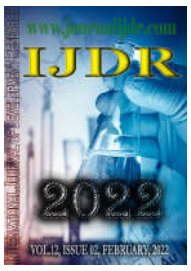
ISSN: 2230-9926

*Available online at http://www.journalijdr.com*

IJDR

*International Journal of Development Research*
*Vol. 12, Issue, 02, pp. 54092-54095, February, 2022*
https://doi.org/10.37118/ijdr.24025.02.2022



RESEARCH ARTICLE OPEN ACCESS

# CHALLENGES IN THE TEACHING OF MATHEMATICS IN EARLY CHILDHOOD EDUCATION

**[1]André Gomes Barros, [1]Dra. Daniela Ruíz -Díaz Morales and [2]Dra. Vera Lucia Vieira de Souza**

[1]UAA-Universidad Autónoma de Asunción –Paraguay; [2]Doctor in Education (Federal University of Rio de Janeiro – UFRJ- RJ – Brazil)

## ARTICLE INFO

***Article History:***
Received 19th December, 2021
Received in revised form
20th January, 2022
Accepted 29th January, 2022
Published online 26th February, 2022

***Key Words:***
Early Childhood Education,
Mathematics, Human development.

***Corresponding author:***
**André Gomes Barros**

## ABSTRACT

This article presents a study on the challenges in teaching mathematics in early childhood education. The study was based on the qualitative, descriptive with non-experimental design. Childhood is a singular stage of human development, where the child develops positive attitudes when he comes into contact with mathematics, even if he maintains contact only with previous knowledge in the family environment and social life. Matematization plays a central role in the development of proficiency, matematization processes must permeate all learning and teaching activities. It is emphasized that teachers should also be based on mathematical foundations in order to effectively facilitate progress in the development of children. The teacher uses the game as a discovery learning approach.



**Citation:** ***André Gomes Barros, Dra. Daniela Ruíz Díaz Morales and Dra. Vera Lucia Vieira de Souza.*** "Challenges in the teaching of mathematics in early childhood education*", International Journal of Development Research*, 12, (02), 54092-54095.

# INTRODUCTION

It is pointed out that the mathematical education of young children extends beyond the walls of the classroom - the family and the community at large can make a significant contribution to the mathematical performance of children. It is important that parents engage in discussions with their children about related activities in the family environment, considering the context of homework. According to Quaresma (2015) it states that childhood is a singular stage of human development, where the child develops positive attitudes when it comes into contact with mathematics. Collaboration and information sharing between parents and teachers is essential for knowledge of mathematics to be truly incorporated. On the other hand, they are usually too busy with classroom management to be available to promote play, or simply did not have the training and didactic resources to do so (Dooley *et al*., 2014). Most scholars agree that teachers need to create a playful classroom environment and allow spontaneous play activities among classmates, but they should also be skilled play partners. (Pinchover, 2017). Teachers need to explore the opportunities offered through the use of a variety of technological tools to mediate learning, not to become repetitive, exhausting and even mechanistic. It is essential that teachers know how to use the materials and tools to enable children to achieve mathematical learning.

The benefits of pedagogical strategies depend on the potential of educators to involve children in mathematically related activities.

# METHODOLOGY

The study was based on the qualitative, descriptive, with non-experimental design. The scientific research proposed here is seen from the qualitative enfoque of scientific research. According to Chizzotti (2014) qualitative research:

Today, it covers a transdisciplinary field, involving the human and social sciences, assuming traditions or multiparadigms of analysis, derived from positivism, phenomenology, hermeneutics, Marxism, critical theory and constructivism, and adopting multimethods of investigation for the study of a phenomenon situated in the place where it occurs, and finally, seeking both to find the meaning of this phenomenon and to interpret the meanings that people give to them. (p. 28)

Thus, this presents specific characteristics that according to Yin's understanding (2016) qualitative research should:

1. Study the meaning of people's lives, In real life conditions;
2. Represent the views and perspectives of people in a study;

3. Cover the contextual conditions under which people live;
4. Contribute to revelations about concepts Existing or emerging that can help to explain human social behavior; and
5. Strive for using multiple sources of Evidence instead of relying on a single source. (p. 29).

