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"PLAYFUL MATHEMATICS: A REFLECTION ON ITS PRESENCE IN THE CLASSROOMS OF THE LAS TABLAS DISTRICT"

"MATEMÁTICA LÚDICA: UMA REFLEXÃO SOBRE SUA PRESENÇA NAS SALAS DE AULA DO DISTRITO DE LAS TABLAS"

"MATEMÁTICA LÚDICA: UNA REFLEXIÓN SOBRE SU PRESENCIA EN LAS AULAS ESCOLARES DEL CORREGIMIENTO DE LAS TABLAS"

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ABSTRACT

This research examines the use and perception of playful mathematics in elementary schools in the Las Tablas district of Panama, an area lacking systematic studies on the topic. Using a mixed-methods approach (surveys, interviews, and classroom observations), the study collected data from 50 teachers and a group of students from Presidente Porras and Claudio Vásquez schools. The findings show an overwhelmingly positive perception of playful mathematics. Teachers and students believe that games and interactive activities not only make learning mathematics more engaging and fun, but also improve the understanding of complex concepts. The study highlights that 94% of teachers observe improved academic performance in students who participate in these activities. Similarly, a large majority of students report that playful activities improve their enjoyment of class and make them more engaged. Despite positive feedback, the article identifies implementation challenges, such as the risk of student distraction from the game and resource and time constraints. The results suggest that, while the methodology is present, its effective implementation requires a careful balance between the game and the educational content. The study concludes that gamified strategies are an effective and well-received pedagogical tool that could benefit from increased teacher training and resources to optimize their impact on mathematics learning.

Keywords: Playful Mathematics. Methodological Strategy. Implementation. Teaching. Games. Teaching Resources.

RESUMO

Esta pesquisa examina o uso e a percepção da matemática lúdica em escolas de ensino fundamental no distrito de Las Tablas, no Panamá, uma área carente de estudos sistemáticos sobre o tema. Por meio de uma abordagem de métodos mistos (pesquisas, entrevistas e observações em sala de aula), o estudo coletou dados de 50 professores e um grupo de alunos das escolas Presidente Porras e Claudio Vásquez. Os resultados mostram uma percepção predominantemente positiva da matemática lúdica. Professores e alunos acreditam que jogos e atividades interativas não apenas tornam o aprendizado da matemática mais envolvente e divertido, mas também melhoram a compreensão de conceitos complexos. O estudo destaca que 94% dos professores observam melhora no

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desempenho acadêmico dos alunos que participam dessas atividades. Da mesma forma, a grande maioria dos alunos relata que as atividades lúdicas aumentam seu prazer nas aulas e os tornam mais engajados. Apesar do feedback positivo, o artigo identifica desafios de implementação, como o risco de distração do aluno do jogo e as restrições de recursos e tempo. Os resultados indicam que, embora a metodologia esteja presente, para que a matemática lúdica seja implementada de forma eficaz, é crucial encontrar um equilíbrio entre o jogo e o conteúdo educacional, algo que merece atenção especial. O estudo conclui que estratégias lúdicas são uma ferramenta pedagógica valiosa e bem recebida que poderia se beneficiar de maior treinamento de professores e mais recursos para aumentar seu impacto na aprendizagem da matemática.

Palavras-chave: Matemática Lúdica. Estratégia Metodológica. Implementação. Ensino. Jogos. Recursos Didáticos.

RESUMEN

Esta investigación examina el uso y la percepción de la matemática lúdica en las escuelas primarias del corregimiento de Las Tablas, en Panamá, un área que carece de estudios sistemáticos sobre el tema. A través de un enfoque de métodos mixtos (encuestas, entrevistas y observaciones de clase), el estudio recopiló datos de 50 maestros y un grupo de estudiantes de las escuelas Presidente Porras y Claudio Vásquez. Los hallazgos muestran una percepción abrumadoramente positiva de la matemática lúdica. Los maestros y los estudiantes consideran que los juegos y las actividades interactivas no solo hacen que el aprendizaje de las matemáticas sea más atractivo y divertido, sino que también mejoran la comprensión de conceptos complejos. El estudio destaca que el 94% de los maestros observan un mejor rendimiento académico en los estudiantes que participan en estas actividades. Del mismo modo, una gran mayoría de los estudiantes informa que las actividades lúdicas mejoran su disfrute de la clase y los hacen más comprometidos. A pesar de las opiniones positivas, el artículo identifica desafíos para la implementación, como el riesgo de que los estudiantes se distraigan con el juego y las limitaciones de recursos o tiempo. Los resultados indican que, aunque la metodología está presente, para que la matemática lúdica se implemente de manera efectiva, es crucial encontrar un equilibrio entre el juego y el contenido educativo, algo que merece mucha atención. El estudio concluye que las estrategias lúdicas son una herramienta pedagógica valiosa y bien recibida, que podría beneficiarse de una mayor capacitación para los docentes y de más recursos, con el fin de potenciar su impacto en el aprendizaje de las matemáticas.

