

Understanding multiplication in initial teacher training: discussions from the Mathematics Club¹

A compreensão da multiplicação na formação inicial de professores:
discussões a partir do Clube de Matemática

Comprender la multiplicación en la formación inicial del profesorado:
debates del Club de Matemáticas.

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ABSTRACT

This article presents an excerpt from a master's research project in Mathematics Education conducted at the Mathematics Club (CluMat) of the Universidade Federal de Santa Maria (UFSM), a formative space focused on the initial training of Mathematics teachers. The study aims to analyze undergraduate students' initial understanding of multiplication, based on moments of study and theoretical discussions. The research is grounded in Historical-Cultural Theory, Activity Theory, and the proposal for organizing teaching through the Teaching-Oriented Activity. Data collection took place between May and December 2023, with the participation of undergraduate students from different courses, as well as coordinating professors, graduate students, and a basic education teacher. The analysis was organized into episodes and scenes that highlight significant moments in the participants' formative process. The results indicate that the collective discussions made it possible to broaden the undergraduate students' understanding of the concept of multiplication, overcoming the view restricted to memorizing multiplication tables and favoring reflections on the organization of the teaching of this concept in the Early Years of Elementary School. Furthermore, they highlight the importance of collaborative learning spaces in initial teacher training.

Keywords: Multiplication; Initial Training; Mathematics Club.

RESUMO

Este artigo apresenta um recorte de uma pesquisa de mestrado em Educação Matemática desenvolvida no contexto do projeto Clube de Matemática (CluMat) da Universidade Federal de Santa Maria (UFSM), espaço formativo voltado à formação inicial de professores que ensinam Matemática. O estudo teve como objetivo analisar as compreensões de acadêmicos em formação inicial acerca do conceito de multiplicação a partir de momentos de estudo e discussões teóricas. A pesquisa fundamenta-se na Teoria Histórico-Cultural, na Teoria da Atividade e na proposta de

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organização do ensino por meio da Atividade Orientadora de Ensino. A produção de dados ocorreu entre maio e dezembro de 2023, com a participação de licenciandos de diferentes cursos, além de professoras coordenadoras, estudantes de pós-graduação e uma professora da Educação Básica. A análise foi organizada em episódios e cenas que evidenciam momentos significativos do processo formativo dos participantes. Os resultados indicam que as discussões coletivas possibilitaram ampliar a compreensão dos licenciandos sobre o conceito de multiplicação, superando a visão restrita à memorização da tabuada e favorecendo reflexões sobre a organização do ensino desse conceito nos Anos Iniciais do Ensino Fundamental. Além disso, evidenciam a importância de espaços formativos colaborativos na formação inicial de professores.

Palavras-chave: Multiplicação; Formação Inicial; Clube de Matemática.

RESUMEN

Este artículo presenta un extracto de un proyecto de investigación de maestría en Didáctica de las Matemáticas desarrollado en el Club de Matemáticas (CluMat) de la Universidad Federal de Santa Maria (UFSM), un espacio formativo enfocado en la formación inicial del profesorado de Matemáticas. El estudio tiene como objetivo analizar la comprensión del concepto de multiplicación por parte de estudiantes de pregrado en su formación inicial, a partir de momentos de estudio y discusiones teóricas. La investigación se fundamenta en la Teoría Histórico-Cultural, la Teoría de la Actividad y la propuesta de organizar la enseñanza mediante la Actividad Orientada a la Enseñanza. La recolección de datos se realizó entre mayo y diciembre de 2023, con la participación de estudiantes de pregrado de diferentes cursos, así como de profesores coordinadores, estudiantes de posgrado y un docente de educación básica. El análisis se organizó en episodios y escenas que resaltan momentos significativos en el proceso formativo de los participantes. Los resultados indican que los debates colectivos permitieron ampliar la comprensión del concepto de multiplicación por parte de los estudiantes de pregrado, superando la visión limitada a la memorización de las tablas de multiplicar y fomentando la reflexión sobre la organización de la enseñanza de este concepto en los primeros años de la educación primaria. Asimismo, resaltan la importancia de los espacios de aprendizaje colaborativo en la formación inicial del profesorado.

