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The Game as a Pedagogical Resource in Mathematics Teaching

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SUMMARY

This article reports the results of a pedagogical intervention through the adaptation of traditional games to reinforce basic operations with natural numbers in third-grade elementary school students. This activity arises as an alternative process through which a ludic-didactic approach is offered to awaken students' interest and motivation in a subject that historically has been labeled as difficult, boring and far from reality. In addition, it is expected to provide teachers with various didactic resources for their teaching practice. The proposal is based on developing complementary activities against the day in a collaborative work context. The results showed the interest shown by the students in work done when they are offered a format different from the conventional one, reporting improvements in the speed of response in mental arithmetic while reducing the level of errors when solving additive or multiplicative situations.

Keywords: Mathematics teaching, didactics, motivation, traditional games.

INTRODUCTION

In Colombia, it is common to see children in the streets, neighborhoods and schoolyards having fun with an important diversity of traditional games that are seen in any country, depending on the culture developed in each of these, although with some or other differences as in their name or design, in the end, they pursue the same essence (Gamboa, 2019; Peñaranda et al., 2019).

According to Pérez (1997), an important flow of popular games is generated in neighborhoods and schoolyards, which constitutes a real treasure given the massive use of ICT resources in children and adolescents (Ortega et al., 2019). Such is the playful production configured from the practice associated with the forms of imagination that many of these games encouraged in this way, come to be transmitted from generation to generation until they become cultural heritage.

A diversity of traditional games are present in different social contexts, but educational centers are the main scenarios where they are part of everyday life, so they are applied as recreational activities during break times or as a motivating means in the classroom because the game is part of man's nature and a

way of learning (Ramírez et al., 2020). On the other hand, Calero (2003) affirms that in many schools, the value of passive, domesticating and alienating learning prevails; importance is not given to integral and permanent education (Contreras et al., 2019).

The traditionalist school assumes that teaching children should be applied by teachers with rigidity, blind obedience, criticality, passivity and absence of initiative (Rojaso & Del Rosario, 2020). Moreover, because of logo-centrism, sometimes play is forbidden, admitted only during break time. Therefore, games are a useful strategy in the learning processes in the classroom because they can be adapted to any content, awakening the students' attention and allowing the understanding of concepts and the development of competencies.

Although, in general, traditional games are adaptable in the learning processes, the context of their application, the age of the children, the space and material to be used must be taken into account according to what is going to be done, especially experiential and discovery learning (Prada et al., 2021). One of the areas to which the game is most adapted is in the area of Mathematics and Exact Sciences since if an analysis is made of the characteristics in the development of these fields, the learning of numerical relationships, geometric relationships and problem-solving can be highlighted (Hernández-Suárez et al., 2017; Trujillo et al., 2019; Patiño et al., 2021).

According to studies by the Organization for Economic Cooperation and Development (OECD, 2016), the 64 countries participating in the Program for International Student Assessment (PISA) indicates that Latin America is below global standards of school performance in areas such as Natural Sciences, Mathematics and Language, of which Peru, Colombia, Brazil and Argentina are among the ten countries whose students have a low level in these areas of training. According to the report (OECD, 2016), it is deduced that these low scores in schools in Latin America are part of the lack of training of students, but also of teachers (Gamboa et al., 2018; Cifuentes & Villa-Ochoa, 2018; Montes Miranda et al., 2018; Gamboa-Suárez, 2016).

According to García-Quintero & Villamizar (2017), the problems of the context and the need shown by students in the compression of mathematics become the primary need to propose a ludic-academic strategy for the teacher to appropriate tools such as traditional games to strengthen their teaching.

Approach to the concept of play

Espinoza and Espinoza (2005) point out that play is a free action or occupation which takes place within certain temporal and spatial limits, according to absolutely obligatory rules, although freely accepted, an action that has its end in itself and is accompanied by a feeling of tension and joy and the awareness of being otherwise in everyday life.

The concept of play has been applied in different situations to explain recreational functions, motor development and even the cognitive level of a person; this term is not new, since through time and according to each author represents an important action in the life of the human being from the development of their functions for adult life as their cognitive development according to their multidimensional development and as a free and spontaneous activity or occupation.

Regarding the characteristics of play, Díaz (2002) affirms that play is a liberating space; it has no material interest, it develops in an orderly manner, the game manifests regularity and consistency, and it has limits that the plot itself establishes and is self-promoting. Similarly, the author states that other characteristics of the game manifest as a fantasy-made reality, a reproduction of reality in the plane of fiction. It is expressed in time and space, without being an absolute fiction, in which individual or group roles are assumed; it is evolutionary and, of course, a form of communication.

