

**MATHEMATICS WORKSHOPS FOR FUTURE LITERACY TEACHERS**

***OFICINAS DE MATEMÁTICA PARA FUTUROS ALFABETIZADORES***

***TALLERES DE MATEMÁTICAS PARA FUTUROS ALFABETIZADORES***



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**ABSTRACT:** The world is constantly changing, and in the education field, this change is evident. Students have evolved, technology has advanced, and the teaching methodology of mathematics needs to adapt to be more attractive and dynamic, aiming at understanding mathematical objects. This article analyzes the contributions of workshops in the training process of mathematics teaching for students of the Teacher Training course of the Colégio Estadual Túlio de França in União da Vitória, PR, Brazil. The workshops were based on problem-solving practices, games, toys, and games to promote meaningful learning. The action research, with a qualitative-quantitative approach and exploratory-descriptive objective, involved 21 students. The results were satisfactory, showing the comprehension of methodologies to improve the understanding of mathematical concepts. It highlights the need for continuity of the project to enhance the training of future teachers/ literacy teachers.

**KEYWORDS:** Meaningful learning. Teaching mathematics. Teacher training. Basic education. Normal course.

**RESUMO:** *O mundo está em constante transformação, e na educação, essa mudança é evidente. Os alunos evoluíram, a tecnologia avançou, e a metodologia de ensino de matemática precisa se adaptar para ser mais atrativa e dinâmica, visando à compreensão dos objetos matemáticos. Este artigo analisa as contribuições de oficinas no processo formativo do ensino de matemática para alunos do curso de Formação de Docentes do Colégio Estadual Túlio de França, em União da Vitória, PR, Brasil. As oficinas basearam-se em práticas de resolução de problemas, jogos, brinquedos e brincadeiras para promover uma aprendizagem significativa. A pesquisa-ação, com abordagem quali-quantitativa e objetivo exploratório-descritivo, envolveu 21 estudantes. Os resultados foram satisfatórios, evidenciando a compreensão de metodologias para melhorar o entendimento dos conceitos matemáticos. Destaca-se a necessidade de continuidade do projeto para aprimorar a formação dos futuros professores/alfabetizadores.*

**PALAVRAS-CHAVE:** *Aprendizado com significado. Ensino de Matemática. Formação de professores. Educação básica. Curso Normal.*

**RESUMEN:** *El mundo está en constante transformación, y en la educación, ese cambio es evidente. Los alumnos han evolucionado, la tecnología ha avanzado, y la metodología de enseñanza de matemáticas necesita adaptarse para ser más atractiva y dinámica, objetivando la comprensión de los objetos matemáticos. Este artículo analiza las contribuciones de talleres en el proceso formativo de la enseñanza de matemáticas para alumnos del curso de Formación de Docentes del Colégio Estadual Túlio de França, en União da Vitória, PR, Brasil. Los talleres se basaron en prácticas de resolución de problemas, juegos y juguetes para promover un aprendizaje significativo. La investigación-acción, con abordaje cuali-cuantitativo y objetivo exploratorio-descriptivo, envolviendo 21 estudiantes. Los resultados fueron satisfactorios, evidenciando la comprensión de metodologías para mejorar el entendimiento de los conceptos matemáticos. Se destaca la necesidad de continuidad del proyecto para primorear la formación de los futuros profesores/alfabetizadores.*

**PALABRAS CLAVE:** *Aprendizaje significativa. Enseñanza de Matemáticas. Formación de profesores. Educación básica. Bachillerato de Magisterio.*

## Introduction

Given the difficulties that students face when learning mathematics and the challenge that teachers face when teaching it, it is imperative to explore different approaches to dealing with mathematical knowledge. In this context, a dilemma arises in the classroom related to the choice between teaching a science that can be applied in several areas or a science that exists on its own (Baade; Brandenburg; González Velasco, 2020). In other words, the question lies in teaching Mathematics as an interactive and transdisciplinary subject, integrated with the others, or as an independent subject, without links to other areas of knowledge.

