



A BRIEF REPORT ON TEACHING MATHEMATICS AND THE USE OF PLAY GAMES

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ABSTRACT:

The use of playful games in the school environment as a teaching tool has been discussed by several authors, especially the teaching of mathematics discussed here. The teaching of mathematics required of the teacher a didactics, use of different teaching strategies and demands an analysis of the pre-existing knowledge of the student since it is necessary to follow the stages of learning. By adopting games as a pedagogical tool, the teacher allows not only the learning of mathematics but also the development of the interactionist aspect that involves the game. Thus, this study presents a brief review of aspects related to the importance of students' developmental stages for learning to occur, as well as studies that highlight the use of games and their playful aspects in the teaching process. Highlighting how and at what times this learning can take place. According to the bibliographic references consulted for the elaboration of this study, the notes referring to the use of games in the context of the teaching of mathematics contribute positively so that the learning and the whole process involved in it present results according to the established by the agents involved in it.

KEYWORDS:

MATHEMATICS TEACHING, GAMES, PLAYFUL.

INTRODUÇÃO

Teaching mathematics to students in basic education has been a great challenge for teachers so that the traditional methods used have been a barrier to student learning.

We know that mathematics is present in almost every moment of our life, from simple to complex situations in everyday life. We can see that the learning difficulty in mathematical content is evident for the vast majority of students.

For the learning of mathematical concepts to occur it is necessary that the student has established the fundamental skills for this teaching, specifically the learning related to mathematics, which involves abstract content, symbols, reasoning, attention, among others, these being determining factors for learning, not just mathematics, but general academic skills.

The teacher when choosing to use the traditional teaching model, which requires the student to reproduce what was passed, often leads students to failure. We observed, according to Miranda and Pinheiro (2016), that the teaching of mathematics usually uses traditional methods as a basis that highlight the use of numerous lists of exercises based on repetitions, which has little favored in the development of learning from the students of basic education today.

Contrary to what is recommended by traditional methods, according to BNCC (BRASIL, 2017), educational systems must use different pedagogical tools

as a didactic resource for teaching mathematics

... such as checkered meshes, abacuses, games, calculators, spreadsheets and dynamic geometry software, it is important to include the history of mathematics as a resource that can arouse interest and represent a significant context for learning and teaching mathematics. However, these resources and materials need to be integrated into situations that encourage reflection, contributing to the systematization and formalization of mathematical concepts (*our translation*) (BRASIL, 2017, p. 256).

The use of various teaching tools favors the process of reflection and action, on pedagogical strategies, and must be in constant concern about how the student learns, and how to build the learning path. The teacher should include in his didactic routine, new tools, and new teaching strategies to achieve good results. One of the strategies used that can favor student learning is the use of games as a teaching tool, since it involves, includes, and facilitates the construction of knowledge.

GAME AND THE LUDIC PROCESS IN LEARNING

Many discourses are observed in educational environments about the use of playfulness and games to favor the construction of learning, however, this use often ends up randomly without a reflection, pedagogical strategy, or well-defined objectives that are sought to achieve when using this strategy.

The epistemological concepts that will be addressed here will be guided by Vygotsky's studies with his interactionist concepts and Piaget with his constructivist approach so that we can dialogue with the child's development processes in playful environments that aim at students'

learning.

Initially, Vygotsky (2010) highlights the importance of social interaction in the development of the concepts necessary for further learning, so that functions such as attention, verbal thinking, logical memory are built on the relationships that occur during the interactions of the subjects.

Its content now determines not only the children's actions about to with concerning the object but also their relationships in the face of other participants in the game. The latter (the other participants) also become content of the ludic activity, and in them get fixed the reason for the game. What distinguishes the games are the different actions relative to other people and that becomes the main thing (*our translation*) (VYGOSTSKY, 2010, p. 135).

In this way, we can observe that when suggesting that students can play games in groups, we favor not only the mathematical concepts but the interactions that these moments offer to the subjects participating in this action, with the playful as the motivator of this action.

However, when we observe that playfulness occurs from the relationship created between children and their commitment during the game, it must be for the child: fun, pleasurable, and motivating so that it can awaken the real playful sense of the game in the individual involved.

Again Vygotsky (2010) points out that contact with the other allows learning to be favored through human learning, in which the development of each one's learning stands out, naming it as a zone of real development, the zone of proximal development and zone of potential development, having at school several possibilities to develop the functions that have not yet been established, since in the school environment we find the diversity of subjects.

According to Kishimoto (2011) based on Vygotsky, this author highlights that the playful process occurs at the time the game process and playing become pleasurable for the child, a factor that favors the teaching and learning process, emphasizing that the characteristic of playfulness will not always appear during the realization of a game. Thus, the author points out that the game has playful and educational functions, and it is necessary to maintain the balance between these two functions so that the objective proposed by the teacher can be achieved without ceasing to be playful.

In the same line of thought as Kishimoto, Macedo, Petty, and Passos (2005) describe that playfulness occurs at the moment of the construction of the child's relations with the object or activity that awakens a pleasure in the child's execution with interest and participation in the process that it involves the moment.

When analyzing the constructivist theory of learning advocated by Jean Piaget, knowledge is built up through experiences and interaction with the stimuli received, that

is, we can relate the student's learning with its phases of the stages of development, these stages being responsible for their learning.