Caillois (1996) points out that the game is an activity that has rules but is characterized by being accessible; no one can force you to play, it is a voluntary decision that separates the daily life in a specific space and time, it is uncertain because it is not determined, unproductive because it does not create goods or wealth outside the game, when it ends, things start again as the first time.

Play and cognition

Piaget (1956, cited in Blanco, 2012) relates play to his cognitive theory, showing it as an activity that favors the development of knowledge by associating it in such a way to its three basic structures with the evolutionary phases of human thought: play is simple exercise (similar to anima); play is symbolic (abstract, fictitious); and play is regulated (collective, the result of a group agreement) (Gómez, 2020).

Each stage implies consistency and harmony of all cognitive functions at a certain level of development (Vanegas et al., 2022). However, it also implies discontinuity, a fact that each successive stage is qualitatively different from the previous one, even considering that elements of the previous stage can be built and incorporated during the transition from one stage to another. Piaget (1956, as cited in Blanco, 2012) divides cognitive development into four stages: the sensorimotor stage (from birth to two years), the preoperational stage (from two to six years), the operational or concrete stage (from six or seven years to eleven years) and the stage of formal operational thinking (from about twelve years onwards).

Piaget (1961, as cited in Llull & García, 2009) argues that rule games will integrate and combine all acquired skills: sensorimotor combinations (running, throwing, among others) or intellectual (chess) with the addition of competitiveness (without which the rule would not be helpful) and under the regularization of a normative code linked to the nature of the game itself or by simple punctual and improvised pacts. The rule that Piaget sustains results from the collective organization of ludic activities.

Subiza (1993), on the other hand, shows a different perspective on the types of games, which are seen in everyday life as traditional games that pass from generation to generation and become famous but do not only become a home or leisure activity. Piaget (1956, as cited in Blanco, 2012) relates them to his theory of multidimensional development to understand the type of game that can be applied according to each person. In this proposal, Piaget contributes not only to the theory of multidimensional development to know according to their age what type of game can be applied, but also the skills that the regulated game develops, thus giving the possibility of applying the types of games proposed by Subiza (1991) as an innovative alternative in education.

Play and teaching in mathematics.

This aside, the game's importance in teaching science and mathematics is reaffirmed. In this sense, important studies such as those conducted by López (2018) conclude that.

The teacher must assume the teaching of mathematics from playful didactic strategies, which impact, motivate and make knowledge more accessible to the student, ensuring the understanding of mathematical concepts and principles for their application in everyday life. (p. 68).

On the other hand, Morales and Villa (2019) propose a very interesting tool and call it role-playing for teaching mathematics; this tool uses playful activities based on the role-playing system and makes the learning process attractive. Furthermore, collaborative work is encouraged where the members solve fictitious situations established by the teacher where topics from the areas of Science and Mathematics are addressed.

A more concrete aspect of the Mathematics teaching framework is the development of different mathematical thoughts (Hernández- Suárez et al., 2017; Albarracín et al., 2020; Albarracín-Villamizar et al., (2020). In this sense, Aristizábal et al. (2016) demonstrate that mathematics acquires a new meaning for the student based on a new methodological strategy such as the game. The authors make an essential recommendation as a result of this research and point out that,

The teaching of mathematics in these times of change must reflect on the conventional didactic methods used in the classroom, and seek to transform the teaching-learning process and the way in which teachers and students access knowledge. (p. 136).

It is important to point out that there is a wide range of studies and theories showing the benefits of games in the teaching of mathematics with novel strategies such as the crossword puzzle (Medina & Delgado, 2020), mental games (Rodríguez, 2020) and traditional games (Tenesaca-Simancas et al., (2022).

METHOD

The process followed for the development of this research begins with the approach to an educational institution (EI from now on) of public nature characterized by having students in all grades with different levels of academic performance around the subject of mathematics. The IE assesses student performance on a scale of zero to five and identifies three levels of performance under the following scale: a) low performance for grades below 3.0; b) medium performance for grades between 3.0 and 3.9; c) high performance for scores greater than or equal to 4.0.

The population consisted of 31 students in third grade in the morning session during the year 2022. Based on the grades obtained by the students at the end of the first academic period of the year, the group could be divided into three subgroups associated with the performance levels defined in the previous paragraph, where 42% of them show medium performance, followed by low performance and approximately one out of every five students shows high performance.