Considering the importance of a child's comprehensive education in the area of mathematics, an approach is sought that provides students with meaningful and comprehensive learning. To achieve this objective, it is essential that the teacher recognizes that students carry life stories and knowledge constructed from their own experiences (Gabiec, 2022).

Based on this, the role of the teacher is no longer that of transmitter of knowledge as in traditional pedagogy, but rather of facilitator of knowledge. He is the one who helps, encourages, stimulates, mediates, and leads the student to build their knowledge (Baade; Brandenburg; González Velasco, 2020). This is the teacher's challenge, to recognize the strengths and weaknesses of their students, to know how to encourage them with interesting classes that lead them to research, question, analyze and understand the subject being addressed.

It is observed that, to build learning with understanding, it is crucial that educators have solid knowledge of the content, methodologies and their students, in order to determine the best way to contribute to the learning process. In this context, based on professional experience, the need was identified to enrich the training of future teachers/literacy teachers in the initial years of the Teacher Training course, formerly teaching, at Colégio Estadual Túlio de França, in União da Vitória, PR. Many of these students brought with them unfavorable perceptions and were marked by difficulties in understanding mathematics (Gabiec, 2022).

To this end, some mathematics workshops were proposed to these students/future teachers/literacy teachers so that they could have contact with mathematics in a practical and playful way, providing them with a space to exchange experiences and understand content and methodologies that can be worked on with students in the early years of elementary school. This article, therefore, has the main objective of analyzing the contributions of these workshops developed as part of the formative process of teaching mathematics to students on the Teacher Training course at Colégio Estadual Túlio de França, in União da Vitória, PR. It is based on the

master's thesis entitled “Mathematics workshops for future literacy teachers: the art of learning to be able to teach”, defended in 2022 by author Cristiane Elizabeth Gabiec (Gabiec, 2022).

Understanding mathematical concepts gives children the ability to carry out daily tasks independently. This includes skills such as positioning yourself in the calendar, knowing and comparing the number of classmates in your class, identifying your age, height, weight, understanding the cost and change when purchasing a snack in the school canteen, in addition to helping the family in preparing recipes, understanding quantities and in other situations involving mathematical knowledge (Gabiec, 2022).

For learning to occur naturally, it is essential that it is meaningful to the child, that is, some point of approximation between their previous knowledge and what is being presented (Walle, 2009). From this observation, it is possible to propose challenging situations, awakening interest in learning.

According to Van de Walle (2009, p. 33, our translation), “the classroom should be an environment where doing mathematics is not threatening and where all students are respected for their ideas”. The author also highlights the role of the teacher, which is to “create this spirit of research, trust and expectation”. In this welcoming environment, children are invited to do mathematics through problems, seeking strategies for solving them (Gabiec, 2022).

Problem Solving, as a teaching methodology in Mathematics, has proven to be an important way of promoting children's learning in a meaningful and understanding way (Meneghelli *et al.*, 2018). When thinking about teaching and student learning in a meaningful way, we use the studies of Vila and Callejo (2006, p. 29, our translation), when they emphasize that problem solving is “a means of focusing on students, and their thought processes and inquisitive methods; a tool to form subjects with autonomous capacity to solve critical and reflective problems”.

Equally fundamental is to consider the use of playfulness, which aims to make teaching Mathematics more fun in the early years (Matos, 2013; Luckesi, 2014), such as through games (Kishimoto, 2010).

This is the teacher's greatest challenge, recognizing the strengths and weaknesses of their students, knowing how to encourage them with interesting classes that lead them to research, question, analyze and understand the subject being covered, Nacarato, Mengali, and Passos (2009, p. 34, our translation) collaborate with this idea when they state that:

[...] mathematical learning does not occur through repetitions and mechanization, but is a social practice that requires student involvement in

meaningful activities. We are convinced that learning is a gradual process, which requires the establishment of relationships. With each situation experienced, new relationships are established, new meanings are produced, and this movement enables qualitative advances in mathematical thinking.

