horizontally, as recorded in the example that follows:

Figure 2: Dots Game: examples of plays.



Source: Elaboration of the author through the Geogebra.

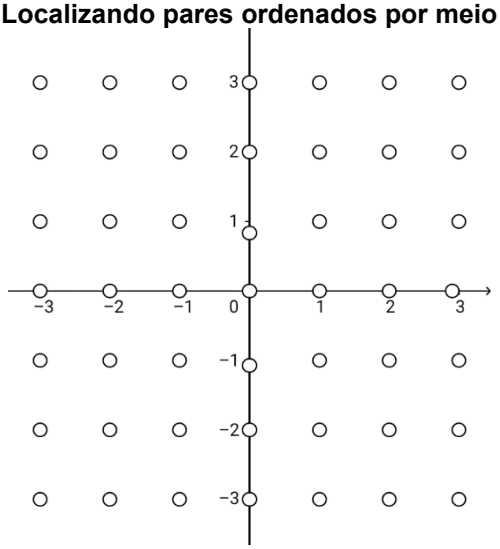
Above are played from vertical strokes in red color and horizontal strokes in green. A square was formed by four strokes and the player who completed it wrote the initial of his name inside the figure, thus securing a point for himself. Due to the moves that are carried out only by vertical and horizontal strokes, in order for the player to form a square and put the initial of his name, he or they (in case of double or team) must think and reflect on winning strategies to win the game.

[2]"It´s a free computer program that combines geometric, algebraic, graphical, table and calculation construction features. Its interface is simple and displays several commands to perform different types of constructions" (SOUZA; PATARO, 2015, p. 293).

The "Dots Game", known and experienced by the author of the text, from a ludic culture, when he was a child/adolescent, was also known by some students of the 8th grade class - when they were asked by the teacher if they knew him, only six of them confirm that yes.

From the teacher's interest in using this game as a mechanism for fixing the content - the concepts of Cartesian Plane, ordered pair and coordinate location - the resource was adapted to "locating ordered pairs". The rules remained the same as those of the "Dots Game", however, what was added to satisfy the need for Mathematical learning were the axes of x abscissas and y ordinates, that is, the Cartesian Graph of the "Dots Game". This example is presented below:

Figure 3: Jogo "Localizando pares ordenados por meio dos pontinhos"



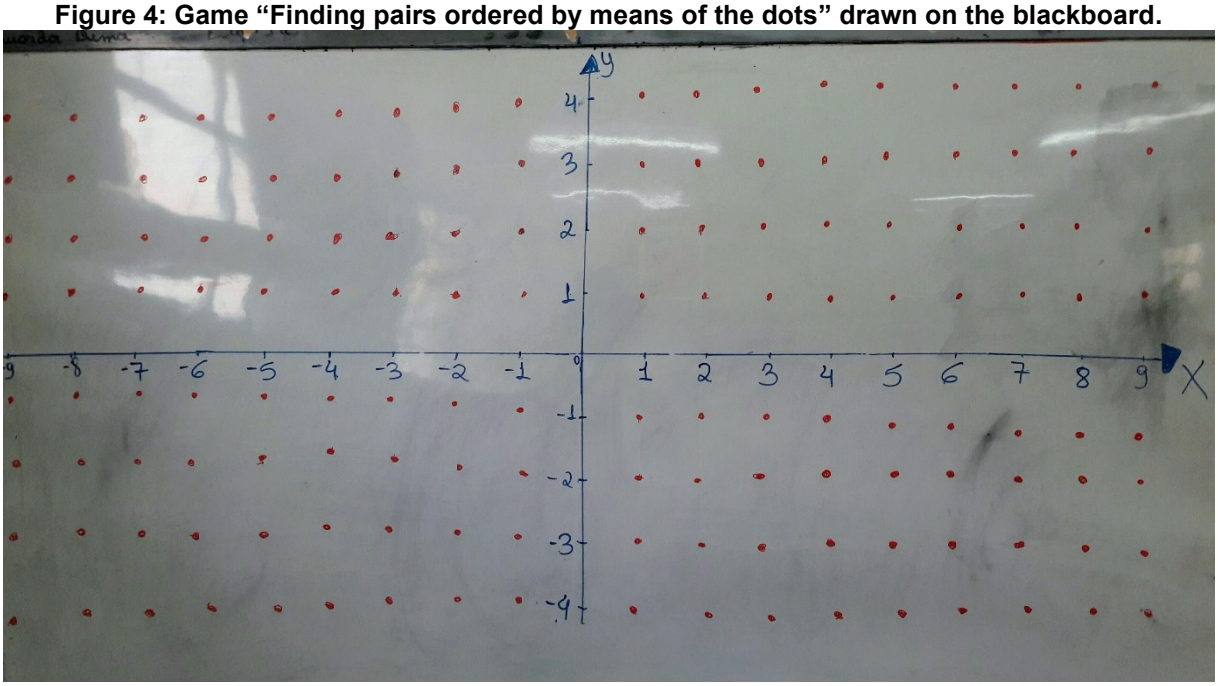
Source: elaboration of the author through the Geogebra.