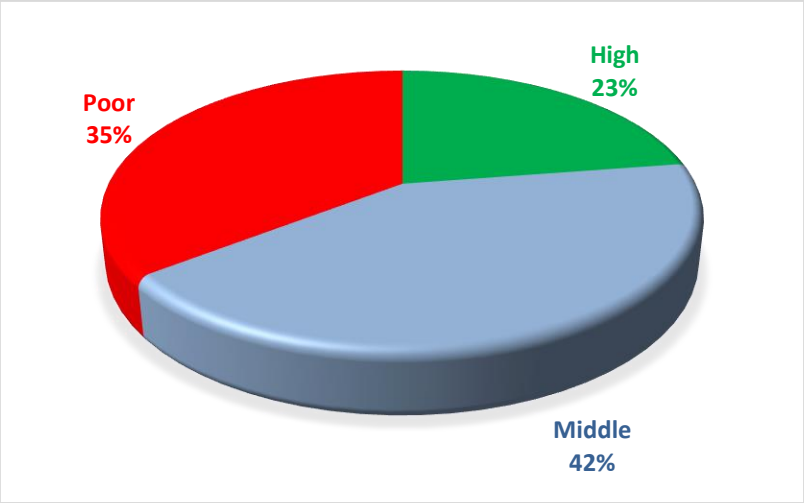

Figure 1. Percentage distribution of students by academic performance.Once the members of each academic performance group were identified, they were informed that they would be part of an academic experiment that implemented two reinforcement strategies during the following three weeks, dedicating one hour each day to this activity. It was explained to them that one strategy consisted of the development of reinforcement workshops of additive and multiplicative operations with natural numbers (Method 1), while the second strategy was only mentioned to them; that it was a novel strategy associated with the game, but demanded a little more work (Method 2).

Students voluntarily selected the methodology in they would like to develop. It is highlighted that students with extreme performance (High and Low) opted for Method 2, which they only knew was different from the traditional, in contrast to those with Medium performance who preferred the already known teaching method. Table 1 shows that 48% of the students selected the traditional reinforcement methodology, while the remaining 52% were inclined to Method 2. The inclination manifested by the students in the selection of the teaching methodology is consistent with Quintanilla (2020), who recognizes the role of the teacher in the teaching process together with the game as a motivating element:

[...] it can be said that the teacher is the first to use novel strategies in the teaching of mathematics. Thus, the most appropriate methodology for teaching elementary school children is play. (p. 147)

Table 1. Disaggregation of the population according to students' level of academic performance by methodology.

Performance	Population	Method 1	Method 2
High	7	2	5
Medium	13	9	4
Under	11	4	7
Total	31	15	16

Once the students defined each methodology, they executed them in separate classrooms. Both methods used cooperative work; that is, groups of three students were organized, guaranteeing (if possible) one student's participation in each performance per group. In method 1, three workshops were developed, distributed as follows: one only for addition with one and two digits, another for multiplication with one digit, and the last one for the resolution of arithmetic polynomials where operations were combined.

Method 2 resorts to the application of three traditional board games known as the ladder, parquets and dominoes; in which some variants are incorporated to enhance mathematical competence in students.

The staircase

This game consists of the players starting from the same point to reach the goal, which is the position marked with the number 100. Along the way, the players have a series of options, among which are: to stay in the same position for one turn; to advance directly to 2, 4, 6 or 10 positions; to return to 3, 5, 7 or 11 positions. In order to advance in the course, each participant must roll two dice (whose faces have between one and six points), and add the points of the top face obtained on each die to advance those positions starting from the player's current position. The game ends when the player reaches the finish line with the exact number of points. The game then includes a variant in which a third die is incorporated where half of its faces are marked with the addition sign and the other three faces with the multiplication sign; in this way the participants can apply the addition or multiplication operator between the points obtained. Finally, in case of being six or fewer points away from the goal, the player rolls a die leaving out the other two data (regular and operations).

The stock exchanges

It is a Colombian game derived from Spanish Parcheesi, in which between two and six people can play. Each player has four pieces with which he/she must go through the whole path consisting of 17 positions per color or pinto; that is to say, the board has a total of 103 positions that must be covered in their entirety to enter their zone of protection in which to crown each piece must additionally advance ten more positions. The game is played by throwing two dice with which the sum of their points on the upper face determines the number of positions to be covered. In order to start the base path, the player must first obtain the same number of points on both dice so that if it is one and six, all the chips are released, while if another pair of numbers different from these two options falls, a maximum of two chips are released. As in the ladder, a third die marked on equal sides with the addition and multiplication symbols is added so that players are expected to advance more quickly if the multiplication operator is obtained on the operator die. When the player is left with only one piece and needs six points or less to finish the game, he/she rolls only one die; otherwise, he/she plays with the three dice.

Dominoes.

It is a game that uses rectangular chips divided on one side into two squares, each containing the same number of dots as a die, with the idea of aligning two sides with the same number of dots. The original game contains 28 counters, but the one used in this activity has 50 counters to ensure that each playing team has ten counters. Due to the objective pursued in this work, a variant was applied to the dominoes, which is why it has been called arithmetic dominoes. On one side, a natural number less than or equal to 100 was placed, while on the other half, arithmetic polynomials were proposed in which the operations of addition and multiplication were combined. The game starts with the team that selects the largest number on the face of the card; then, they place the first card, which the other teams must match by turning clockwise and matching the operation of a card with its respective answer on the face of another card. When a team has no matches, it must give up its turn and the team with no tiles or the least number of points wins in case the game is closed.