It is noteworthy that activities imbued with meaning and understanding play a crucial role in the construction of knowledge, since children assimilate what is presented to them more effectively. It is essential to consider not only the isolated fragments, but also the totality, maintaining an awareness of the repercussions that actions can have on the environment, covering all associated thoughts, actions and reflections (Morin, 2005).

According to Ribeiro (2011, p. 43, our translation), it is possible to start “observing the whole in an inseparable way and having the desire to build knowledge through a multi- and transdisciplinary approach [...]. Overcoming the vision of simplistic and reductionist thinking, proposing not to be the opposite of this thinking, but rather an interaction with it”.

This reconsideration leads to the concept of complex thinking, as described by Petraglia (2013). This type of thinking does not promote separations, but rather unions, seeking connections between the different aspects of life. It is a thought that integrates different ways of thinking, going against any disjunctive mechanism.

## Methodology

This research is of an applied nature, as it was intended to improve the relationship between teaching mathematics to students in the initial grades with Teacher Training students (formerly teaching), as, according to the definition of Prodanov and Freitas (2013, p. 126, our translation), applied research “seeks to produce knowledge for practical application aimed at solving specific problems”.

Its approach is characterized as qualitative and quantitative. Qualitative, therefore, according to Fontelles *et al.* (2009), this is research that seeks to understand phenomena of a social and cultural nature, through descriptions, interpretations and comparisons and quantitatively, as it works with numerical variables, representing the analyzed results with greater fidelity (Fontelles *et al.*, 2009).

As for the objectives, the study is characterized as exploratory and descriptive. Exploratory because according to Gerhardt and Silveira (2009, p. 35) “this type of research aims to provide greater familiarity with the problem, with a view to making it more explicit”

and descriptive, because according to the studies of Prodanov and Freitas (2013, p. 52) “in descriptive research, facts are observed, recorded, analyzed, classified and interpreted”.

To develop the present study, action research was predominantly used, defined by Thiollent (1986, p. 14, our translation) in the following terms:

[...] action research is a type of empirically based social research that is conceived and carried out in close association with an action or the resolution of a collective problem and in which researchers and participants representative of the situation or the problem are involved in a cooperative or participatory way.

The research involved the participation of twenty-one (21) students from the 3rd and 4th grade of the Teacher Training course at Colégio Estadual Túlio de França, located in União da Vitória, PR. Due to the complementary nature of the training for students on the Teacher Training course, the interaction during these meetings proved to be extremely significant, both for the researcher and the collaborators. The exchange of experiences on these occasions provided an environment conducive to mutual learning (Gabiec, 2022). And, unlike the regular course, in which there is often excessive concern about complying with teaching plans, content and assessments, the workshops provided more informal and relaxed spaces, in which students felt more free and willing to interact.

The instruments used for data collection were questionnaires and participant observation. The diagnostic questionnaire for collecting information regarding understanding and familiarity with the subject in question (mathematics teaching for the initial years). During the workshops, participatory observation was used, which according to Gil (2008, p. 55) “consists of the real participation of knowledge in the life of the community, group or a given situation. In this case, the observer assumes, at least to some extent, the role of a member of the group.” The records of this stage were made through field diaries and photographs. To obtain feedback on the activities carried out and the influence of the workshops on the construction of knowledge of future students, a prognostic questionnaire was applied. This questionnaire played a crucial role in highlighting the project's weaknesses, allowing adjustments for future applications and contributing to the continuous improvement of the research (Gabiec, 2022).

This research was submitted to the research ethics committee of the Alto Vale do Rio do Peixe University, through Plataforma Brasil, and was approved under opinion number 5,085,406.

## Results and discussion

The workshops of this project took place in the months of November and December 2021, in the space of Colégio Estadual Túlio de França, União da Vitória, PR, with participants in the 3rd and 4th grades of the Teacher Training course. They were developed in the form of seven face-to-face meetings, in the evening, lasting an average of three hours.