Palabras clave: Multiplicación; Formación Inicial; Club de Matemáticas.

1 Introduction

The initial training of mathematics teachers is of great relevance and requires ongoing research, especially regarding the understanding of mathematical concepts and how to organize them for teaching. In this context, this article presents an excerpt from a master's thesis in Mathematics Education that investigated the training processes of future teachers within the Mathematics Club (CluMat) at the Universidade Federal de Santa Maria (UFSM). The research focused on understanding how student teachers who are part of CluMat acquire knowledge related to the organization of multiplication instruction in the early years of elementary school, considering the processes of study, discussion, and planning developed collectively.

The analysis presented here gains relevance when considering that the concept of multiplication, often associated solely with memorizing the multiplication table, involves a broader historical, social, and conceptual construction. Understanding the essence of this concept and its different approaches in teaching is fundamental for future teachers to develop pedagogical practices that foster meaningful student learning. Thus, discussing how pre-service teachers reflect on the origin, meaning, and possibilities of teaching multiplication contributes to broadening discussions on the initial training of teachers who teach mathematics.

The training space in which the research was conducted is the Mathematics Club (CluMat), an extension project that brings together pre-service teachers, graduate students, elementary and secondary school teachers, and university faculty. In this space, participants engage in theoretical studies, collective planning, develop activities in schools, and engage in moments of reflection on the practices carried out. Thus, CluMat constitutes a space for collaborative training, in which future teachers have the opportunity to discuss mathematical concepts, reflect on teaching, and share experiences that contribute to the construction and consolidation of learning among teacher candidates and students in the basic education system.

In this context, this article aims to analyze the understandings of pre-service teachers regarding the concept of multiplication based on moments of study and theoretical discussions, considering the implications for teaching in the early years of elementary school. Based on an analysis of the interactions that took place during the Mathematics Club meetings, we seek to highlight elements of the teacher candidates' educational process, as well as the reflections that emerge when discussing the organization of teaching this concept.

Following the introduction, the article presents the theoretical framework underpinning our research, the methodology characterizing our participants and the approaches taken, the organization of the article and how the analysis was conducted, followed by an analysis of the scenes depicted in the episode, and finally, the concluding remarks.

2 Theoretical Reference

The theoretical foundations of our work are based on Vygotsky's Historical-Cultural Theory (HCT), Leontiev's Activity Theory, and Moura's Teaching Oriented Activity (TOA), as a proposal for organizing instruction. We also draw upon an understanding of the initial training of teachers who teach mathematics in the early years of elementary school based on the TOA.

Vygotsky, in his theory, argues that it is the relationship between individuals of the same species that enables human beings to develop their higher psychological functions. Since nature does not provide sufficient conditions for human beings to live in society, they must appropriate what has been historically produced by previous generations.

This historical appropriation takes place throughout one's entire life; it is not within a short period of time that one comes to know everything that has been built, but rather over the course of history. For this to happen, generations must communicate, and this is only possible because humans possess higher psychological functions—specifically human, mediated, and produced through interpersonal and historical relationships. Vygotsky (2000, p. 81) states that mediation is a central concept for understanding higher psychological functions, such that there is “a process of intervention by an intermediate element in a relationship; the relationship then ceases to be direct and becomes mediated.”

This brings us to the discussion that individual development occurs within a social environment, with the school playing a fundamental role in creating a space for the acquisition of scientific knowledge, based on socialization and cooperation in the process of constructing the social psychological self. In this context, the school encompasses culturally constructed, historically developed knowledge, but it must also pay attention to the specificities of children and the motivations that shape their learning trajectories. These aspects, in particular, interest us in theory, given that our research focused on examining the training of future teachers who will work in school education and the teaching and learning process developed within that space.