Confirming Chizzotti (2014, p. 28) says that qualitative research implies a dense sharing with people, facts and places that constitute research objects, to extract from this conviviality the visible and latent meanings that are only perceptible to sensitive attention. According to Gil (1991, p.48), bibliographic research is developed based on material already elaborated, consisting mainly of books and articles related to the study in question.

**Theoretical Foundation**

***Possible challenges in the teaching of mathematics in early childhood education from the point of eye of teachers:*** Dooley et al. (2014) state that matematization plays a central role in the development of proficiency, matematization processes should permeate all learning and teaching activities. This includes connecting, communicating, reasoning, arguing, justifying, representing, solving problems, and generalizing. Proficiency in mathematics in the foreground as an objective of mathematics education has the potential to change the type of mathematics and learning that young children experience. As it requires significant changes in pedagógica proposals, curricula and institutional support, the teaching of Mathematics in Early Childhood Education also presents challenges that are broad and systemic. According to Quaresma (2015) it states that childhood is a singular stage of human development, where the child develops positive attitudes when he comes into contact with mathematics, even if he maintains contact only with previous knowledge in the family environment and social life. When this previous knowledge is worked in the school context, learning becomes more significant, emerging the basic ideas, expanding the child's potential in problem solving. However, many children may not learn these initial concepts spontaneously due to lack of encouragement or even insecurity. Dooley *et al.* (2014) explain that it is impossible to think of efficient pedagogical strategies for children aged 3 to 8 years without recognizing that much of early mathematical learning occurs in the context of children's play. Educators need to understand how math learning is promoted by the involvement of young children in play and how best to support that learning.

The idea of a mathematical teaching model usually stems from the practices adopted in the classroom, involving a quantitative or spatial system that can be used, in particular, in prescribed ways. The logical blocks used in teaching numerical operations are an example of a mathematical model in this context. The teacher is the expert who has knowledge of the mathematics represented by the model, and his intention is to use this model to make mathematics accessible to children (Dooley *et al*., 2014).

***Burak and Martins point out that:*** A task is imposed on the mathematical educator: to know the bases that sustain a practice capable of enabling the development of capacities in the subject and that prepare him for the long-awaited transformation in the field of Education, with the caveat that this will not be achieved without the contribution of other areas of knowledge. As Mathematical Educators, we do not desire or admit a Mathematics Education without Mathematics; however, we cannot also conceive it without the presence of other areas that underpin it, precisely because we are substantive by Education (Burak & Martins, 2015, p. 99). It is known that the playful has the potential to prevent the problems arising from the routine in the classrooms that end up reducing the interest of students for the contents, allowing the teacher to elaborate more attractive and stimulating classes. The teacher plays a significant role in creating a playful environment and in the development of children's play. The teachers ' role includes planning the scenario for play, choosing an appropriate instrument using a playful pedagogical approach and involving children (Braga, 2015). It is important to emphasize that teachers should also be based on mathematical foundations in order to effectively facilitate progress in the development of children. To teach children that numbers represent quantities, for example, they need to understand how to symbolize and compare their own quantities; however, evidence suggests that teachers may need additional training to be adequately prepared. (Lorenzato, 2011). According to Fisher, Pasek and Golinkoff (2012) also suggests that teacher training may require re-education in mathematical thinking processes in addition to traditional practices in Early Childhood Education. It is important for teachers to present a deep understanding of how children's mathematical concepts often evolve over time and that specific experiences promote children's discovery and conceptual evolution. Children demonstrate an abstract concrete change in the understanding of forms, in which they begin to categorize forms by visual similarity and orientation, regardless of their defining properties and later switch to abstract concepts based on rules. During play activities, teachers carefully observe children, assess their current understanding of the concepts and uses of materials, encouraging learning in appropriate ways.