### Meeting 1: Presentation and diagnosis

Initially, the proposal for the mathematics workshop was presented to future literacy teachers, informing them of the days and times of the meetings. Students were also asked to respond to the diagnostic survey, made available through a form on the Google Forms® platform<sup>3</sup>, about their professional profile, possible difficulties and needs regarding teaching Mathematics. This stage was extremely important for the advancement of the project, as it not only required the analysis of survey responses, but also involved attentive listening to the students' desires regarding the teaching of certain mathematical content, their experiences along the way school and the positive and negative aspects of interaction with this curricular component (Gabiec, 2022).

Of the 39 students present at the project presentation, only 21 chose to participate in the workshops. Within this group, the majority were 18 years old and enrolled in the 4th year of the teacher training course. When asked about their relationship with mathematics, 14.2% (3 students) stated that they had a positive relationship, while the remaining 85.8% (18 students) expressed difficulties, describing it as difficult, bad, incomprehensible, very complicated and indicating that they always faced challenges with this component during their elementary school years (Gabiec, 2022).

In order to overcome the difficulties identified and guide future meetings, students were asked to list possible topics to be addressed. The majority, with 8 requests, expressed the desire to explore "a little bit of everything, with the construction of playful materials" that could be useful in the internships. Then, with 5 requests, the interest in working with fractions based on everyday situations stood out. There were 3 requests for the study of graphs, another 3 for understanding areas, and additional requests related to contextualized questions (2 students), geometric figures (2 students) and the four operations (1 student) (Gabiec, 2022).

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<sup>3</sup>Link to the diagnostic questionnaire: <https://forms.gle/DT9PiFHFxbKHUWEh7>. Accessed on: 10 Dec. 2023.

When analyzing the questionnaire, it is observed that the initial training of future teachers/literacy teachers in the initial years is not satisfactory, and this thought is completed when Gualberto and Almeida (2009) in their studies on Pedagogy degrees state that, even the As a professional with a multifaceted role, mathematics teachers in the initial years of basic education are not always clear about their own conceptions about Mathematics. Therefore, difficulties were identified both with the mathematical content and with its didactic transposition.

Gualberto and Almeida (2009, p. 303, our translation) further state:

Many students on the pedagogy course choose this course to avoid mathematics, [...] In view of this, the contradiction is clear in a course that aims to train mathematics teachers, but in addition to presenting a broad and generalist training, it receives students who, in significant numbers, seek to avoid mathematics.

It was observed that this situation in the Pedagogy degree course, in some cases, is also applicable to the Teacher Training course. The analysis led to reflection on the possible failure or success of students in the mathematics curricular component, which, in the majority of responses, is related to the attitude of mathematics teachers (Gabiec, 2022). Calcon, Lima, and Gessinger (2011) corroborate this result when, in their research with students on the teacher training course (Teacher), when questioning the construction of mathematical knowledge throughout their school life, they obtained the following result:

The largest group is made up of those students who attribute their success or failure in Mathematics to external causes, the teacher or the school. They complain about teachers who don't pay attention, about schools that are weak, about teachers who don't know their subject, etc. An example of this type of statement is: "It was a study based largely on traditional education, the teacher came in, explained the subject and that was it, he had no interest in knowing my difficulties.", or "Because it is a state school, the lack of a teacher is big, teaching is small." Also included in this class were those who judge teachers or their schools of origin well, such as, for example, the student who responded: "All my teachers were well qualified and that made me like the subject" (Calson; Lima; Gessinger, 2011, p. 120, our translation).

When comparing the research by Calcon, Lima and Gessinger (2011) with the present research, it appears that the majority of students declare that they have difficulties with Mathematics, do not like the subject or even blame the teachers for building their knowledge. This finding causes concern, as future literacy teachers will teach mathematics to children, even if they do not like the subject or have difficulty with it.