In this context, we emphasize that in the learning process, Leontiev (2010) highlights that the individual is only engaged in activity when driven by a need. On this point, Lopes (2009, p. 83) notes that:

[...] this theory is based on the idea that humans feel a need to establish active contact with the outside world and, to maintain their place in it, must produce the means for their survival. This need is always directed toward satisfying his needs, which leads him to act upon and influence the space in which he lives, transforming it; however, in doing so, he also transforms himself. Therefore, it is the individual's activity that determines who he is, because it is linked to his level of development and to his means and forms of organization.

In other words, this theory is based on the idea that humans need to establish relationships with the world around them and, to do so, must belong to it to remain within that context. It can also be understood that their motivation is constantly guided by their needs, leading humans to transform the world and themselves. Thus, it is the individual's activity that determines who they are, since it is linked to their level of development.

In his theory, Leontiev (2010) highlights two types of motives: effective motives and merely comprehensible motives. Motives that do not coincide with the object of the activity are called comprehensible, while those that direct the individual toward the goal of the activity are called effective. Furthermore, the author notes that “[...] comprehensible motives become effective motives under certain conditions, and this is how new motives emerge and, consequently, new types of activity” (Leontiev, 2010, p. 70). This theoretical discussion is pertinent, given that by understanding that the teaching actions developed in CluMat can constitute an activity, we sought, in the research that gave rise to this article, to identify the real needs and motives that lead future teachers to participate in and develop their actions in CluMat.

Based on the premise that human development and the process of cultural appropriation have a historically constructed relationship within the educational process, we recognize that school education enables students to develop theoretical thinking and appropriate the scientific knowledge produced by humanity throughout history. Building on these ideas, and drawing on Leontiev, Moura (1996) proposes the concept of the Teaching Oriented Activity (TOA).

TOA is based on the frameworks of HCT and TOA, designed as a proposal for organizing teaching and learning activities. Based on these theories, we understand that learning does not occur individually or through biological development, but rather through the development of the society in which the individual is embedded.

TOA preserves the characteristics of TA by presenting essential elements “such as the need for cultural appropriation, the motivation to appropriate historically accumulated knowledge, objectives for learning and teaching, and actions and operations that enable the process” (Pozebon, 2014, p. 70). In this context, we understand that the student will only be engaged in a learning activity when the needs and motivations for learning are triggered by the teacher’s instructional activity.

Considering the context of this study, which focuses on the initial training of mathematics teachers, we seek to break with the paradigm that teachers in this field should focus exclusively on teaching their subject area only in the final years of elementary school and high school, but rather that they understand that mathematics education involves all stages of basic education. Based on this understanding, they will have sufficient resources to organize their teaching at any level, moving beyond fragmentation, and realize that it is not only teachers in the early or final years of elementary school who are responsible for whether or not students learn the concepts considered basic in school mathematics.

It is this special way of organizing teaching—in which objectives, actions, and operations are articulated as an activity—that gives the Teaching Oriented Activity the dimension of a formative unit for both students and teachers as they actualize the appropriation of culture within the context of school education. Thus, the mediating quality of the Teaching Oriented Activity characterizes it as an intentional act, which imposes a unique responsibility on those responsible for school education (Moura et al., 2010, p. 220).

When we speak of responsibility, we mean that the teacher is committed to providing students with tools that enable the development of their potential. Furthermore, to promote the appropriation of human culture, the school is a space for learning and social interaction that must be collectively explored by all who are part of it. TOA characterizes this intentionality as a way to guide the teacher within this organization, so as to enable the educational activity to be carried out based on existing knowledge about human processes and to seek to integrate the school, student, and teacher.

What is presented here leads us to believe that a teacher is not born a teacher; they become one over time (Lopes, 2009). In this sense, it is through the relationships they

establish and the object of their activity—teaching—that the individual develops; that is, they must learn (Lopes, 2018). It is during initial training that they begin their journey of acquiring the knowledge needed to become a teacher; however, it is not just any activity within the teacher education program that will make them a teacher, but rather those specifically focused on teaching.

Moura (2002) points out that the teacher can learn pedagogical skills through the principles of didactics and the teaching processes involving TOA. Through it, the teacher can learn to organize themselves and their teaching materials; in this sense, we understand that it shapes both the teacher and the student. Once the individual understands that the primary focus of teaching is instruction, only then can they define the actions and operations to be carried out (Libâneo, 2004).