Each competition group had a different leader each week who assumed direct participation in the game and had two advisors whose function was to support the realization of the operations; in each game, they had to register if they reached the answer through direct mental calculation or the realization of operations in a notebook. The games were organized sequentially according to their degree of difficulty, first being the Parcheesi, followed by the ladder and ending with the arithmetic dominoes, starting with two dice and then playing a game with the operations dice. Each time a team won, a point was added.

At the end of the three weeks and without prior notice, all the students in the course were given a knowledge test containing ten items: 30% of additional exercises, 30% of multiplication exercises and the remaining 40% of arithmetic polynomials. For each participant, the time taken to solve the test, the method that predominated in the test, the score, the time taken to solve the test, the method used in the test, and the score were recorded, and obtained according to the number of correct answers and a question in which they had to score from zero to ten the level of pleasure they experienced during the three weeks of pedagogical intervention.

Based on the above, it is recognized that this research adopts a quantitative approach at a descriptive correlational level (Hernández et al., 2018), where through the determination of some descriptive the research tried to demonstrate the benefits of the incorporation of these games as a didactic resource for reinforcement, through the monitoring of a field design. The SPSS v25 software was used for data processing.

RESULTSTable 2 shows that there is a slight predominance of the male gender within the group of participants in the research, with a predominance of 8 years in a range of 7 to 9 years, which is evidence to recognize that there are no overage students in this group.**Table 2**. Cross-tabulation of age and gender of participants

	Genre		Total
Age	**Female**	**Male**	
7 years	10%	6%	16%
8 years	32%	39%	71%
9 years	3%	10%	13%
Total	45%	55%	100%

This research starts from an academic motivation based on the Basic Standards of Competence for the area of Mathematics (Mineducación, 2006) in third grade, where the student is specifically expected to: a) solve and formulate problems in additive situations of composition and transformation; b) solve and formulate problems in situations of proportional variation; c) use diverse strategies of calculation and estimation to solve problems in additive and multiplicative situations.

Table 3 below shows the results obtained by each student according to the reinforcement methodology used. **Table 3.** Results derived from the application of the knowledge test.

N°	Method 1				Method 2			
	Weather	Process	Score	Pleasure	Weather	Method	Score	Pleasure
1	33	Manual	0	3	22	Mental	7	7
2	332	Manual	7	1	23	Mental	10	10
3	34	Manual	7	7	24	Mental	10	10
4	36	Manual	0	7	22	Manual	9	10
5	39	Manual	0	2	17	Mental	8	7
6	31	Manual	1	1	22	Mental	7	8
7	34	Manual	6	5	18	Mental	10	9
8	30	Manual	3	5	16	Mental	9	8
9	37	Manual	6	2	28	Mental	6	10
10	31	Manual	5	7	18	Manual	7	10
11	30	Manual	3	4	22	Manual	6	9
12	32	Manual	4	00	15	Mental	7	9
13	35	Manual	7	2	25	Mental	5	9
14	32	Manual	3	2	17	Mental	9	9
15	37	Manual	7	3	27	Mental	8	9
16					19	Manual	7	9

Table 4 shows that the group of students under the intervention of Method 1 used the algorithmic process to obtain the solution to each situation. In contrast, the students under Method 2 preferred mental calculation as a solution alternative, without disregarding the fact that some preferred the algorithmic process.Table 4. Comparison of the predominant process used by the students to solve the exercises according to the methodology used.

		Process		Total
		Algorithmic process	**Mental arithmetic**	
Methodology used	Traditional	48%		48%
	Traditional games	13%	39%	52%
Total		61%	39%	100%

Additionally, for each student, the time taken to solve the test was determined (they had a maximum of 40 minutes), the score or grade obtained, together with the level of pleasure, liking or satisfaction experienced in the development of the pedagogical intervention. Finally, due to the quantitative nature of these parameters, a box-and-whisker plot was used to determine whether or not significant differences were observed in these values for each methodology used.

Given that the box-and-whisker diagrams shown in Figure 2 do not overlap, it can be inferred that there are significant differences between the solution times required by the students in the knowledge test

according to the reinforcement methodology strategy employed; evidencing less solution time in the students who were under the methodology that employed traditional games as a didactic resource, with the recognition that the time employed by this group of students was more varied than that employed by the other group.