For Piaget (2010) the developmental stages are divided into four stages that determine the capacities in which the child is found that is established since birth. The advancement of the stages of development and knowledge in the subject occurs whenever the subject is faced with actions in which Piaget calls it assimilation, balance, and accommodation.

Within this aspect of the development of the subject's learning process, Piaget (2010) presents the game as a tool for this learning to occur in a meaningful way, respecting the stage in which the student is.

The game is, therefore, under its two essential forms of sensory-motor exercise and symbolism, an assimilation of the real to the activity itself, providing it with its needs and transforming the real into the multiple needs of the "I". For this reason, active methods of educating children require that children be provided with all the necessary material, so that, by playing, they will come to assimilate the intellectual realities that, without this, remain outside child intelligence (*our translation*) (PIAGET, 2010, p. 99).

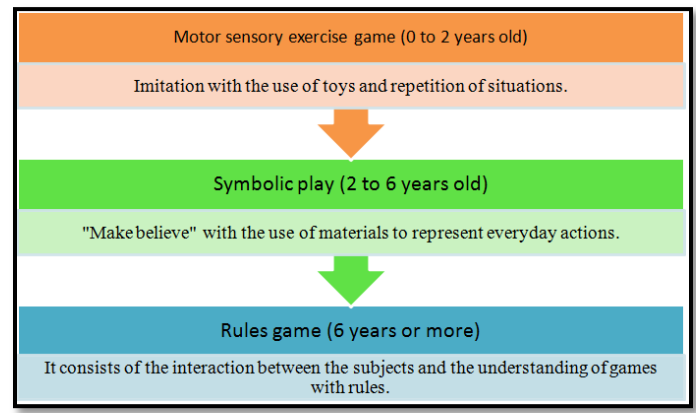
In this perspective, the game process proposed by Piaget shows the need to know the development stages so that from this aspect the necessary tools can be offered so that the development related to learning can be obtained.

According to Piaget (2010) and his epistemology, the game has three modalities that fit into the stage of development to which the subject is inserted, this division he calls: exercise games, symbolic games, and games of rules.

For the author, the child develops according to the stage of cognitive development, and it is not possible for the child to progress from the stage without being well established in the stage in which she is cognitively.

In Figure 1 we can understand what happens and when the child's developmental stages occur.

FIGURE 1. STAGES OF THE GAMES ACCORDING TO PIAGET.



Source: Adapted from Piaget (2010).

The relationships presented about the descriptions of the stages, as well as having knowledge about which stage your student is in is related to the success of the activity proposed by the teacher, as well as which interventions can be performed. For Muniz (2016), the relationship of learning with the use of games is largely related to the attitude that the teacher adopts in the use of games as a ludic resource for the theme addressed, since for him only the use of games to teach certain concepts does not enable effective learning, but all the system that involves this process, such as the interaction between peers, the mediation of the teacher, the observation of how much the game it was playful for students and other possibilities.

Meanwhile, for school it is important to observe if the items covered are being arranged within this possibility of playfulness, these being highlighted within the game.

Kishimoto (2011) highlights two functions that are inherent to the presence of the game in education, being the ludic and educational functions, so when proposing the use of games for teaching, it is up to the teacher to balance these two factors so that one does not stand out from the other.

The balance between the two functions is the aim of the educational game. However, the imbalance causes two situations: there is no more teaching, there is only play, when the ludic function predominates or, conversely, when the educational function eliminates all hedonism, only teaching remains (*our translation*) (KISHIMOTO, 2011, p. 19).

The role of games and how it will be developed by the teacher must consist of planning, organization, and knowledge of the subjects who will participate in this action by the teacher.

To use this tool effectively, the definitions of the terms playfulness and game must be clear so that the teacher can establish what the real intentionality of this practice is.

According to Rau (2013, p. 47) the term playful

it refers to the actions of play that manifests itself throughout human existence, presenting leisure characteristics and manifesting itself as a form of expression of human evolution. This is because games and games change from generation to generation, reflecting social changes. Adding that the ludic manifests itself through the game, the toy and the play terms that conceptually present differences. (*our translation*)

It is observed that the author describes that the playful, the game and the play are different concepts, the playfulness occurs within the game or the play since the meaning of the game and play are different once the game establishes rules to be followed that can only be changed in common agreement between the players and thus the game is defined with something more flexible and passive of changes according to those involved.

According to Luckesi (2005), the playful process within the context of school learning must be guided by five principles that will indicate the favoring of this approach within the learning aspect, being that they must be pleasant, challenging, create possibilities, symbolic dimensions and be constructive and present relationships with the student. It is observed that games are not always presented as playful activities.

The role of the game and the understanding of the playful situations that it can provide during school activities exposed by the authors mentioned in the text are important for the teacher so that he can have an understanding of the stages in which he goes through as well as the system that involves the student development.

CONCLUSION

When analyzing the literature presented by the theoreticians mentioned in this study, in order to substantiate the contribution of the use of games to the teaching of mathematics and to relate it to students' learning, we can highlight the importance of these studies to guide the work developed by teachers in schools and thus trace a line that relates to the student's development process and from that knowledge establish the strategies that will be applied in order to obtain satisfactory results.

In this way, the current practices to which the use of games are applied often without establishing reflective criteria and methods, can be replaced by scientifically based strategies for the game, so that it can contribute to mathematical learning.

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