This adaptation is consistent with the proposal of "Adaptation of the traditional game with insertion of Mathematical knowledge", presented by Muniz (2021). In addition to the insertion of the Cartesian Graph in the Dots Game, another situation also added in its rules was the need for the player, when performing each stroke (horizontal or vertical), to have to write in his notebook the location of the two corresponding ordered pairs. Since each trace is made from the ligament of two points, then he would have to write in his notebook the coordinates of the two connected points, that is, their ordered pairs (x, y).

4 REPORT OF THE DEVELOPMENT OF THE GAME "FINDING ORDERED PAIRS"

The explanation of the object of knowledge in question was highlighted, as mentioned, with images through slides and dialogues between students and the teacher. After the end of this first class, in the second, the development of the game "Finding ordered pairs" was carried out. His execution was carried out by means of the whiteboard. The teacher made the Cartesian Graph on the blackboard and filled it quickly by means of dots, because this activity would be developed only in this second class. Due to the short time to perform the activity, the distance between the points and their alignments were not adequate. However, that would not prevent the game from taking place. This explanation is highlighted in the following image:

Figure 4: Game "Finding pairs ordered by means of the dots" drawn on the blackboard.



Source: Photographic record made by the author.

After having done the whole sketch, as shown in the image above, the teacher asked the students if they knew the Dots Game, if they had already played it. As already mentioned, only six students reported having knowledge about the game. Then it was explained to the students that they would now put into practice the object of knowledge they had just studied. Thus, as there were thirty students in the classroom, they were asked to form groups of five members, totaling a total of six groups. However, some students did not agree to join with certain classmates and others would like to have groups of more than six people. Due to the short time, the formation of the groups was allowed according to the criteria of the students. According to Grando (2004), the realization of activities with the use of games demands a lot of time, so the teacher needs to be

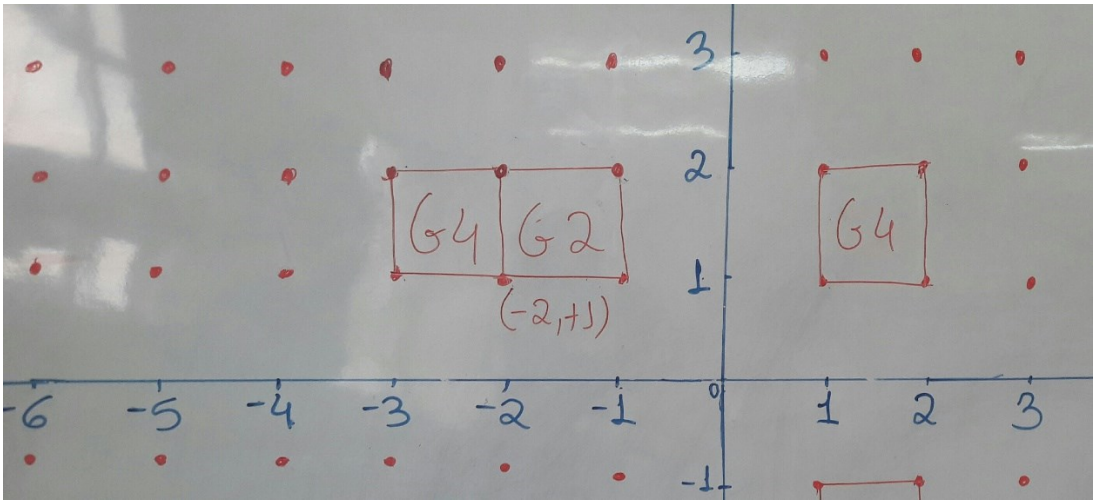
equipped with a good planning to perform this type of pedagogical procedure. Thus, four groups were formed containing five players, one with eight and the other with only two.

Then it was explained that the teams would compete and only one of them would be the winner. They were excited, because as stated by Muniz (2021), Huizinga (2007) and Grando (2004), in a game there must be competition, a healthy competition. It´s through such competitiveness that players get excited and acquire the will to play, which makes the game more exciting, allowing them to run all the way to the production of the winner.

In addition to the competition, the excitement and noise was evident in the groups. According to Borin (1996, p. 12), "noise is inevitable, because only through discussions is it possible to reach convincing results. We need to face this noise in a constructive way; without him, there's hardly any mood or motivation for the game". That noise ran through all the action of the game, especially when there was the change of teams to make the dashes.

