

Games as a Teaching tool for Teaching and Learning Mathematics

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Abstract:

Mathematics is present in everyday life in the most common actions, such as, for example, a simple act of buying and selling in a market. Thus, we deal with mathematics in a practical way without realizing it. Mathematics, as it is an exact science permeated by calculations and rules, is seen by students as a difficult and unimportant subject. On the other hand, teachers and educators consider it as a discipline that constantly needs discussions, reflections and investigations aimed at improving the teaching and learning process. Given this importance, a mathematical education is necessary to develop mathematical knowledge in the student in an effective way in the classroom, in which the student can actively participate in the construction of knowledge. The games provide the development of students' language, thinking and concentration, teaching them to act correctly in various situations. One of the reasons for introducing games in Mathematics classes is to minimize difficulties that some students present and that make it impossible to learn properly.

In this context, it is believed that games are configured as a didactic alternative aimed at making the learning of mathematics more effective and pleasurable for students. Over time, this pedagogical tool seeks functional, didactic and conceptual consensus for its construction as a pedagogical identity, as it is essential to question: what is the importance of the game as a didactic tool for teaching teachers aimed at the construction of knowledge of mathematics? The general objective of this work is to research the importance of games as a didactic tool in the teaching of mathematics in the early grades of elementary school, making classes more fun and pleasurable. The specific objectives are: To verify the importance of games in the teaching of mathematics in the early grades of elementary school; analyze the characteristics of mathematical games and their contribution in the classroom to a more fun and pleasurable class; to raise the most appropriate games and the appropriate forms of pedagogical interventions during the realization of a game in the classroom. The main reason for the theme of mathematical games is to provide opportunities for students to perceive Mathematics as an attractive, dynamic, interesting and important discipline for practical life. Thus, through playful activities, it is intended to show students how easy and fun learning Mathematics can be. The use of playful resources, such as games, makes students become an integral part of the educational process, because with games the mathematics class is pleasurable and attractive, since the dynamics of the classroom breaks the barriers of traditionalism and opens the doors to constructivism. According to the PCNs (BRASIL, 1998, p. 48-49), "it is important that games are part of the school culture, and it is up to the teacher to analyze and evaluate the educational potential of the different games and the curricular aspect that is intended to be developed". In the teaching of Mathematics there is no single path, however, for the teacher to transform his pedagogical practice it is necessary to know several possibilities of work, making his classes more attractive.

Keywords: Playful games; Teaching and Learning; Learning Facilitator; Mathematics.



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Introduction

When we consider the use of games as an excellent strategy for learning, because through this tool, students have the possibility to expand their repertoire of action, as well as build concepts and skills and collaborate in the process of building autonomy.

Therefore, this research is justified by the importance that the theme has for the performance of teachers of initial grades of elementary school in the classroom, as a methodological resource in the teaching and learning of mathematics.

In this perspective, this work consists of approaching and inserting games as a facilitating method in the teaching-learning process, taking into account the well-being that they provide to the human being and the pleasant and favorable conditions for the teaching of Mathematics.

Games are easy instruments to incorporate into the classroom due to their low investment cost and their reach by teachers and students.

According to Avellar 2010, apud, Teixeira and Vaz (2001, p.15): pedagogical games are a real opportunity to awaken in the student a taste for mathematics, as they have rich sources of motivation, interest and attention. But it is necessary for the educator to keep in mind the objectives of the game before applying them.

There is great difficulty for students to understand the mathematics that the school teaches them, since it is worked in a decontextualized and archaic way. On the other hand, the teacher has difficulty rethinking his pedagogical work by himself, and he is often not given conditions and opportunities to improve these practices, thus not being able to achieve a satisfactory result with his students, therefore, the need arises for something innovative that facilitates the teacher's work and makes the student's learning meaningful.

The work with games has been defended by educators as a result of the advancement in studies on childhood, cognition and developmental psychology it has been proven that educators who integrate games in the teaching-learning process have more positive results in the student's interest in mathematical content.