While conducting research at CluMat, we focused on initial teacher education; therefore, like Lopes (2009), we believe it is important for future teachers to engage with theoretical foundations that serve as a basis for them to conceive of teaching that contributes to the school being viewed as an institution that fosters the intellectual, moral, ethical, and cultural knowledge of the individuals who attend it. Furthermore, the school provides students with opportunities for collective experiences, fostering characteristics and qualities that make them human (Moura et al., 2010).

We understand that CluMat has been established as a space that enables students to become teachers through a collective process, guided by constant reflection on teaching and learning. Teacher training is shaped by the fundamental guidelines for the activities carried out within the space, from planning through to the implementation of activities, including critical reflection. Thus, the future teacher develops into an education professional, eventually attaining the status of teacher (Lopes, 2009).

As the focus of this study, we detail the approach to the concept of multiplication. In studies related to the logical-historical movement, we observed the different forms of multiplication, depending on the trajectories of their peoples. Furthermore, we understand the origin of numbers and operations, which stem from the needs of society at the time. With this, we understand the importance of the logical-historical movement as a relevant element for the appropriation of a concept, so that we may understand it in its essence, and we propose to reflect on the teaching of the context in question.

Furthermore, we believe it is pertinent to present students with this historical context that led to the creation of the concept, in a way that sparks their interest in learning it. Thus, we understand the important role that the teacher plays in achieving this purpose, insofar as they devise and plan activities that enable students to engage in the pedagogical process. In the next section, we outline the methodological approaches of this study.

3 Methodological Approaches

This study is part of a master's research project in Mathematics Education that investigated the training processes of future teachers participating in the Mathematics Club at the Universidade Federal de Santa Maria (UFSM). More specifically, the general objective of the research was to investigate the training of future teachers who are members of the UFSM Mathematics Club within a specific context of organizing the teaching of multiplication for the early years of elementary school.

In this article, we present a segment of the research whose objective is to analyze the understandings of pre-service teachers regarding the concept of multiplication based on moments of study and theoretical discussions. Data collection took place between May and December 2023, within the scope of the activities of the UFSM Mathematics Club (CluMat), a training space that integrates theoretical studies, collective planning, the development of classroom activities, and moments of evaluation of pedagogical actions at the School Mathematics Education Laboratory of the UFSM Education Center. The project develops initiatives aimed both at the mathematical learning of students in Basic Education and at the training of preservice teachers participating in the group. During the period under investigation and to be analyzed in this article, participants conducted theoretical studies on mathematical concepts and on the foundations of Historical-Cultural Theory and Activity Theory, which guide the Club's activities.

The participating group consisted of four scholarship recipients from different degree programs — three from the Bachelor's in Mathematics and one from the Bachelor's in Geography — at various stages of their undergraduate studies, which facilitated the exchange of experiences and the collective construction of knowledge.

In addition, the group included two faculty coordinators of the Math Club project, two master's students, one doctoral student, and a K-12 teacher. The students voluntarily

participated in the research by signing an Informed Consent Form, and their identities were protected through the use of pseudonyms.

Various instruments were used to collect research data, including questionnaires, field diary entries, photographs, recordings of the meetings, and reflective sessions. In this article, the analysis focuses on the transcripts of the audio recordings from the meetings where the text by Moura (2019) was discussed.

Data organization and analysis were conducted through the construction of episodes and scenes, as proposed by Moura (2000). Episodes correspond to analytical segments that highlight significant moments in the participants' learning process, while scenes consist of utterances and interactions that reveal elements relevant to understanding the phenomenon under investigation. Based on this analytical procedure, we selected for this article an episode composed of three scenes, in which the reading of the text, the presence of multiplication in daily life, and the understanding of the essence of this concept are discussed. The next section presents the data analysis.