***According to Quaresma (2015):*** Considering the multiple languages in early childhood education, mathematical language, as well as verbal, sound, body, etc., is a form of communication, so it is important that it be presented to children in a playful way, through children's stories, songs, fables, problems that can be solved through games, games, which are activities proper to the children's universe; in this sense and content are interconnected in the learning of mathematics in childhood (Quaresma, 2015, p. 11875). Most scholars agree that teachers need to create a playful classroom environment and allow spontaneous play activities among classmates, but they should also be skilled play partners. On the other hand, they are often too busy with classroom management to be available to promote play, or just don't know how to do that. (Pinchover, 2017). One of the main challenges in the adoption of playful practices such as musicalization in Early Childhood Education, as described by Kastein and Pacific (2018), concerns the training of a teaching professional who is often not able to recognize the needs and limitations of children. The authors also reveal that most of these professionals do not have technical competence and aesthetic sensitivity to develop a work of perception with children. It is not enough that a teacher working in Early Childhood Education simply respects the play entre young children. This professional should also assume a playful behavior, incorporate playful actions and dummy techniques of facilitation of pranksters. It is essential that teachers observe children, especially when playing, so that they can acquire the ability to understand and support playful behavior and learning (Antunes, 2011). Considering the foundations that involve the teaching of mathematics, it is essential that the teacher identify alternatives that seek pleasure and fun, while maintaining the educational pedagogical character. It is essential that teachers know how to use the materials and tools to enable children to achieve mathematical learning. For Bordignon and Camargo (2013) the playful activity does not cover the practice of games and games randomly, without involving some context or situation in common with the school program contents, because actions should prioritize meaningful learning, fostering the creativity and curiosity of the student for the initial mathematical foundations.

Carter (1993) suggests that teachers go through three stages of training to be fun and achieve good results in pedagogical practice. First, they need to identify their experiences and attitudes towards the act of playing. Then, they need to pay attention and understand the children's play in order to identify the relevant peculiarities and characteristics. When these two skills are achieved, they can move on to the third stage of the training, which includes the elaboration of playful activities, allowing teachers to also practice playful behaviors with the children. In his study, Pinchover (2017) demonstrated that spontaneity plays an important role in defining fun, referring to the individual's ability to be flexible and free, especially in the application of playful strategies and overcoming the difficulties encountered in the teaching of mathematics. It is possible that, being more spontaneous, teachers focus more on playing and less on discipline in

the classrooms, which in turn offers children more opportunities to play and gain knowledge. However, it is also possible that the teacher's spontaneity is affected by the behavior of children in the classroom, but research is necessary to fully understand this relationship. Activities should arise from children's interests, questions, concerns and everyday experiences. The benefits of pedagogical strategies depend on the potential of educators to involve children in mathematically related activities, such as play, reading stories, figure books, project work, arts and physical education. The potential of these activities for the development of mathematical proficiency can be better perceived when educators focus on children's mathematical reasoning. In addition, educators need to maximize the opportunities offered through the use of a variety of technological tools to mediate learning (Dooley *et al*., 2014). It is worth mentioning that the mathematical education of young children extends beyond the walls of the classroom - the family and the community in general can make a significant contribution to the mathematical performance of children. It is important that parents engage in discussions with their children about mathematically related activities in the family environment, considering the context of homework. Collaboration and information sharing between parents and teachers is essential for knowledge of mathematics to be truly incorporated (Dooley *et al*., 2014).

***Playful strategies adopted by teachers:*** Recent research points to several other important principles that support a good mathematical pedagogy for children aged 3 to 8 years. The principles focus on the people and relationships built in the learning environment and with students. Adults can help children maximize their learning by helping them represent and reflect on their experiences. Learning through the game is seen as fundamental for good mathematical pedagogy in early childhood, assuming various levels of productivity, depending on the age of the child (Dooley *et al.,* 2014). Children's games and interests are the basis of their first mathematical experiences. Activities and playful situations provide the main contexts in which most mathematical learning takes place before the child is inserted into the school environment. It is known that children play spontaneously in much of mathematics, and some of them at very advanced levels, and these playful experiences become mathematical as children represent them in their routine activities (Dooley *et al.,* 2014). The pedagogy of Mathematics incorporates a number of general practices including the promotion of mathematical speech, the productive disposition to learn, emphasis on mathematical modeling, the use of cognitively challenging tasks, and formative evaluation. Several studies have addressed the use of games and games in the teaching of mathematics, with the objective of transmitting the contents while amusing and creating important bonds in childhood (Quaresma, 2015).

In recognizing this potential, teachers need to integrate mathematics learning into children's playful activity. The incremental development of children's spatial-geometric reasoning and their geometric and measurement skills throughout the transition period can be achieved through a systematic approach to teaching related concepts. This approach allows the integration of problem solving skills and content knowledge, being optimized from the adoption of playful strategies (Dooley *et al*., 2014). Anthony and Walshaw (2009) report that some principles should guide the playful pedagogical practices for the teaching of Mathematics to children, among them:

- Recognition that all children, regardless of age, have the ability to become potential learners of mathematics;
- Commitment to maximize access to mathematics;
- Training to develop positive mathematical identities and knowledge;
- Holistic development of productive citizenship through mathematics;
- Building relationships and connecting people and ideas;
- Interpersonal respect and sensitivity;
- Justice and consistency.