## Encounter 2: Never Ten

In the second meeting, initially, data from the Basic Education Assessment System (SAEB) related to mathematics teaching was presented. Some weaknesses and emergency needs for internship applications were discussed, followed by a fun activity called "Never Ten". This game addresses exchanges between units for tens, from tens to hundreds and from hundreds to thousands. To play this game, golden material was used, consisting, in most cases, of a small cube representing the unit, a small bar representing the tens, a plate representing the hundreds and the large cube representing the thousands unit. The game was used to practice addition and subtraction calculations (Gabiec, 2022).

**Figure 1** – Experiencing the exchange of units for tens



Source: Research collection, 2021.

It was a relaxed moment for the group, in which the importance of children knowing the decimal number system was discussed. As indicated in the 2014 National Pact for Education at the Right Age document, just as the Alphabetic Writing System (SEA) organizes the provisions and functioning of the written language, the Decimal Number System (SND) also requires organization. This is because children need to understand quantification and its recording so that they can perform operations with symbols effectively.

## Meeting 3: Sweet Mathematics

At this meeting, initially, the importance of constantly improving and the relevance of participating in lectures, courses and workshops was discussed. Participation in such events contributes significantly to training and, consequently, enriches the curriculum. When seeking improvement and continued training, the teacher moves from teacher to student, providing the opportunity to experience situations that improve the understanding of how their students feel about these activities. The construction of knowledge goes beyond didactic and scientific

information; it involves the exchange of experiences and reports, the elaboration of theories about practices and, mainly, critical reflection on lived experiences (Gabiec, 2022).

Regarding this orientation, Imbernón (2001, p. 48-49, our translation) states:

The training will be based on the subjects reflecting on their teaching practice, in order to allow them to examine their implicit theories, their operating schemes, their attitudes, etc., carrying out a constant process of self-evaluation that guides their work. Guidance for this process of reflection requires a critical proposal for educational intervention, an analysis of practice from the point of view of underlying ideological and behavioral assumptions.

Knowledge is a set of concepts, theories, values and beliefs that are built through everyday experiences. However, it is crucial that professionals constantly seek qualification, updating and improvement to achieve better performance. To illustrate and experience the themes, exercises, contextualized questions, problem solving and reading comprehension, the game "Doce Matemática" was used. In this activity, several questions related to the topics discussed were inserted inside balloons, and participants needed to solve these challenges to win the sweets (Gabiec, 2022).

**Figure 2** - "Sweet mathematics" activity



Source : Research collection, 2021.

During the activity, it became clear how crucial stimuli are in classes, sweets being, in this case, an example. Students showed interest in participating, knowing that they would receive something in return. This raises the thought that, with children, this "interest" is even more pronounced when they know that there will be a reward, since, regardless of whether the result was correct or not, all students received their candy. This dynamic highlights the importance of motivational strategies to engage students and make the learning process more engaging and rewarding (Gabiec, 2022). On the other hand, it is important to balance the use of extrinsic motivations with intrinsic strategies to promote lasting learning and a genuine

interest in mathematics. While sweets can be an effective tool initially, it is crucial to cultivate an intrinsic passion for the subject to ensure long-term sustainable learning. The activity concluded by emphasizing that this game can be applied to any mathematical content or other curricular component according to the needs of the moment.

#### **Meeting 4: Fractions**

At this meeting, playful activities related to fractions were developed. The teaching and learning processes reveal that difficulties in relation to this content, as pointed out by Costa (2010), arise due to a lack of understanding on the part of both students and teachers. Both demonstrate ignorance of the different meanings that fractions take on in different learning situations (Gabiec, 2022). In this way, “without fundamental skills to deal with this representation, situations that encourage students to develop a sense of rational numbers are not promoted, creating barriers to their understanding” (Valera, 2003, p. 3, our translation).

However, for understanding of concepts related to fractions to occur, teachers need to know the content and have the teaching skills to approach it, as, in some cases, “teachers struggle with the same difficulties and present the same misunderstandings as students” (Lamon, 2007, p. 633), which ends up compromising the learning of students (Gabiec, 2022).