Palabras clave: Matemática Lúdica. Estrategia Metodológica. Implementación. Enseñanza. Juegos. Recursos Didácticos.

1 INTRODUCTION

With the implementation of playful mathematics as a methodology, the aim is to improve the learning process of mathematics and transform it into a dynamic, fun and attractive experience for students, through the use of games, activities and didactic resources that contribute to stimulating creativity, critical thinking and problem solving.

In recent years, the implementation of Playful Mathematics in school classrooms has gained relevance as part of innovative teaching strategies for the teaching of mathematics. In the village of Las Tablas, located in the province of Los Santos, there has been an increase in motivation for the incorporation of Playful Mathematics in the teaching activity. However, there is a lack of a systematic study that explores the use of the methodology in school teaching in this region.

1.1 STATEMENT OF THE PROBLEM

In the educational context, the teaching of mathematics has been, most of the time, concerned with the exposition of content through the use of expository methods, giving priority to memorization, algorithmic calculation, which sometimes does not make sense, and the repetition of procedures. However, studies such as that of (Gutiérrez, 2025) suggest how traditional approaches to mathematics teaching can be demotivating due to their emphasis on memorization and lack of contextualization. It is in this sense that game mathematics is emerging as a novel pedagogical strategy that aims to make the process of learning mathematics as pleasant and interesting as possible.

In the case of the township of Las Tablas, despite the growing interest of teachers in the use of game mathematics, there is no evidence of a systematic study that investigates its prevalence and the impact it has on the classroom in the region. This gap in the literature is what this research aims to address, and it has a particular relevance to frame the challenges and possibilities given in this context, since it will allow for a solid pedagogical reflection and align the practice with the real needs of the learners.

Given this analysis, the following research questions can be raised:

- What is the level of implementation and frequency of use of playful mathematics in mathematics classes in primary schools in the township of Las Tablas?
- What is the perception of teachers and students about the use of playful mathematics in the classroom, including its advantages, disadvantages and challenges for its implementation?

- What impact does playful mathematics have on the learning of mathematics, the motivation and commitment of students in the schools of this township?

1.2 JUSTIFICATION

Mathematics is a fundamental discipline that develops logical thinking and problem-solving skills. However, the traditional mechanistic and rote approach has contributed to disinterest and poor performance in this area, especially at the basic levels. UNESCO (2019) has pointed out the need to rethink the way mathematics is taught, promoting active and inclusive methodologies. In the village of Las Tablas, despite the growing interest in playful mathematics, there is no systematic study that analyzes its presence and impact in the classroom. Therefore, this research is crucial to identify barriers and opportunities in the school context of the region, allowing us to reflect on pedagogical practice and adapt it to the real needs of students.

1.3 OBJECTIVES

The general objective of this research is to analyze the presence of Playful Mathematics in the school classrooms of the township of Las Tablas. To this end, the following specific objectives are established:

- To determine the frequency with which teachers use playful strategies in their mathematics classes.
- Explore teachers' and students' perceptions of playful mathematics, including its advantages, disadvantages, and challenges.
- Evaluate the impact of playful mathematics on student learning.

2 THEORETICAL FRAMEWORK

2.1 TEACHING MATHEMATICS IN SCHOOL CONTEXTS

Mathematics is a fundamental discipline within the school curriculum, as it develops logical thinking, problem solving and the ability to abstract students. However, it has traditionally been taught from a mechanistic and rote approach, focused on the repetition of decontextualized procedures and exercises. This situation has contributed to the lack of interest and low performance in this area, especially at the basic levels of education. According to UNESCO (2019), it is necessary to rethink the way in which Mathematics is taught, promoting active, inclusive and meaningful methodologies.

2.2 PLAYFUL APPROACH IN THE TEACHING OF MATHEMATICS

The playful approach in the teaching of Mathematics involves the use of games, dynamics, recreational activities, manipulatives and didactic situations that allow the student to learn in an active and participatory way. Playfulness, understood as a natural way of learning in childhood, favors motivation, interest and a deep understanding of mathematical concepts. Piaget (1952) and Vygotsky (1978) agree that play is an important means for cognitive development, since through it the child experiences, constructs and transforms his reality.