4 Analysis

In the episode explored here, we seek to discuss the students' reading of the text: "Activities for Teaching Mathematics in the Early Years of Basic Education: Numbers and Operations" by Moura (2019). To do this, we have three scenes: Scene 01 – Comments on the text; Scene 02 – Multiplication in our daily lives; and Scene 03 – The essence of multiplication. In the first scene, we would like the teacher candidates to comment on what they wrote in their journals about the text, since they were supposed to write a summary as a pre-assignment. The second scene of the episode features moments of reflection on multiplication in our daily lives and highlights what they perceive as important for students to know about this concept. In the final scene of this episode, we will discuss the essence of multiplication and its meanings. Thus, we present the first scene below (Table 1).

Table 1 - Scene 1: Comments on the text

Scene description: This scene features discussions about the reading of the section on Multiplication from the book <i>Activities for Teaching Mathematics in the Early Years of Basic Education: Numbers and Operations</i>. Thus, we have the following questions: <i>“What did you note from the text?”</i> and <i>“Did any part catch your attention?”</i>
What did you note from the text? 01. Amélia: From the multiplication table, I noted that it dates back to 2000 B.C. First on clay tablets, I also noted the organization into equal groups and quantities in each group, the arrangement in rows and columns, and the combination of elements. 02. Julia: Since Amélia mentioned it, I’ll share what I noted. Multiplication served the need to manage large quantities. As I mentioned earlier, it was designed to speed up counting and be more efficient than addition, which they already understood. I noted that the origin of the concept of multiplication varied among different people. They created different approaches and mechanisms to solve problems involving the operation. Until it became formalized, so to speak. Then, regarding the mental processes, there are four: grouping, arranging in rows and columns, combining elements, and proportionality. 03. João: I agree with the girls, and as I said before, it was to break down a calculation—seen as large—into smaller fractions. 04. Mariana: I think that’s it; what the girls said is quite comprehensive, and that’s what gives relevance to the multiplication part, given the needs they had. 05. Researcher: Did any part catch your attention? 06. Julia: I read the booklet for the third time. Regarding multiplication, it’s about necessity and why it was created—to manage large quantities—which led to organizing them into groups to make counting easier, and then came the mental processes. 07. Amélia: I really liked the activities; I noticed there were four activities on addition and subtraction, and six on multiplication. 08. Mariana: They’re very dynamic and playful. 09. João: I liked the design of the games—I would never have imagined them—and it’s cool to see them thinking about the student, the student getting into the game and being the firefighter, the Indians, and really experiencing the activity.

Source: Prepared by the author (2025) - Online meeting via Google Meet on October 30, 2023.

Based on this scene, we first highlight Amélia’s comment, in which she mentions the origin of multiplication, dated to 2000 B.C., though she notes that this refers to the multiplication table and actually points to evidence of the earliest records of multiplication. This is because, when we speak of the multiplication table, we imagine that classic structure that everyone studies, memorizes, and uses; but since we are talking about something very ancient, the organization of this concept was found in different forms in each settlement, as it served to meet practical needs for controlling quantities in different communities.

In the text read by the scholars, the origin of the concept in Egypt is presented, dated to 1650 B.C., a civilization that followed Mesopotamia, in which the document records calculations from the Rhind Papyrus, a work by Ahmes. The method they used was duplication, such that:

In two columns, they placed, on the right, the multiplicand, which was successively doubled the number of times indicated in the left column (Gómes ??). Thus, to multiply, for example, 56×25 , we obtain the following columns.

1	56
2	112
4	224
8	448
16	896

To find the result of the multiplication 56×25 , we must select from the left column the numbers whose sum is 25, that is, $1 + 8 + 16$. Finally, we add the corresponding results from the right column: $56 + 448 + 896 = 1400$ (Moura *et al.*, 2019, p. 47).

The idea behind this section is to show what multiplication was like in Egypt and how it developed throughout history. Thus, the multiplication table we know today is something that was systematized over a long period and underwent adaptations, making it easy and quick to learn. The text reflects that this account also helps us understand how multiplication can streamline extensive calculations, which emerged as civilizations and social life developed (Moura *et al.*, 2019).