The teacher explained to the students how the game would be and made a simulation through the points and the Cartesian graph drawn on the blackboard. It also warned that the team that completed more squares would win, which would be identified with the acronyms of the corresponding groups (G1, G2, G3, G4, G5 and G6) that had managed to complete them. In addition, he pointed out that only one member of each group would go to the board to make the trace in the place chosen by the team, with the purpose of avoiding confusion by preventing all the students at once from going to the front of the blackboard to connect the two chosen points. At each round, a member of each team would only have the opportunity to make a dash between two points, except if in that same round the dash completed a square, because in that case the group would have the opportunity to make another vertical or horizontal stroke. After that, the member should return to his place, only for another member of another group, after discussing the strategy with his team, go to the blackboard and trace the chosen place. In addition, for each trace connected between two points on the graph, all members of the group would have to copy into their notebook the ordered pair identified in the coordinate of the Cartesian Plane (x, y), in which "the first number represents the value of the unknown x; The second number represents the value of the unknown y. This order needs to be respected. Hence the name **ordered pair**" (GIOVANNI JÚNIOR; CASTRUCCI, 2018, p. 148, authors' emphasis).

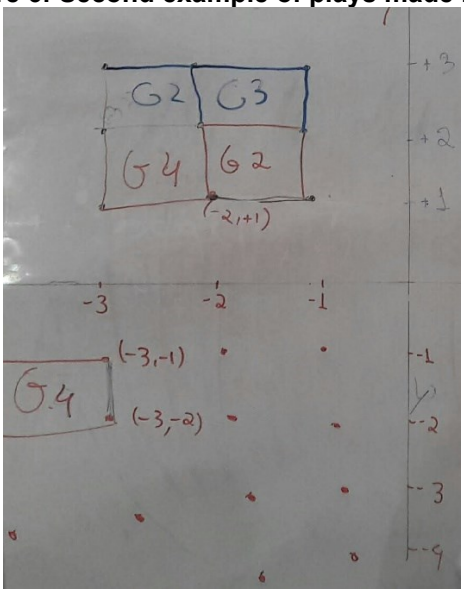
Figure 5: Examples of moves made by students.



Source: Photographic record made by the author.

Figure 5 identifies examples of moves performed by the students, verifying that group G2 has one point and G4, two.

Figure 6: Second example of plays made by students.



Source: Photographic record made by the author.

Note that there are coordinates presents in Figures 5 and 6. This is justified due to the fact that some students have doubts in recording such coordinates in their notebooks. To avoid being frequently called by the students with this type of doubt, the teacher chose to explain on the board how it would be the writing of some ordered pairs of points that were dashed by each team. For example: the ordered pair (-3, -1) indicates that the location of this point is directed with the -3 of the abscissa x and with the -1 of the y ordinate.

During the execution of the activity, it was verified that four students of the group that had more members, that is, the eight-member, were not effectively participating in the game. So the teacher asked why they didn't want to play. They justified that they had no interest. The teacher understood, since no one was obliged to play a game in which they did not want to participate, and stressed that they should stay there without disturbing the others.

As the teacher was as an observer and mediating the students who called him to solve doubts, he identified that the students were distressed thinking of strategies to complete the square and not to give the opportunity for other groups to complete first than theirs. The elaboration of strategy is one of the contributions that the application of activities with the use of games can develop to improve the cognitive reasoning of those who are playing (GRANDO, 2004). In addition, in particular, it also becomes essential to support mathematical learning.

Due to the short class time, the teacher changed the rules of the game, allowing at a certain point that each team, when it was going to make the ligament between the points, had the opportunity to perform two traits. So the game could end more quickly. As soon as this option appeared, students were completing more squares more quickly. Even so, the school siren sounded and the class was shut down before completing the entire game. In this way, the teacher mentioned to the teams that the winner was the one who completed the most squares and that in the next Mathematics class the information about what they had done/learned from the game would be discussed.

5 FINAL CONSIDERATIONS

In view of the discussions exposed on the theme of the games, it´s identified that such a pedagogical resource, when executed in an appropriate way, with the accomplishment of study, research and planning by the teacher, has the capacity to develop in those who play cognitive, affective, emotional and moral aspects (PIAGET, 2017), essential factors for the construction of the human being. In addition, it can also contribute to criticality, interaction, respect and elaboration of hypotheses and different strategies for the resolution of game situations (GRANDO, 2004).

The Mathematical activity developed by the teacher with the students of the class of the 8th grade of Elementary School through the game "Locating ordered pairs" had the purpose of fixing the object of knowledge concepts of Cartesian Plane, ordered pairs and location of their coordinates. From the observation and the moments in which the students

called the teacher to solve doubts about the coordinates of the game that were being copied in the notebook, it was possible to verify that the activity was of fundamental importance for the students to fix the mathematical concepts addressed in a fun and pleasurable way, that is, ludic.

In addition, it´s possible to highlight that, through the action of the game, the students became active agents in the construction of their knowledge, a moment in which they felt competitive when reflecting on their plays, seeking strategies to win the game, through the locations of the coordinates of the points dashed by them. The doubts that arose about the coordinates were remedied by the teacher whenever the students called him.

Therefore, it´s seen that the development of activities with the use of games becomes relevant to Mathematics classes, both for students to learn actively, differently and with more sense for themselves about the concepts addressed, as well as to demystify and solve the challenges they have to learn mathematical concepts. In addition, as stated by Grando (2004), the game can establish the interest of the student for the development of the activity, in this way, even for Mathematics.

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