According to Farias and Rojas (2010), playful learning in Mathematics promotes a positive attitude towards the subject, strengthens logical-mathematical skills and favors collaborative work. In addition, it allows the inclusion of different learning styles and adapts to the individual rhythms of the students.

Benefits of Playful Mathematics in the classroom

Including playful strategies in mathematics teaching has multiple benefits:

- It stimulates critical and creative thinking.
- It improves the emotional disposition towards learning.
- It allows abstract knowledge to be consolidated through concrete experiences.
- It encourages the autonomy and active participation of the student.

In addition, playful mathematics is compatible with the competency-based approach, as it allows the comprehensive development of cognitive, communicative, social and attitudinal skills.

Challenges and realities in the school context of Las Tablas

In the township of Las Tablas, as in many other regions of Panama, traditional practices persist in mathematics teaching. Despite the curricular and training recommendations, the use of playful strategies is still limited. Factors such as the lack of teacher training, the rigidity of the curriculum, the pressure for academic results and the scarcity of teaching resources condition the effective incorporation of playfulness in the classroom.

Therefore, reflecting on the presence (or absence) of playful mathematics in the classrooms of this township allows us to identify barriers and opportunities to transform pedagogical practice, adapting it to the real needs of the students.

Theoretical approaches that support Playful Mathematics

- **Constructivism**: According to Piaget (1952), knowledge is actively constructed, and play allows the child to manipulate and explore the environment, facilitating this construction.
- **Socioconstructivism**: Vygotsky (1978) states that learning occurs in interaction with others. Collaborative games allow learning in the zone of proximal development.
- **Didactics of Mathematics**: From this perspective, authors such as Brousseau (1986) highlight the importance of creating didactic situations that favor cognitive conflict, discovery and reflection, elements present in playful activities.

3 METHODOLOGY

The present research was carried out using a mixed-methods approach, combining quantitative and qualitative elements to obtain a comprehensive and multifaceted understanding of the use of playful mathematics in the township of Las Tablas, in Panama. This approach allowed not only to quantify the prevalence of certain practices and perceptions, but also to delve into the experiences and reasons behind the numerical data. The study focused on the town's primary schools.

For data collection, three main techniques are applied: surveys, interviews, and class observation.

- **Surveys:** A survey was applied to a sample of 50 primary level teachers. The participants had between 5 and 20 years of teaching experience and belonged to the Presidente Porras and Claudio Vásquez schools. The surveys are designed to assess teachers' perceptions of the use of playful strategies in mathematics teaching. Questions were included on frequency of use, perception of benefits in academic performance and understanding of concepts, and implementation challenges, such as lack of resources or time.
- **Class Observation:** Observations of mathematics classes were carried out to directly document how playful activities are implemented in the classroom. This allowed the researchers to analyze the alignment of activities with learning objectives, the level of student engagement, and the overall classroom environment. Specific dynamics such as ball throwing games with table questions, multiplication bingo and activities with pictures and paint were documented.
- **Interviews:** Semi-structured interviews were conducted to obtain a deeper insight into the perceptions and experiences of both teachers and students. The interviews with

the teachers allowed us to identify strengths and areas for improvement in their pedagogical methods. A representative sample of 30 students out of a student population of 850 was interviewed to explore their specific feelings, experiences, and examples related to the use of games in their math classes. The interviews with students focused on the frequency of the activities, their perception of the effectiveness of the games for learning, and their overall enjoyment.

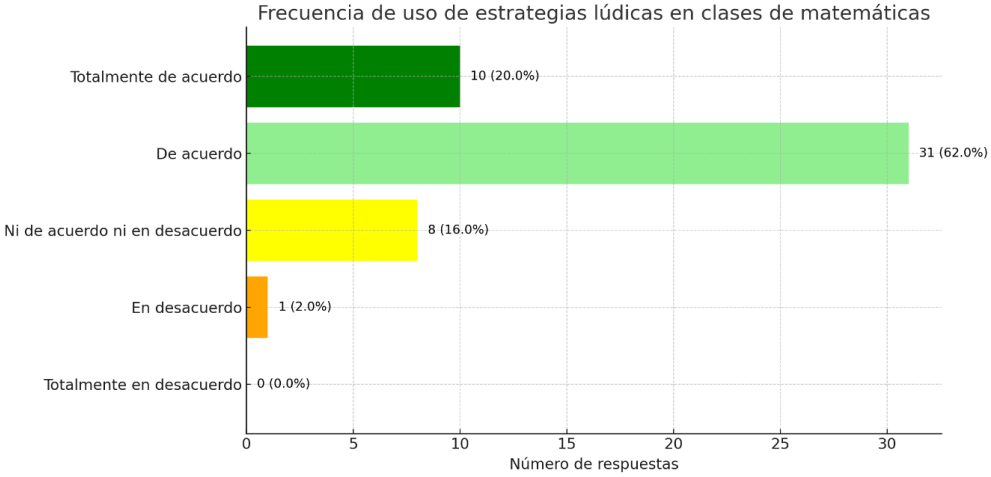
Data analysis was carried out as follows: survey results were tabulated and statistically analyzed to obtain percentages and frequencies. Interview transcripts and notes of class observations were subjected to content analysis to identify recurring themes and patterns in responses, allowing findings to be categorized in areas such as implementation, perception, and impact on learning.