In statements 02 and 06, Julia adds to what Amélia said, noting that “*multiplication served the need to manage large quantities*,” and as Moretti (2007, p. 97) points out, “understanding the essence of the needs that drove humanity in the search for solutions enabling the social and historical construction of concepts is part of the process of understanding the concept itself.” In other words, this moment in which the scholars are engaging in dialogue and comprehending what they have understood about the emergence of the concept allows them to learn much more than just its history, but also about a process of constitution that is part of culture.

In this regard, it is important for future teachers to understand and internalize the knowledge presented there, because this process enables them to explore possibilities for teaching. In addition to the logical-historical approach, the text also addresses the mental processes the characters discuss in the scene, such as adding equal parts, organizing data into rows and columns, proportionality, and combining elements.

To complement these mental processes and clarify how they can be addressed, the text presents a teaching unit containing game proposals that can be used in class. The

teaching unit is presented through a virtual story, and from there, the activities are developed. Regarding the games, there are four, each with a different objective: the stick game, soccer goal kick, bowling, and multiplication wheel. Thus, in lines 08 and 09, João and Mariana highlight that they liked this part—involving the students in the games—and comment on experiencing the activity. In this sense, we present the next scene (Frame 02), which addresses the practical needs of multiplication in daily life and asks how student teachers could address them with children.

Table 02 - Scene 02: Multiplication in Our Daily Lives

Scene description: This scene features discussions about reading the Multiplication section from the book <i>“Activities for Teaching Mathematics in the Early Years of Basic Education: Numbers and Operations.”</i> Seeking to understand the need for multiplication in our daily lives, we have the question: <i>“How will you help students realize this need to master multiplication? How will they understand that it is important? How will you do this?”</i>	
10.	Amélia: I think that bringing in more practical examples from their daily lives.
11.	Collaborator 1: You can give examples—what fun activities would you do with the children?
	Mariana: A virtual story would be interesting—one of those problems we used to have back in the day.
13.	Amélia: I’d do something related to the market.
14.	Julia: I’d bring activities they could handle, for example, bringing real money and using it to work on concepts. Or even games like sticks or gold material.
15.	João: As the Coordinating Teacher 2 mentioned that time, I always try to think about Geography in everything, because we need to incorporate it. I think I’d set up a little market so they can handle and sell the products. Since they know the six times table, I’d think of something they can buy that costs six reais, so they’ll need to observe the quantity multiplied by the price.
16.	Collaborator 1: But thinking about Geography, Math, and also the market issue you brought up, we can consider the industrialization of food—which is grown in a rural area, then goes to the factory, and then to the market. So, we can explore all these steps until we get to the little market.
17.	João: If we were to do a project on the Christmas tree, we could incorporate Geography with Mariana, explaining the type of tree and where it grows. Then the students could decorate that tree; we could buy the ornaments, the decorations, and the stars.
18.	Contributor 2: With João talking about pine trees, I remembered that we could work on planting, organizing a plantation, determining the number of seeds, thinking about the distance between them, thinking about the rectangular layout, multiplying rows and columns—I’ve already thought about the mental process, I don’t know if I went too far.
19.	Mariana: In this question, regarding the part about birds where the little bird carries the seed, and the pine trees grow, geography also comes into play.
20.	Collaborator 1: If we think about school, we can work with maps and explore the maps within the school.

Source: Prepared by the author (2025) - Online meeting via Google Meet on October 30, 2023.

The scene presented captures the moment when they discuss how to plan an activity in which the child feels the need to use that concept, and where it is part of their daily life. When asking how they would approach this with the children, several ideas emerge that are later implemented in the planning, though they will be discussed at a later time. Throughout the scene, the students were concerned with the resources to be used and the concept being addressed; given that we have studied this previously, it is part of being a teacher.