For this meeting, the following activities were used:

1) Conceptualization of fractions and construction of meaningful learning through chocolate bars: This activity provided a playful, fun and tasty moment, allowing us to observe that a fraction is a division into equal parts.

2) Fraction ruler: Using a fraction ruler, students were able to understand fractions and perform equivalences. During the activity, rulers were created, equivalences and comparisons were explored, and practical activities such as "Who is greater..." and "Which is equivalent to..." were experienced.

3) Identification of fractions: This activity involved the representation of fractions through figures, allowing students, based on the images, to identify the corresponding fractions.

These practical and visual approaches contribute to a more solid and meaningful understanding of the concept of fractions, making learning more engaging and accessible to students (Gabiec, 2022).

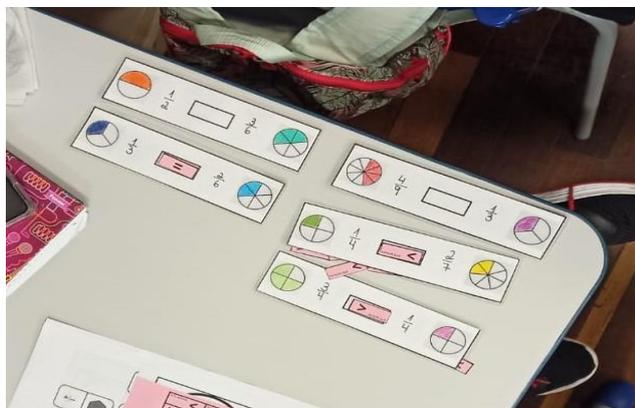
**Figure 3 - Experiencing the identification of fractions**



Source: Research collection, 2021.

4) Equivalence of fractions: The objective of the activity was for students to read fractions and relate them to their visual representations. During the activity, students were encouraged to observe and compare fractions, determining whether one was larger, smaller, or equivalent. The suggestion to use fraction rulers together was provided to facilitate a deeper understanding on the part of students during this activity (Gabiec, 2022). This practical and visual approach was used to strengthen the understanding of the relationships between fractions, making it easier to identify their magnitudes and equivalences.

**Figure 4 - Experiencing the equivalence of fractions**



Source: Research collection, 2021.

5) Quantities of a fraction: With this activity, students gained a complete understanding of the function of the denominator and numerator. In the case of the denominator, they divided the total number of carts into equal groups, while the numerator represented the specific part taken by each student. This practical approach provided a concrete and visual understanding of the relationships between the numerator and the denominator, clarifying the function of each element in representing fractions (Gabic, 2022).

6) Fraction dominoes: The objective of this game was to relate the written fraction with its drawing.

During the activities, it was noticed that many of the future teachers/literacy teachers did not have the necessary knowledge about fractions. However, throughout the activities, they discovered that learning and teaching fractions can be an easy and enjoyable task. This finding highlights the importance of practical and playful approaches in the learning process, providing educators in training with a more positive and effective experience in understanding and transmitting this content (Gabiec, 2022).

### **Meeting 5: Basic addition and subtraction operations**

At this meeting, the focus was on addition and subtraction operations. Considering that children already arrive at school with an understanding of these operations and frequently use their fingers to perform calculations, it is essential that teachers clearly understand these concepts. Respecting the knowledge brought by children, teachers play a crucial role in appropriating this mathematical knowledge. They must be aware of appropriate methodologies to improve the understanding of addition and subtraction, thus contributing to effective mathematical learning, especially through playful approaches (Gabiec, 2022).

It is worth highlighting that:

The construction of numbers, the decimal number system and the operational properties with natural numbers, in our opinion, are fundamental topics for good student performance at the beginning of schooling. Therefore, the role of the teacher who works at this level is even more relevant, since, if he does not know in depth the content and methodologies that can be used, it will be difficult for him to provide students with quality cognitive and affective development. Sometimes, this does not occur in initial training courses for teachers who work in the Initial Years of Elementary School, and, in this sense, the search for continued actions becomes a pertinent and fruitful alternative (Leivas, 2019, p. 2, our translation).