4 ANALYSIS OF RESULTS

Survey for teachers: This survey was carried out with the objective of evaluating the perception of 50 primary level teachers about the use of playful strategies in the teaching of Mathematics. The participants, from these two educational institutions (Presidente Porras School and Claudio Vásquez), have teaching experience that varies between 5 and 20 years.

Figure 1

Frequency of use of playful strategies in mathematics classes

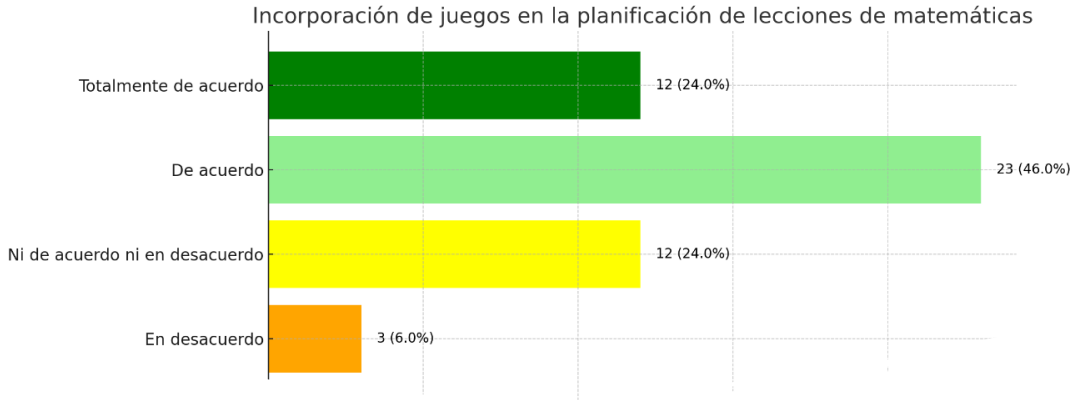


Source: Data obtained from the survey of teachers in the framework of this research.

- This indicates that the playful strategies they apply have a good general reception with 82% of respondents, with a small margin of people who could be undecided or disagree.
- Most participants value their focus on making learning more dynamic and participatory.

Figure 2

Incorporating Games into Math Lesson Planning

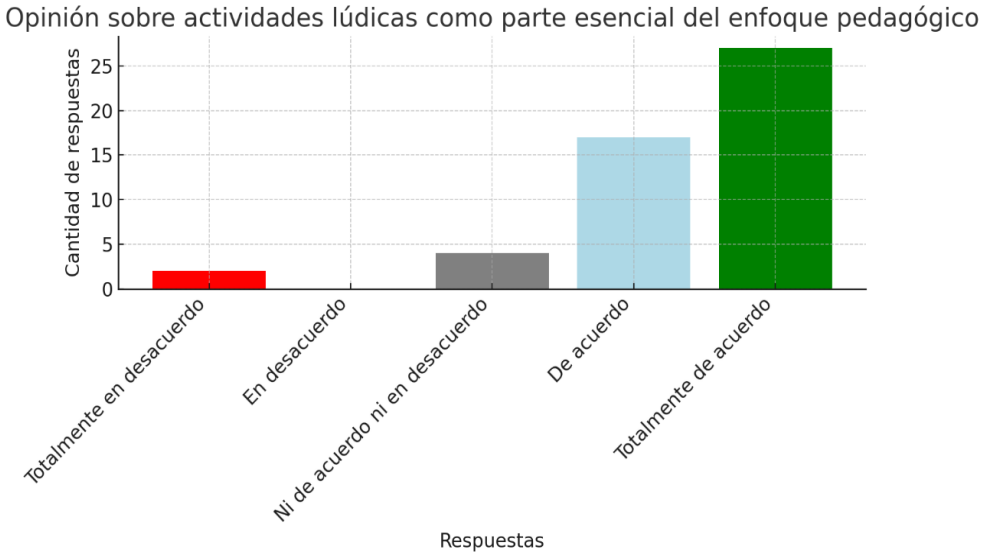


Source: Data obtained from the survey of teachers in the framework of this research.