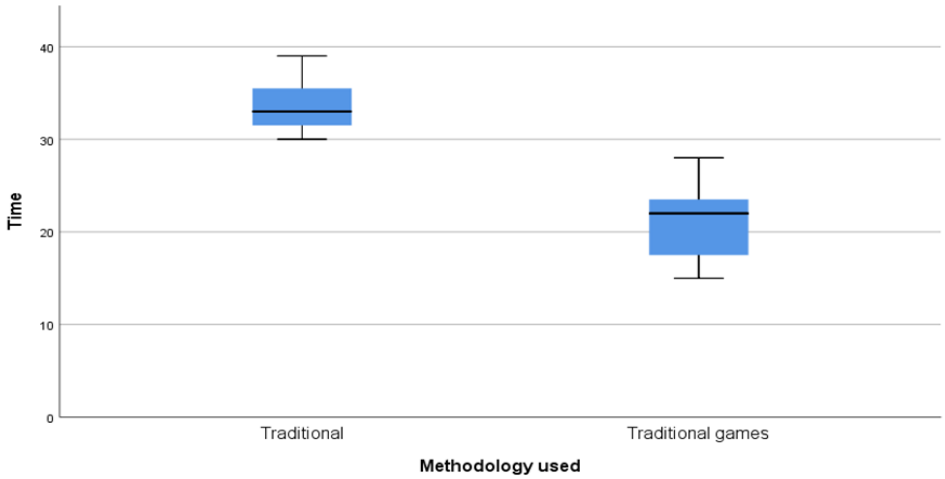

Figure 2. Comparison of time spent according to preparation method.

Analogous to what was mentioned in the previous figure, Figure 3 shows that there are no statistically significant differences between the scores obtained by the students based on the reinforcement method used, but despite this, the students who were under Method 2 showed less dispersion and better results in their test scores.

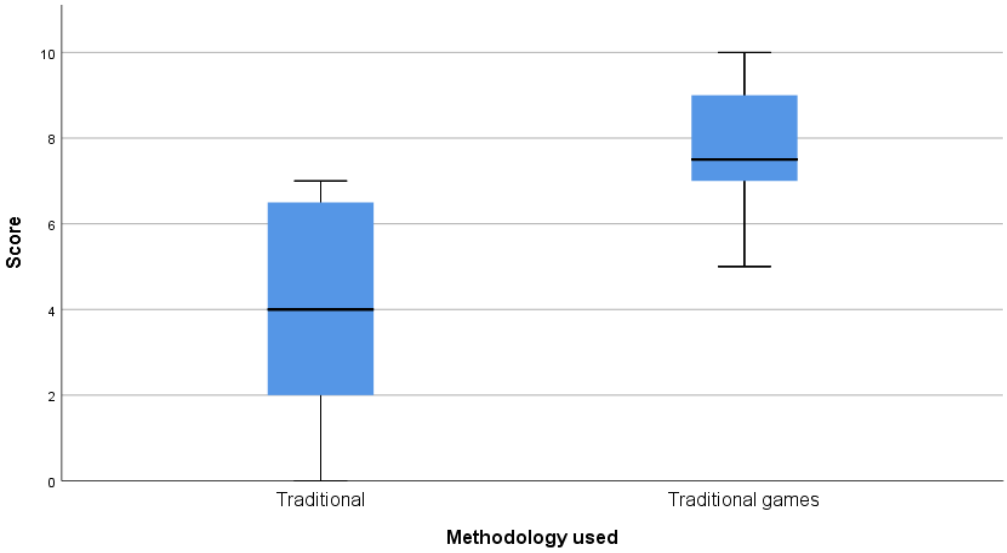

Figure 3. Comparison of the rating achieved according to the method of preparation.

Continuing with the comparison of the parameters obtained from the two methods used, it can be inferred that the students working under the methodology that used traditional games were more comfortable, satisfied, and happy compared to the students who worked under the reinforcement

process of the traditional model.