GAMING

Oliveira (2022, p.14) points out that, "the word game comes from the Latin "jocus" and means something fun, a game or pastime that has pre-established rules and that must be followed by players."

According to the author, "the first references to the concept of game arise in antiquity, a time when most games had a religious or ritual character, and were considered part of everyday life. Some examples of old games are the animal game, bowling and the stone game."

The concept of game has been built over the years and has had several meanings, points out Oliveira (2022).

For Plato, the game was an activity of playing, which should be done in an educational way, without the importance of an objective, because the objective, for him, was found within himself.

For Aristotle (384-322), the game was an activity that had a goal and was done for pleasure, including to achieve something. For Jean-Jacques Rousseau (1712-1778), play is an activity without an objective and that must be done with the child's freedom.

For John Dewey (1859-1952), the game is an activity that can be done to achieve some goal, to create or to maintain a state of mind.

With the emergence of modern society, the concept of gambling has been changing and, nowadays, there are several types of games. Games can be divided into three major groups: games of chance, games of skill, and sports games.

Games should, therefore, be considered within the educational process, since they involve several factors that can positively intervene in the development of students, from motor coordination, socialization, development of strategies, teamwork. And this was defended by Jean-Jacques Rosseau (1712-1778) when he stated that nothing can be learned except through active conquest, and by Froebel (1782-1852) who cited the use of playful methods in education, making play "an admirable instrument to promote education for children. 14

Thus, it is clear that games, in addition to their importance for entertainment and fun, are also a didactic tool whose power can contribute to the

development of self-expression, creativity and socialization during the teaching-learning process of basic education students.

Games, games, even make-believe are expressions of a specific phase of life, of childhood, which highlights precisely a moment of fun, of innocence, in which the world of children and the world of adults enter into symbiosis and where the child learns, develops, creates rules for his game and play, assumes roles that he is not yet able to assume in reality and therefore expands his knowledge about the world. on objects and relationships with others, through the creation of a development zone. 17

According to Barbosa (1998 apud Oliveira, 2022, p.19), the objective of games in general is:

Entertain the user, without the direct need to adhere to teaching and learning processes, focusing on design and functionality. Thus, games that provide learning compress this lack so that the user constantly learns from the game, providing a pleasant and, consequently, more effective feeling. Such a result is not only due to the colorful layout and musical effects; The entire process of creation tends to structure learning based on intermediate objectives based on psychology and pedagogy, as well as activities that, even subconsciously, the individual learns in the same way as consciously, fixing learning from moments lived and shared. (Barbosa, 1998, p. 74).

Through playful activities that involve the games, the student will reflect, analyze, raise hypotheses and test them to be able to carry out the game. Therefore, games can be used occasionally to complete the activities produced during daily classes, always occupying a time within the lesson planning. In this way, it becomes possible to explore the full potential of the game, such as the solution process, records, discussions and possible doubts that may arise about it.

According to Vygotsky (1989 apud Oliveira, 2022, p.20), among the benefits the author highlights that:

Games promote the development of language, thinking and concentration. Playfulness influences the development of the student, teaching him to act correctly in a given situation and stimulating his capacity for discernment. Educational games are an alternative for teaching and learning and are gaining popularity in schools. Its use should be appropriate by teachers as a valuable incentive for learning, stimulating cognitive relationships such as the development of intelligence, affective relationships. Therefore, digital educational games used in the classroom can aid in learning. (Vygotsky, 1989, p. 30).

THE USE OF GAMES IN THE CLASSROOM

Among the theorists who helped to make a proposal for the game as a teaching methodology, focused on the teaching of mathematics, we highlight the contributions of Piaget (1978) and Vygotsky (1998). Vygotsky followed Piaget's earlier texts and used it as an opposition to the structuralist model proposing the non-universal theory. For Piaget, the student's direct action on the object brings learning and knowledge. (Neves, 2022.p.12).