The majority "agree" (23 responses) or "strongly agree" (12 responses), suggesting that a good portion of respondents say they incorporate these activities at least once a week. However, a significant group (12 responses) remains neutral, which could indicate a less clear or variable perception of frequency.

Figure 3

Opinion on play activities as an essential part of the pedagogical approach

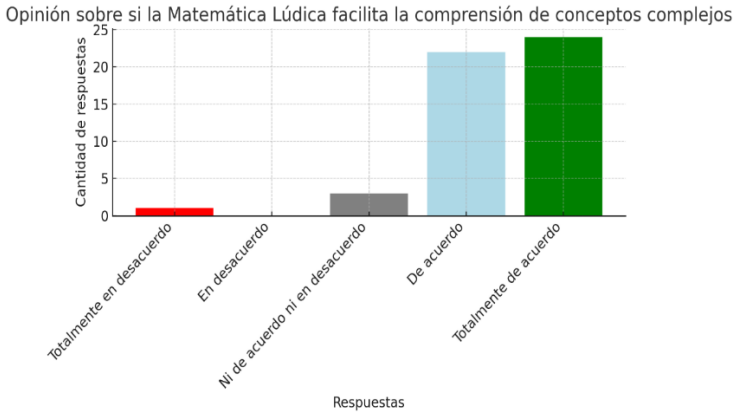


Source: Data obtained from the survey of teachers in the framework of this research.

84% of participants support this statement positively. This indicates that there is a strong consensus on the importance of playful activities in the teaching of mathematics.

Figure 4

Opinion on whether Playful Mathematics facilitates the understanding of complex concepts

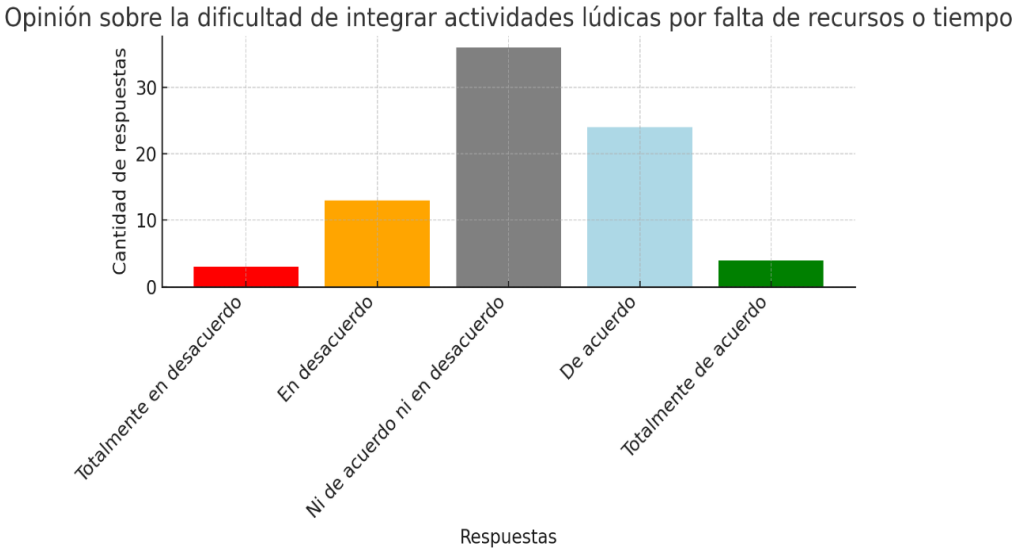


Source: Data obtained from the survey of teachers in the framework of this research.

92% of the participants support this statement. This result shows almost unanimous support for the effectiveness of Playful Mathematics as a pedagogical tool to address difficult concepts, suggesting that respondents perceive this approach as valuable for teaching more complex topics.