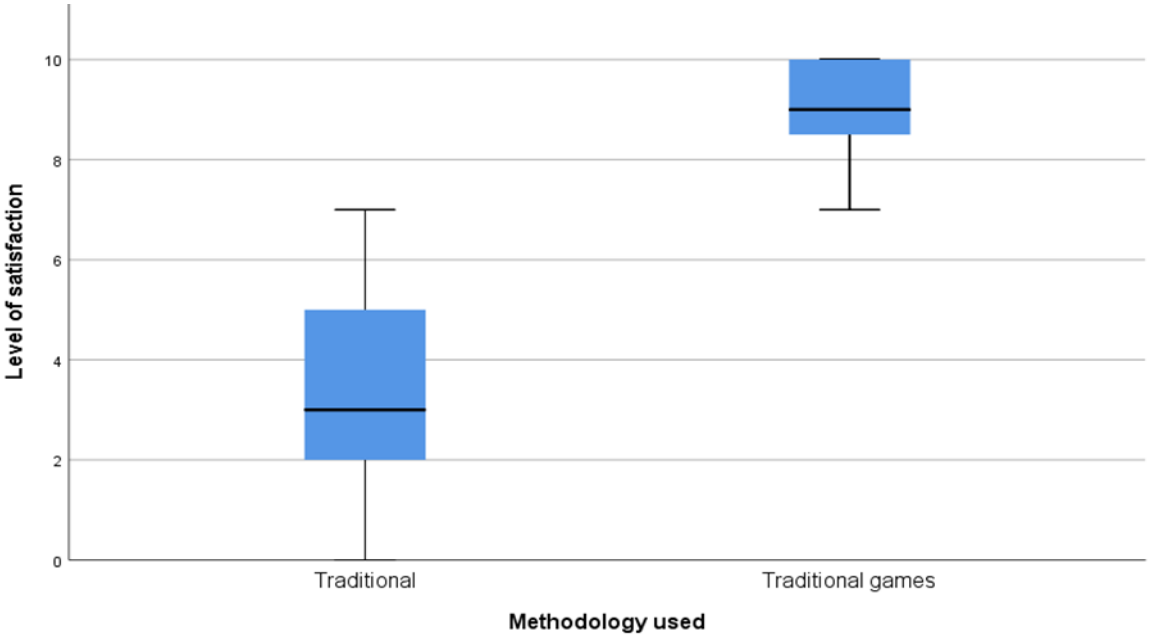

Figure 4. Comparison of the level of satisfaction achieved by the method of preparation.

Regarding the relationship that should exist between the school as a training center for children and play as a didactic resource, Nieto (1990) affirms that:

The school must favor the elaboration of experiences and the transmission of knowledge, with the possibility of actively applying it. Thus, the ability to act means to solve present, future, real and imaginary situations, for which play is an ideal instrument (p. 114).

The same author advances in her analysis by highlighting the typology of games, recognizing their contribution to the educational process. Although, in the case of this research, each of the games implemented is located within the category of rule games, characterized by being "proper to the world of logic and tend to focus on rational thinking" (Nieto, 1990, p. 115), then with the sessions developed the students were not only reinforcing the competences in arithmetic thinking but also contribute to the development of logical thinking, so essential in the solution of problems or situations in context.

Then the teacher plays an essential role in the teaching process; it requires a teacher with different competencies than being a simple transmitter of information; it requires a teacher who assumes the challenge of becoming more competitive every day in his or her work role, as mentioned by Matos (as cited in Quintanilla, 2020):

The teacher is a mediator, not in a declarative way; in fact, he/she must assume the challenge of being involved in the construction of knowledge in the classroom. Within the integrative pedagogical praxis, the teacher's role must be perceived as a promoter of learning, a motivator and a sensitive. (p. 146).

In this same line of argument, Chacón & Fonseca (2017) recognize the importance of the proper choice of games that teachers take to the classroom since it must be a very delicate process since the games lead to

Motivate the student with attractive and recreational situations; develop skills and abilities; invite and

inspire the student in the search for new paths; break with the routine of mechanical exercises; create in the student a positive attitude towards the rigor required by the new contents to be taught; review some mathematical procedures and use them in other situations; including students with different abilities in the teaching-learning process; develop positive habits and attitudes towards school work and stimulate individual qualities such as self-esteem, self-worth and confidence. (p. 15).

Additionally, since the activities were developed in work groups, the benefits derived from collaborative work, as referred by Guerrero et al. (2018), can also be highlighted:

[...] collaborative work as a didactic strategy contributes to the development of communicative and social interaction skills and competencies in students; they also maintain that the construction of knowledge is expanded to the extent that students have spaces to share ideas, experiences, sources of information and learning, mediated by social interaction and communication, fundamental aspects within the integral formation of the learner. (p. 962).

The positive results of this pedagogical process give merit to the combination of several aspects, such as a didactic strategy that awakened the interest and motivation of the students, a work environment in which they supported each other, and a guiding teacher who motivated the students to work autonomously.

CONCLUSIONS

The traditional game as a strategy in mathematics teaching may be considered innovative for many teachers, but very few really take its importance and the time to execute it as a strategy that is not simply reactive but an element to teach.

Creativity has great relevance in education since it has no limit when it is taught, the game potentiates creativity and in this way, students can learn in a meaningful way and their highly complex vision of mathematics can change from a playful look, without leaving, of course, the rigor that the area demands.

In the same way, it is important to point out that playfulness in the teaching of different areas provides important insights into teacher training, from the use of manuals for traditional games as a learning strategy in the area of mathematics in elementary school, in which students' interest is awakened while concepts are reinforced.