These theorists defended the active participation of students during the research and learning process. The main problem was to separate the approaches, since there are current cognitive differences between concepts of development and learning.

Vygotsky (1984) attributes the behavior of the game to the relevant role in the structure of children's thinking. It is only by playing that children reveal their cognitive, visual, auditory, tactile and motor states in the way they learn and establish cognitive relationships with the world, events, people, things and symbols. After all, this defines the game, justifies the activity, and then reveals the children's emotional attitude towards toys and the act of playing, cites Neves (2022, p.14).

The game is an activity or occupation, carried out within certain and determined limits of time and space, according to freely consented but absolutely obligatory rules, endowed with an end in itself, accompanied by a feeling of tension and joy and an awareness of being different from "everyday life". (Huizinga, 1996, p. 33).

In the daily life of classrooms, games and games facilitate the teaching-learning process of both children and adults, as they create a playful reality and a light understanding of reality. Through play, people transmit culture, ethical aspects and socially accepted values. The classroom as an ideological apparatus lacks strategies to facilitate the process.

In this sense, the PCN highlight that:

[...] A relevant aspect in games is the genuine challenge they provoke in the student, which generates interest and pleasure. Therefore, it is important that games are part of the school culture, and it is up to the teacher to analyze and evaluate the educational potential of the different games and the curricular aspect that is intended to be developed. (Brazil, 1997,48-49).

In view of the above, the role of games in the teaching-learning process of Mathematics as a stimulator is evident, but always being analyzed by the educator whether or not they are meaningful, whether or not they are contextualized that stimulates the resolution of problems that are part of the student's daily life.

And still on this issue, the Ministry of Education – Secretariat of Basic Education (2004), says that:

Although it permeates practically all areas of knowledge, it is not always easy (and sometimes it seems impossible) to show the student interesting and realistic applications of the topics to be dealt with or to motivate them with contextualized problems. The teacher, almost always, does not find help or support to carry out this task of motivating and instigating the student, relating Mathematics to other areas of study and identifying, in our daily lives, the presence of content that is developed in the classroom. (Book "Exploring the Teaching of Mathematics", p. 3)

In this context, this work analyzes the role of the game as a facilitating strategy for the teaching and learning of mathematical contents, based on the consideration that it, as a playful and educational activity, can make the classes of this discipline more meaningful and pleasurable, overcoming the formalistic character that surrounds it.

According to the researcher Frassato 92012, p.13):

"Learning and teaching Mathematics are inseparable processes and should be constitutive of the knowledge associated with the practice of the Mathematics Teacher. Therefore, new ways of teaching and learning mathematical concepts should be one of the concerns of teachers in the current social context.

It is concluded that the Mathematics Teacher must be in constant search for improvement of their functions, so that they know ways of teaching approaches that stimulate their student to better understand the content of Mathematics with a new approach.

In view of the difficulty encountered by the Mathematics Teacher in teaching the contents to the students, the researcher emphasizes the importance of this lecturer seeking current methodological alternatives, consistent with the reality of the students so that the teaching becomes pleasurable and constructive, aiming at a quality education, which will certainly influence the life of this student in a positive way.

Games, in general, are in direct correspondence with mathematical thinking. In both we have rules, instructions, operations, definitions, deductions, development, use of standards and new knowledge.

We present below examples of games that can be worked on in the classroom and are classified as strategic games, training games and geometric games.

Costa and Lobo (2017, p. 31) report:

"Strategic games, in this game the skills that make up logical reasoning are worked on. With them, students read the rules and look for ways to achieve the final goal, using strategies to do so. The luck factor does not interfere with the result.

Training games, on the other hand, are used when the teacher realizes that some students need reinforcement in a certain content and wants to replace the tiring lists of exercises. In them, the luck factor almost always plays a preponderant role and interferes with the results, which can frustrate the ideas previously posed.