Figure 5

Opinion on the difficulty of integrating recreational activities due to lack of resources or time

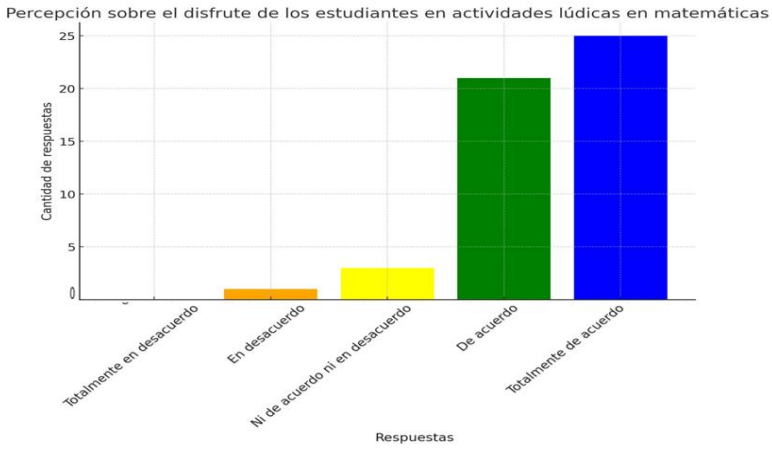


Source: Data obtained from the survey of teachers in the framework of this research.

Overall, these results reflect that, although there is a recognition of the difficulties in the integration of playful activities, there is also a considerable diversity of experiences and perceptions among teachers.

Figure 6

Perception of students' enjoyment of playful activities in mathematics

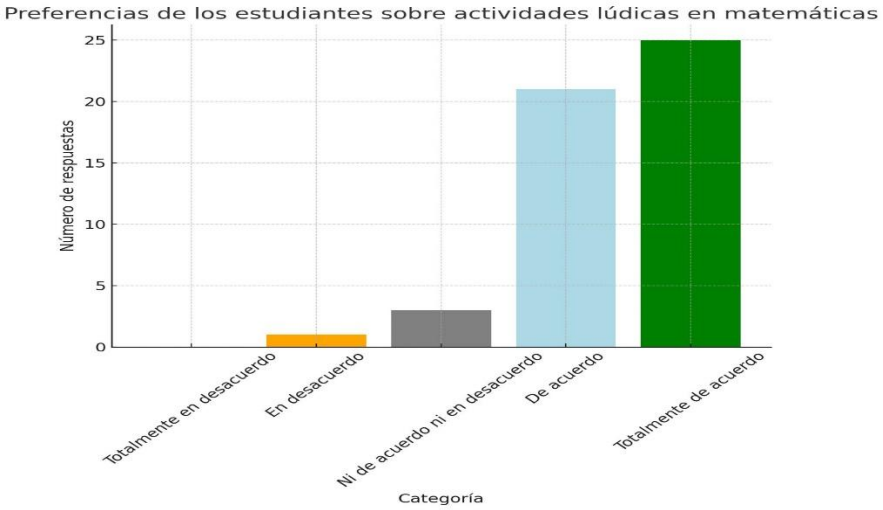


Source: Data obtained from the survey of teachers in the framework of this research.

A significant majority of teachers consider that playful activities improve students' enjoyment of mathematics classes, reflecting a positive assessment.

Figure 7

Perception of students' preference for playful activities in mathematics

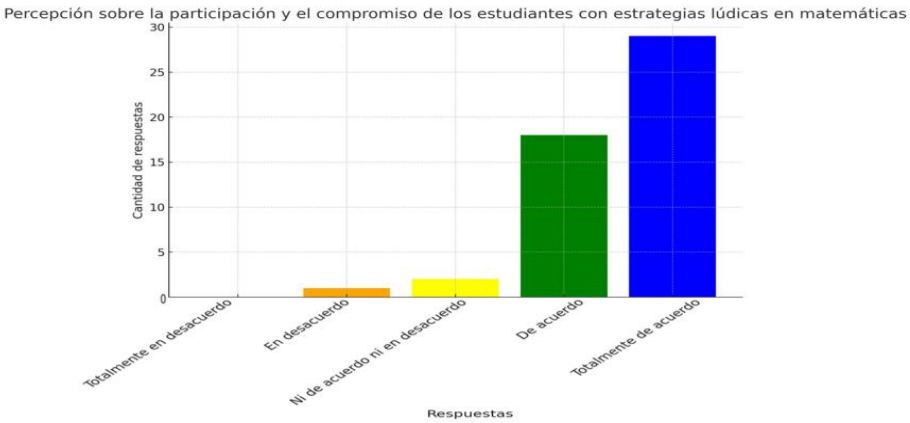


Source: Data obtained from the survey of teachers in the framework of this research.

Most teachers see improvements in students' academic performance in mathematics when they use playful activities in their classes.