Therefore, the following materials were explored:

1) Place value table: which allows the student to understand additions and subtractions and their respective exchanges, for example, why 11 units cannot remain in the unit's "little house".

2) Ladybug sum: this material, generally used to introduce sum in the initial grades, makes the student quantify numerals and add them.

**Figure 5** – Adding with the ladybug



Source: Research collection, 2021.

3) Adding and subtracting: this material, which also uses the introduction of addition and subtraction, allows the student to quantify, add and subtract in a concrete way.

**Figure 6** - Adding and subtracting in a concrete way



Source: Research collection, 2021.

Regarding this meeting, it was observed that the operations of addition and subtraction are known to everyone; however, when approaching the explanation of changing units to tens or from tens to hundreds, students demonstrated insecurity, often resorting to the expression

"go up by one". Given this discomfort expressed by the students, it was decided to resume the game "Never Ten" to improve understanding regarding exchanges during operations (Gabiec, 2022).

### **Meeting 6: Basic operations multiplication and division**

At this meeting, multiplication and division operations were discussed. Considering that the role of the teacher in the early years of elementary school is to promote understanding of the ideas that involve mathematics, including the signals, signs and symbols present in mathematical operations, it is important to recognize the limitations faced by these professionals. Often, teachers in the initial years restrict themselves to the teaching proposed in the textbooks adopted by the school (Gabiec, 2022).

Given this, Dante (1996, p. 52-53, our translation) states that "the textbook has become the main and, in many cases, the only instrument of support for teaching work", as part of the teachers, due to their precarious training, or your difficulty with the content, the books are a kind of instruction manual for what should be taught and how to do it.

To avoid exclusive dependence on the textbook and promote engaging activities, a conversation was started highlighting that each child learns in a unique way. When approaching multiplication, the importance of initially presenting it as the addition of equal portions was emphasized. After understanding this concept, we move on to the next stage, addressing multiplication itself. This same reasoning is applied to the division process. It is important to highlight that when facing problems involving these ideas, the child is given the opportunity to move between multiplication and division. This approach aims to make learning more adaptable to children's different ways of learning (Gabiec, 2022).

After the moment of conceptualizing multiplication and division, in which students were able to share their practices, desires and successes, we moved on to the activities of creating materials related to the subject: 1) Making the 2 times table using sums, which can be used for all other tables; 2) Knowledge and understanding of the Pythagorean multiplication table. To study the division, golden material was used. To contextualize the multiplication and division mechanism, contextualized activities were developed for their application in internship classes.

At this meeting, it was observed that students have knowledge about the mechanism of multiplication and division, however, some do not feel completely confident teaching these concepts to future students. The predominant difficulty identified was related to explaining the division mechanism. Therefore, this topic was approached specifically, seeking to overcome

perceived weaknesses and provide greater confidence to students in transmitting these concepts to future learners (Gabiec, 2022).

### Meeting 7: Geometric figures and area

At the last meeting, the topic covered was geometric figures and the area of figures. To start, logical blocks were used, which offer the opportunity to explore not only geometric figures, but also colors and thicknesses. After this initial contact with the main geometric shapes (triangle, square, rectangle and circle), students were introduced to a figure matching game, similar to a puzzle, which can be used to introduce geometric figures to young children. This activity gives the child the opportunity to identify the figures and relate them according to the size of the model sheet (Gabiec, 2022).

Figure 7 - Geometric Figure Puzzle



Source: Research collection, 2021.

Afterwards, the story of Tangram was shared with the students, and then they created this resource themselves. The students had the freedom to manipulate the Tangram, forming different figures. Later, they were challenged to assemble a square using two pieces, then three pieces, four pieces and, finally, create other possibilities for figures and shapes. In the last activity, the area of several figures was calculated using graph paper or graph paper. This activity surprised the students, as many had no idea how simple it could be to teach the concept of area of a figure (Gabiec, 2022).