According to Fisher, Pasek and Golinkoff (2012) guided play is a mid-point learning approach between didactic instruction and free-play experiences. Teachers create flexible, interest-oriented, child-centered experiences that encourage children's natural curiosity and mathematical thinking. In particular, teachers are seen as collaborative partners who actively facilitate the process of "making sense" in at least two ways. First, educators can enrich the environment with objects, toys, or games that offer experimental learning opportunities with an infusion of curriculum content. To promote form concepts, for example, teachers can incorporate objects with varying sizes and angles into play environments that allow children to discover and practice the basic principles of mathematics (Fisher, Pasek & Golinkoff, 2012). Second, teachers facilitate the construction of meaning through a variety of sociocognitive support techniques, including comments on children's findings; playing with them; asking open questions about what the children are finding; suggesting ways to explore and play with materials in ways that children may not have thought of doing; or creating games with simple materials. Geometric shapes are crafted by encouraging children to play a game called "Search for Shapes", in which children locate shapes in the classroom, for example, blocks, other toys, windows, doors, tables, etc. The teacher develops his understanding by requesting the discovery of the properties of the form, for example, which makes all these triangles look different, how many sides it is possible to observe and other questions (Fisher, Pasek & Golinkoff, 2012).

# CONCLUSIONS

Therefore, the materials are an important instrument for the development of the educational task together with the instruction and capacity of the teacher regarding the content and the incorporation of new didactic strategies to incorporate mathematics in children of early childhood education. The educational software (relevant to early childhood education) results in a lot of pedagogical strategies to be used by teachers. On the other hand, the lack of time for teachers to train themselves, even for financial issues and other points, in addition to the lack of incentive of the school to promote the continuous training of mathematics, to arouse interest and human development.

# REFERENCES


Anthony, G., & Walshaw, M. (2009). *Mathematics education in the early years:* Building bridges. Contemporary Issues in Early Childhood, 10(2), 107–121.

Antunes, C. (2011). *Jogos para a estimulação das múltiplas inteligências*. Rio de Janeiro: Vozes Limitada.

Bordignon, S. A., & Camargo, G. S. (2013). *Antidermatophytic activity of volatile oil and nanoemulsion of Stenachaenium megapotamicum (Spreng.) Baker.* Industrial crops and products, 50, 23-28.

Braga, E. S. O. (2015). *Relevantes aspectos relacionados ao ensino de matemática.*

Burak, D., & Martins, M. A. (2015). *Modelagem Matemática nos anos iniciais da Educação Básica:* uma discussão necessária. RBECT, 8(1), 92-111.

Carter, M. (1993). *Catching the spirit: training teachers to be playful.* Child Care Inf. Exch. 89, 37-39.

Chizzotti, A. ( 2014). *Pesquisa em ciências humanas e sociais.11. ed. São Paulo: Cortez.*

Dooley, T., Dunphy, E., Shiel., G., Butler, D., Corcoran, D., Farrell, T., NicMhuiri, S., O'Connor, M., Travers, J., & Perry, B. (2014). *Mathematics in Early Childhood and Primary Education (3-8 years):* Teaching and Learning. Dublin: NCCA.

Fisher, K. R., Pasek, K. H., & Golinkoff, R. M. (2012). *Fostering mathematical thinking through playful learning.*

Gil, A. C. (1991) *Como elaborar projetos de pesquisa. São Paulo: Atlas. sical na educação infantil:* a questão docente e as possibilidades da musicalização. RPD, 18(38), 143-157.

Lorenzato, S. (2011). *Educação Infantil e percepção matemática*. Campinas: Autores Associados.

Pinchover, S. (2017). *The Relation between Teachers' and Children's Playfulness:* A Pilot Study. Front Psychol., 8(2214), 1-8.

Quaresma, R. P. (2015). *Os desafios de ensinar Matemática na Educação Infantil.*

Yin, R. K (2016). *Estudo de caso: planejamento e métodos.* 4.Ed. Porto Alegre: Bookman.

*******