Figure 8

Perception of student participation and engagement with playful strategies in mathematics

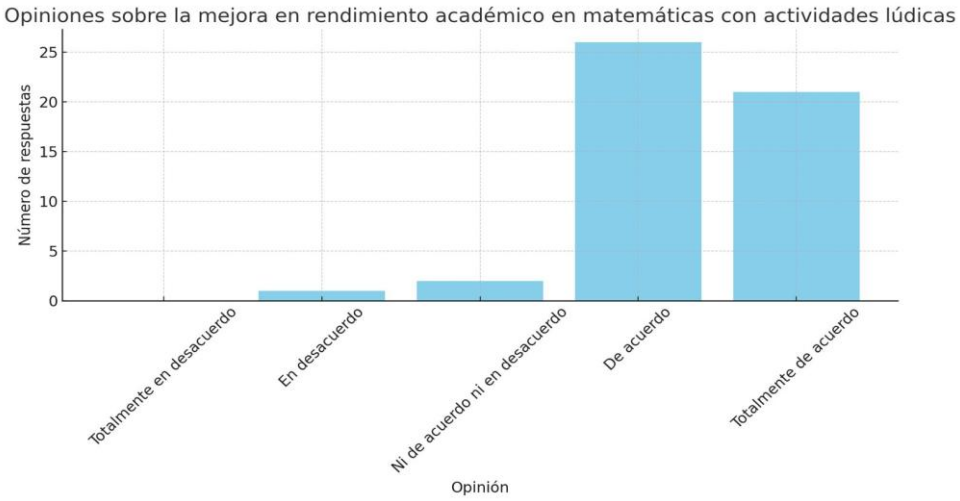


Source: Data obtained from the survey of teachers in the framework of this research.

Most students seem more engaged and engaged when these strategies are applied in class.

Figure 9

Opinion on the improvement in academic performance in mathematics with playful activities

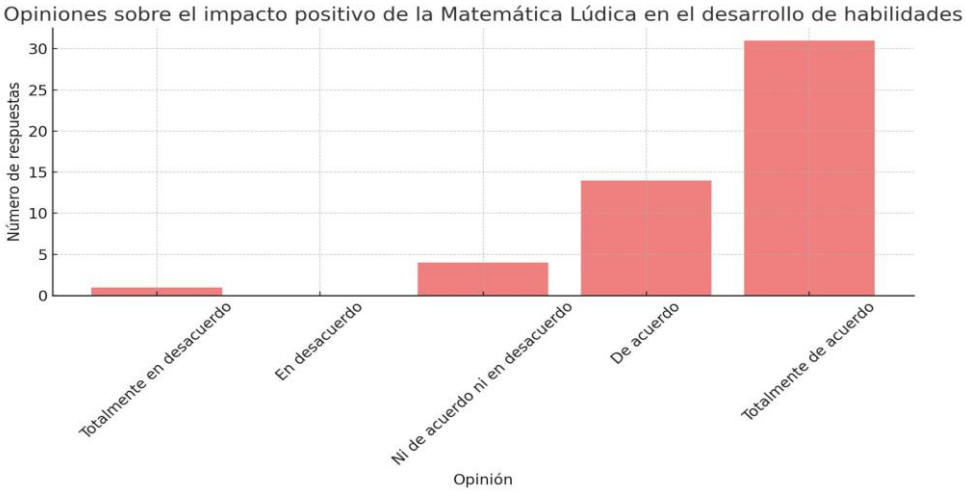


Source: Data obtained from the survey of teachers in the framework of this research.

With 94% of respondents recognizing that playful activities contribute to better academic performance, it is evident that these strategies are seen as effective by teachers.

Figure 10

Opinion on the positive impact of playful mathematics on the development of skills



Source: Data obtained from the survey of teachers in the framework of this research.

A total of 90% of respondents consider that Playful Mathematics contributes positively to the development of mathematical skills in students, which reflects a strong approval of this approach.

Teacher interview: This measurement seeks to identify strengths and areas for improvement in pedagogical methods. The results obtained will be presented and organized by category that was analyzed from the data collection.

Level of implementation of Playful Mathematics: The interviewed teachers use playful strategies on a regular basis in their mathematics classes. The activities mentioned include skill games, crossword puzzles, riddles, among others. The integration of these strategies seems to be influenced by the nature of the lesson and the learning objective. Some mention that it is necessary to balance the use of play to prevent students from being distracted only by the game and forgetting about the content.

Teachers' Perception: The advantages of playful mathematics indicated include faster learning and greater motivation on the part of students, who are attracted to interactive and concrete activities. However, challenges were also identified, such as the possible loss of control of the class and the lack of habit in some students to work with these strategies. To address these challenges, they suggest ongoing training and better access to resources.

Impact on Learning: Playful activities seem to have a positive impact on the understanding of mathematical concepts, promoting a more analytical and reflective environment among students. Teachers have observed improvements in academic performance, with specific examples such as learning numbers through songs.