### Closing and evaluation of workshops

To conclude the activities, a brief discussion was held about the meetings that took place, emphasizing the importance of constantly learning and seeking help when difficulties arise. It was highlighted that student learning in the initial years depends on the stance adopted

by educators. This moment was very rewarding, as the students demonstrated how meaningful the meetings were for them. Reflection on the importance of continuous learning and collaboration in overcoming challenges highlighted the relevance of the role of the educator in the training of future teachers (Gabiec, 2022). Student X stated:

Teacher, I never imagined some of these activities, like, for example, never ten, which can be used with so many varieties; and these fraction activities were top notch. I used them all in my internship, and even the teacher liked them and said she had never seen some of them. The teacher could give more of these workshops, she added a lot to us [sic!] (our translation).

Participants were also asked to respond to an online form, which aimed to probe the validity of the meetings and plan future actions, as the school requested the continuation of this project in the coming years. In general, through the evaluation questionnaire, it was possible to observe that the workshops/meetings were of great value to the students, contributing significantly to their training and helping to prepare them for internships, which were a more immediate need. However, more than that, the workshops proved to have transformative potential for long-term educational practice. In a certain sense, they represented a paradigm shift in relation to traditional prejudices regarding the teaching of mathematics. This change in perspective signals a more innovative and effective approach to teaching the subject (Gabiec, 2022).

With the workshops, other objectives were achieved, such as creating a space for exchanging experiences, desires and successes, where students always had examples or experiences to share with the group. The contextualization of the content, the experience of the activities and the creation of materials provided didactic and methodological means that will contribute to their practices in the classroom. A connection was established between what is taught and its application in everyday life, highlighting the significant presence of mathematics in the early years and its fundamental importance for subsequent learning and, therefore, students' academic success. In short, the learning of these future teachers/literacy teachers on the topics covered was permeated with meaning and understanding (Gabiec, 2022).

The challenges encountered in executing the project mainly refer to the temporal aspect, which would require an extension both in the duration of each meeting, enabling the adequate creation of teaching materials, and in the total number of meetings. Other topics relevant to teaching in the early years, which students do not yet have a complete understanding of, were not covered due to time constraints (Gabiec, 2022).

## Final remarks

The proposal to provide mathematical workshops originated from the perception and feedback of some fellow teachers who work in the initial years. These professionals reported facing difficulties in teaching certain mathematical content. Furthermore, there was a lack of preparation of interns on the Teacher Training course when starting their internships in schools. These findings were the main drivers for the creation of these workshops, aiming to fill these gaps and improve the quality of teaching in this area.

From these considerations, the idea of complementing the training of students at Colégio Túlio de França who are enrolled in the Teacher Training course emerged. The objective is to help them understand and prepare lesson plans related to the contents of this curricular component, filling the gaps identified in their knowledge.

Considering that students will not only undertake internships, but will also be future literacy teachers, the idea was to offer workshops where they would have the opportunity to express their weaknesses, share their experiences and exchange learning. This approach aims to create an environment conducive to professional development and improvement of the skills necessary for the role of future educators.

To achieve this purpose, the workshops had the general objective of contributing to the formative process of teaching students mathematics through actions based on problem-solving practices and the use of games, toys and activities, aiming to promote meaningful and meaningful learning. Given this objective, it can be said that it was achieved. Through games, toys and games, students were able to understand and attribute meaning to mathematical content related to the early years. There was notable participation, and students reported an improvement in their mathematical understanding, as well as greater confidence in dealing with the content covered.

It is believed that this project has contributed significantly to the training of future teachers/literacy teachers. In addition to identifying weaknesses, solutions were actively sought. The project is being reconsidered and rethought for future editions, aiming to further improve the approach and benefits provided to participating students.

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