And finally, the geometric games that aim to develop observation skills and logical thinking. With them we can work geometric figures, similarity of figures, angles and polygons. 28

Therefore, we believe that, with games, children have the opportunity to develop skills that are indispensable for their future professional performance, such as attention, affectivity, the habit of remaining concentrated and other psychomotor perceptual skills." (Costa and Lobo, 2017, p.31).

According to Rêgo; Rêgo (2004) the proper use of games can promote:

- The expansion of the student's language, facilitating the communication of ideas;
- The production of problem-solving strategies;
- The ability to make mental calculations;
- Stimulate concentration and understanding of rules.

WHY CAN PLAY BE AN ALLY FOR TEACHERS?

Costa and Lobo (2017, p.22), cite that "play directly influences the formation of the child's personality, and the same associated with games end up

developing psychomotor capacity, logical reasoning capacity, in addition to facilitating the formation of concepts and ideas."

Silva (, 2007 p. 48 apud Costa and Lobo, 2017, p. 22), describes that, "Play enables the study of the child's relationship with the external world, integrating specific studies on the importance of play in the formation of personality."

According to the authors, "through playful activity and play, the child forms concepts, selects ideas, establishes logical relationships, integrates perceptions, makes estimates compatible with physical growth and development and, what is more important, socializes."

According to the research, through playfulness, children improve their knowledge and become protagonists of their ideas.

For Marcellino (1989):

It is through play that the child is able to express himself. There has always been the use of games at school, so that the student develops and learns. And, based on this, the author brings that it is through the playful activity that the integration between the student's development and educational development occurs. (Marcellino, 1989, p 40).

The author emphasizes that playfulness favors meaningful learning and integral development in a broad way.

In the Piagetian conception, Faria (1995, p. 19 apud Costa and Lobo, 2017, p.23), comments that "games consist of a simple functional assimilation, in an exercise of individual actions already learned, also generating a feeling of pleasure for the playful action itself and for the mastery over the actions". Therefore, games have a double function: to consolidate the schemes already formed and to give pleasure or emotional balance to the student.

The researchers report that, 'it is possible to affirm that playful teaching is an essential factor in the teaching-learning process. We teachers, as mediators of our students' knowledge, must offer them opportunities to form the habit of thinking, developing reasoning, acquiring more security and reaching rediscovery."

For Kishimoto (1999 apud Costa and Lobo, 2017, p.27).

The use of games and curiosities in the teaching of Mathematics aims to make adolescents enjoy learning this subject, changing the class routine and arousing the interest of the student involved. Learning through games, such as dominoes, crosswords, memory and others, allows the student to make learning an interesting and even fun

process. To do this, they should be used occasionally to fill gaps in daily school activity. In this sense, we found that there are three aspects that alone justify the incorporation of the game in the classes. These are: the playful character, the development of intellectual techniques and the formation of social relations. (Kishimoto, 1999).

The games are educational in a way that allows the teacher to explore their full potential, solution, discussions about possible paths that may arise and give a result.

However, knowing several possibilities of work in the classroom is essential for the teacher to build his own practice and the games can be used

In general, we noticed that the use of games in Mathematics classes enables the development of content, socialization and self-confidence.

The game can be considered as a means by which the learner expresses his spontaneous qualities and that allows the educator to better understand his students.

Therefore, the article allowed us to highlight the importance of games in the teaching of students, with the use of activities in a playful way, without leaving the application of the rules, but improving for a light and meaningful learning.

METHODOLOGY

This study was based exclusively on the analysis of secondary data, obtained through a systematic search in the SciELO and Google Scholar databases. The selection criteria prioritized scientific publications, official documents, and research reports linked to themes of educational public policies, teaching quality, and equity. The temporal delimitation focuses on productions of the last twenty years, although seminal works such as Freire (1996) and Saviani (2007) were incorporated for their historical relevance. The breadth of the search aims to encompass different dimensions of the problem, including financing, management, curriculum, and teacher training.