REFERENCES

Albarracín, C. Z., Hernández, C. A., & Rojas, J. P. (2020). Objeto virtual de aprendizaje para desarrollar las habilidades numéricas: una experiencia con estudiantes de educación básica. *Panorama, 14*(26), 111–133. https://doi.org/10.15765/pnrm.v14i26.1486

Albarracín-Villamizar, C. Z., Hernández-Suárez, C. A., & Prada-Núñez, R. (2020). Objetos de aprendizaje y desarrollo de habilidades del pensamiento numérico: Análisis mediante un diseño cuasiexperimental. *Aibi Revista De investigación, administración e ingeniería, 8*(3), 131-137. https://doi.org/10.15649/2346030X.725

Aristizábal, J., Colorato, H. & Gutiérrez, H. (2016). El juego como una estrategia didáctica para desarrollar el pensamiento numérico en las cuatro operaciones básicas. *Sophia, 12*(1), 117-125. https://doi.org/10.18634/sophiaj.12v.1i.450

Blanco, V. (2012, 12 de noviembre). *Teorías de los Juegos: Piaget, Vigotsky, Groos*. https://actividadesludicas2012.wordpress.com/2012/11/12/teorias-de-los-juegos-piaget-vigotsky-kroos/

Caillois, R (1996). *Teoría de los Juegos.* Barcelona: Editorial Seis Barral.

Calero, M. (2003). *Juego de crianza: el juego corporal en los primeros años de vida.* Buenos Aires: Editorial Biblios.

Chacón, J. A., & Fonseca, L. Á. (2017). Didáctica para la enseñanza de la matemática a través de los seminarios talleres: juegos inteligentes. *Rastros y rostros del saber*, *2*(1), 10-26.

Cifuentes, W., & Villa-Ochoa, J. (2018). Características de los modos de pensamiento matemático en profesores de matemáticas. *Revista Espacios*, *39*(10), 6-23.

Contreras, J. V., Ramírez, X., & Hernández, V. K. (2019). Factores que influyen en el desempeño escolar de los estudiantes de Básica Primaria de una institución educativa del área metropolitana de Cúcuta. *Revista Perspectivas*, *4*(1), 6–13. https://doi.org/10.22463/25909215.1746

Díaz, F. A. (2002). *Estrategias docentes para un aprendizaje significativo*. México: McGraw-Hill.

Espinoza, M., & Espinoza, M. C. (2009). Johan Huizinga (1872-1945): Ideal caballeresco, juego y cultura. Konvergencias: *Revista de Filosofía y Culturas en Diálogo*, (21), 3-18.

Gamboa, A. (2019). Tradiciones y problemas de la investigación educativa. En C. Chévez & J. Melengue (Eds.), *Tendencias y desafios de la investigación educativa: aproximaciones teóricas y metodológicas* (pp. 25 – 33). INFOD.

Gamboa, A., Hernández, C., & Prada, R. (2018). Práctica pedagógica y competencias TIC. *Saber, Ciencia y Libertad*, *13*(1), 258-274. https://doi.org/10.18041/2382-3240/saber.2018v13n1.2090

Gamboa-Suárez, A. A. (2016). Docencia, investigación y gestión: Reflexiones sobre su papel en la calidad de la educación superior. *Revista Perspectivas*, *1*(1), 81-90. https://doi.org/10.22463/25909215.973

García-Quintero, C., & Villamizar, G. (2017). Análisis fenomenológico de la conciencia del docente a partir de sus prácticas evaluativas. *Revista Perspectivas*, *2*(2), 49-59. https://doi.org/10.22463/25909215.1313

Gómez, J. A. (2020). *Transformaciones curriculares en la educación superior en América Latina*. Editorial FEDICOR.

Guerrero, H., Polo, S., Martínez, J., & Ariza, P. (2018). Trabajo colaborativo como estrategia didáctica para el desarrollo del pensamiento crítico. *Opción*, *34*(86), 959-986.

Hernández, R., Fernández, C., & Baptista, P. (2018). *Metodología de la investigación*. México: McGraw-Hill Interamericana.

Hernández-Suárez, C. A., Prada-Núñez, R., & Gamboa-Suárez, A. A. (2017). Conocimiento y uso del lenguaje matemático en la formación inicial de docentes en matemáticas. *Revista de Investigación, Desarrollo e Innovación, 7*(2), 287–299. https://doi.org/10.19053/20278306.v7.n2.2017.6071

Hernández-Suárez, C. A., Prada-Núñez, R., & Ramírez-Leal, P. (2017). Obstáculos epistemológicos sobre los conceptos de límite y continuidad en cursos de cálculo diferencial en programas de ingeniería. *Revista Perspectivas*, *2*(2), 73-83. https://doi.org/10.22463/25909215.1316

Llull, J., & García, A. (2009). *El juego infantil y su metodología*. España: Editorial Editex.