Student interview: With a student population of 850 students, a representative sample of 30 students was interviewed. Interviewing a small group allowed us to explore the why of the quantitative findings: the specific feelings, experiences, and examples. The main findings obtained from the interviews, organized by key themes are presented below.

Frequency of Implementation of Playful Mathematics: The data show that the implementation of playful activities in mathematics classes varies, suggesting that these methods are present in teaching, although not in a completely constant way.

Perceived Effectiveness of Games in Learning: Most students perceive that games help both to learn and to have fun, indicating that they always feel that games fulfill this double function. This indicates that games are not only seen as a source of entertainment, but also as effective tools for acquiring new knowledge.

Student Perception: Most students express great enjoyment in participating in recreational activities. Participants indicated that they strongly agree that they enjoy these activities and that they make them interesting and fun.

Level of Playful Math Implementation: Students report that their teachers regularly use playful activities in math classes, although the frequency may vary. They mention activities such as ball games, in which they must answer questions about mathematical operations. These strategies seem to be an effective tool to engage students, who enjoy and learn in a dynamic way.

Perception of teachers: Students perceive positively the use of recreational activities by their teachers. They observe that their teachers enjoy using them, which is reflected in their attitude and the atmosphere in the classroom. In addition, students feel that their teachers are well prepared to implement these strategies, based on their ability to make classes more fun and effective.

Class observation: The activities were aligned with the objectives set and favored the understanding of mathematical concepts, while promoting fun and meaningful learning. The teachers demonstrated preparation to implement this type of resources, getting students not only to reinforce academic content, but also to live an enriching playful experience. The class fostered a positive, participatory, and motivating environment, with satisfactory results in the teaching-learning process. Dynamics were developed such as ball throwing with table questions, multiplication bingo, games with pictures and painting activities.

5 DISCUSSION

The results of the survey of teachers showed that 82% have a good general reception of the play strategies. 92% of teachers believe that these activities help them understand difficult topics, and 94% observe an improvement in students' academic performance. The majority of teachers (67%) use these strategies on a regular basis, indicating that they are present in teaching, although not completely consistently. Students, on the other hand, perceive that games are not only a source of entertainment, but also effective tools for acquiring new knowledge. A large majority of students indicate that playful activities enhance their enjoyment of the class and make them more engaged.

Despite the benefits, the study also identified challenges. Teachers cited the risk of students being distracted and resource or time constraints. It was suggested that effective implementation requires a careful balance between play and educational content, as well as increased teacher training and resources.

This study provides valuable information on the current situation of playful mathematics in Las Tablas, an area where there was no systematic research on the subject.

The findings confirm the positive perception and benefits of this methodology, supporting the idea that playful strategies are an effective tool in mathematics teaching. However, it also points out the limitations and challenges, such as the need for greater frequency in its implementation and a more solid teacher training.

6 CONCLUSIONS

- Playful mathematics is perceived positively by both teachers and students, with clear benefits in the motivation and understanding of mathematical concepts. However, its effective implementation requires a careful balance to keep the focus on educational objectives. Suggested improvements include increased teacher training, the use of technological resources, and the integration of families into the learning process.
- Playful activities in mathematics classes are viewed very positively by both teachers and students. Students emphasize that these activities make learning more interesting, understandable, and motivating. Likewise, improvements are observed in academic performance and interest in mathematics. To improve implementation, it would be ideal to increase the frequency of play activities, as students recognize that they learn best in this way. Overall satisfaction with the methodology reinforces the idea that playful strategies are an effective tool in teaching mathematics.
- The results of the surveys confirm that 92% of teachers believe that playful activities help to understand difficult topics, and 94% observe an improvement in academic performance. In general, the implementation of playful mathematics is associated with greater student participation, engagement, and enjoyment.
- Despite these findings, it is important to recognize the limitations of this initial study. The research focuses on two educational institutions in the township of Las Tablas, which may limit the generalization of the results to a broader scale. In addition, the nature of the study, which combines quantitative and qualitative elements, provides a snapshot of the current situation, but does not offer insights into the long-term impact of playful mathematics on students' academic development. Although teachers report improvements in performance, the study does not include a longitudinal assessment to measure these changes over time. Based on these limitations, several lines of research are proposed to deepen the subject:

Longitudinal Study: It would be beneficial to conduct research that follows a group of students over several years to assess the long-term impact of playful mathematics on their

academic performance, attitudes towards the subject and development of critical thinking skills.

Impact on Different Educational Levels: The current study focused on primary education, so it would be valuable to investigate how playful mathematics is implemented and perceived at secondary levels, where mathematical concepts are more abstract.

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