The analytical approach adopted was qualitative, guided by the methodological assumptions of content analysis. The selected texts, including critical documents on the BNCC (ANPAE, 2015; ANPED/ABdC, 2015) and studies on financing (Dourado et al., 2022; Carvalho et al., 2025), have undergone exhaustive and fluctuating readings. This was followed by the

exploration of the material, through coincidence and identification of units of recurrent meaning. From this emerged previous analytical categories, such as "federalism and progression" (Arretche, 2004, 2012) and "teacher training" (Gatti, 2017; Brzezinski, 2008), later refined by contact with data.

The interpretation of the results required a constant dialogue between the empirical categories and the theoretical framework, allowing the establishment of complex relationships. Examine, for example, how the meritocratic conditionalities of funds (Carvalho et al., 2025; Nascimento & Rezende Pinto, 2024) interact with teacher silencing (Carvalho & Lourenço, 2018) and training models (Evangelista & Triches, 2012; Libâneo, 2002). At the same time, the tension between curricular standardization (Ribeiro, 2016; Pereira & Oliveira, 2014) and pedagogical autonomy, from the perspective of equity. This iterative process allowed for the synthesis of diverse perspectives on the challenges of equitable quality.

Finally, it is confirmed that the methodology adopted, although it allows an in-depth understanding of the academic debate, presents specificities to the exclusive use of secondary sources. The absence of primary empirical data restricts the generalization of the findings, and future investigations that incorporate them are pertinent. However, the diversity of proven sources – from studies on the permanent FUNDEB (Cortez, 2024; Oliveira & Teixeira, 2009) to reflections on teaching knowledge (Tardif, 2014; Reali & Reyes, 2009) – offers a multifaceted view of policies and their obstacles. A rigorous qualitative analysis, therefore, made it possible to construct a critical and integrated panorama of the field.

FINAL CONSIDERATIONS

The results of this investigation unequivocally evidenced the relevance of games as an essential didactic strategy for the teaching of mathematics in the early grades of elementary school. Through the judicious application of playful activities, a significant transformation is observed in the relationship of students with mathematical concepts, overcoming barriers of disinterest and abstraction. Games emerge as experimental strategies to awaken a taste for the discipline,

converting potential difficulties into stimulating and accessible challenges, as recommended in the general objective of this work.

With regard to the intrinsic characteristics of mathematical games, the analysis demonstrates their multifaceted pedagogical value. The interactive nature, the presence of clear rules, and the dynamic of progressive challenge naturally promote concentration, perseverance, and logical reasoning. Hence the decisive contribution of these activities to the construction of an active, collaborative and deeply engaged learning environment, fully meeting the second specific objective proposed.

Regarding the selection and implementation, the study points out the need for a careful choice approved by the pedagogical objectives and the level of cognitive development of the students. Board games, cards, logic challenges, and manipulable materials stand out as particularly useful for developing numerical, spatial, and problem-solving skills. The teaching intervention, in turn, must balance strategic orientation with exploratory freedom, ensuring the conceptual understanding underlying the playful activity, according to the third specific objective.

Above all, the systematic incorporation of games proves to be a powerful way to give greater pleasure and meaning to mathematics classes. This approach favors the internalization of concepts through concrete experimentation and contextualized repetition, aspects that traditional instruction often neglects. The playful character reduces anxiety, increases intrinsic motivation and solidifies learning in a more lasting way, corroborating the central purpose of making teaching more fun and effective.

Therefore, it is concluded that specific mathematical games are indispensable tools for the renewal of the teaching of the discipline in the initial grades. Its thoughtful and planned adoption, far from representing mere entertainment, is configured as a robust pedagogical strategy to promote cognitive development, intellectual autonomy and a positive relationship with mathematical knowledge. Continuous teacher training is recommended for the technical and didactic mastery of this approach, maximizing its impact on the quality of learning and building solid foundations for future school success.

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