López, M. (2018). 4. El juego como estrategia didáctica para la enseñanza de la matemática en educación especial. *Revista Educare*, *21*(2), 70-90. https://doi.org/10.46498/reduipb.v21i2.65

Medina, N., & Delgado, J. (2020). El Crucigrama como estrategia para la enseñanza y aprendizaje de la matemática universitaria. *CienciAmérica*, *9*(1), 11-33.

Montes, A. J., Ramos, D. M., & Casarrubia, J. L. (2018). La formación de maestros en Colombia: alcances y limitaciones. *Revista Espacios*, *39*(10), 6-23.

Morales, R. & Villa, C. (2019). Juegos de rol para la enseñanza de las matemáticas. Education in the Knowledge *Society, 20.* https://doi.org/10.14201/eks2019_20_a7

Nieto, M. (1990). El juego como recurso didáctico: una reflexión educativa. Tabanque: *Revista Pedagógica*, (6), 113-122.

Organización para la Cooperación y el Desarrollo Económicos. (2016). *La educación en Colombia. Aspectos Destacados 2016*. https://www.oecd.org/education/school/Educacion-en-Colombia-Aspectos-Destacados.pdf

Ortega, I. M., Rincón, G. A., & Hernández, C. A. (2019). Uso del video como estrategia pedagógica para el desarrollo de la competencia escritora en estudiantes de educación básica. *Revista Perspectivas*, *4*(2), 52–63. https://doi.org/10.22463/25909215.1972

Patiño, K. N., Prada, R, & Hernández, C. A. (2021). La resolución de problemas matemáticos y los factores que intervienen en su enseñanza y aprendizaje. Revista *Boletín Redipe*, *10*(9), 459–471. https://doi.org/10.36260/rbr.v10i9.1453

Pérez, A. (1997). *Recreación y fundamentos teóricos metodológicos.* México: Instituto Politécnico Nacional.

Peñaranda, A. M., Prada, R., & Gamboa, A. A. (2019). Juego y enseñanza de las Matemáticas: Reflexiones teóricas para el trabajo de aula. *Revista Perspectivas, 4*(2), 80–84. https://doi.org/10.22463/25909215.2459

Prada, R., Hernández, C. A, & Avendaño, W. R. (2021). Gamificación y evaluación formativa en la asignatura de matemática a través de herramienta web 2.0. *Revista Boletín Redipe*, *10*(7), 243–261. https://doi.org/10.36260/rbr.v10i7.1361

Quintanilla, N. Z. (2020). Estrategias lúdicas dirigidas a la enseñanza de la matemática a nivel de educación primaria. *Mérito-Revista de Educación*, *2*(6), 143-157.

Ramírez, L., Gómez, J., Batanelo, L., Chica, F., Marin, J. & Tuay Sigua, R. (2020). *La calidad de la educación en el laberinto del siglo XXI: aportes desde el proyecto de investigación sobre incidencia del enfoque pedagógico en la calidad de la educación.* Fundación Universitaria Juan N. Corpas. Centro Editorial. Ediciones FEDICOR.

Rodríguez, D. (2020). *El impacto de los juegos mentales para el aprendizaje de las matemáticas.* https://www.normaldesaboya.edu.co/images/publicaciones/pintando_escuelas_version_final.pdf#page=55

Rojas, R. R., & Del Rosario, E. (2020). Aplicación de la resolución de problemas de Pólya en el estudio de ángulos en estudiantes de cuarto grado del nivel secundario. *Revista Perspectivas*, *5*(2), 6–12. https://doi.org/10.22463/25909215.2823

Subiza, M. J. (1993). Algunos juegos tradicionales en el valle de Esteríbar. *Cuadernos de etnología y etnografía de Navarra*, *25*(62), 271-278.

Tenesaca-Simancas, M. C., Auccahuallpa-Fernández, R., & Ávila-Mediavilla, C. M. (2022). Juegos tradicionales para el aprendizaje de Matemática en niños de Educación Intercultural Bilingüe. *Revista Arbitrada Interdisciplinaria Koinonía*, *7*(1), 287-303.http://doi.org/10.35381/r.k.v7i1.1790

Trujillo, J. A., Vera, C. L., & Saraza, D. F. (2019). Ingeniería didáctica como recurso metodológico para el aprendizaje de los conceptos de límite y continuidad. *Revista Perspectivas, 4*(1), 39–47. https://doi.org/10.22463/25909215.1758

Vanegas, J., Gamboa, A., & Gómez, J. (2022). *Perspectivas epistemológicas en el locus de las Ciencias Cognitivas*. Jotamar.