We believe that this moment of discussion fosters the development and learning of teaching for each individual, as part of a group that shares the same intentions and concerns. We understand the challenges of the current school reality, but we emphasize that shared teaching organization is a practice that would yield benefits if implemented by schools, so that there would be dedicated time and moments for planning within the school environment, followed by an evaluation and reflection on what can be improved. In this regard, Moura (2001, p. 157) argues that,

Teaching activities, therefore, should be the result of collective agreements regarding the desired goals of education. Educational intentionality is, at its inception, the result of multiple factors that come together in a collective purpose to influence or modify behaviors. And this modification, in turn, may serve to alter some aspect of reality, thanks to learning how to perform concrete actions, such as building a tool, performing a surgical procedure, or building roads. In other words, educational intentionalities will bring about changes in individuals who acquire new skills, behaviors, and values, and in objective reality, as a result of these individuals' actions.

The author emphasizes that the teacher's intention regarding the activity is necessary, whether in games, problem-solving situations, virtual stories, or whatever is done in the classroom. In this vein, the collective intentionality of teachers leads students to transform their behaviors and to acquire the knowledge necessary for human development. It is from this that CluMat's collective discussions can influence future teachers to strive in some way to promote quality teaching that engages students' interest.

The final scene of this episode also features a discussion of the text by Moura (2019) mentioned earlier, but now with the intention of understanding whether, after

all the reading and discussion regarding the origin of multiplication, mental actions, and teaching units, there was an understanding of the concept's essence (Table 03).

Table 03 - Scene 03: Essence of Multiplication

Scene description: Here we are still reading the section on multiplication from the book <i>"Activities for Teaching Mathematics in the Early Years of Basic Education: Numbers and Operations."</i> Seeking to understand the essence of multiplication, we ask the students: <i>"What would be the essence of multiplication?"</i>	
14.	Julia: To make it easier to add large quantities? That's how I see it.
15.	Researcher: Does anyone have a different opinion, or do you agree with Julia?
16.	Mariana: I agree.
17.	Amélia: I agree.
18.	Contributor 1: Put the key point in the text so we can see it.
19.	Researcher: The text tells us that the essence isn't in the different techniques but in understanding what it means to multiply—do you agree?
20.	Contributor 2: I've been thinking here, what does understanding what multiplication means involve? What do we need to develop with the children so they can reach this understanding of what multiplication means?
21.	João: I think students understand that it's about breaking down a large sum to make the calculation easier. Because it saves time and gets the answer faster.
22.	Contributor 2: And how do we understand what you've brought up?
23.	João: By practicing, they should associate addition with multiplication.
24.	Contributor 2: Right, that's our first mental operation.
25.	Contributor 1: If you were to work on multiplication, would you use the mental processes or the method you learned in school?
26.	Mariana: More along the lines of what I learned in school. Because I'd already have an idea of what it would be like.
27.	Amélia: I'd present both ways—something more playful, but without leaving the board out, like in the combination where I need to go to the board.
28.	Julia: I think I'd work on something more playful, since I like that part better. Then I'd move on to the more theoretical part at the board. And right at the end, the multiplication tables.
29.	João: Well, what Julia said. First, I'd use the object to help them make connections, keeping it more playful, and then I'd move on to the more theoretical part.

Source: Prepared by the author (2025) - Online meeting via Google Meet on October 30, 2023.

After comments on the text and discussions by everyone, we returned to the essence of multiplication, which is important for understanding the true meaning of the concept presented. Julia, in utterance 14, says that it is to facilitate addition, and all the other students agree with her, without adding anything. In this sense, in utterance 19, the scholars' thinking about the meaning of multiplication is stimulated, and then we return

to what the authors Moura et al. (2019, p. 47) state: “[...] the essence lies not in the different techniques but in understanding what it means to multiply [...].”

Thus, we discuss from this point on what is important is understanding the meaning of this concept, although, as teachers, we need to think of ways to present it to students. Our Collaborator 2, in utterance 20, asks how we manage to understand the meaning of multiplication or even how we get children to think about it; at this moment during the meeting, there was a long silence, as if they were searching for the answer. João, in utterance 21, finally comments on the subject and says that students need to understand that the goal is to reduce a very large sum, adding in utterance 23 that students realize this by practicing calculations, associating addition with multiplication, which is the first mental action.

The participants’ remarks so far reveal that, in no subject studied up to that point, had a connection been established with this content from the early grades, even though it is used constantly in the later grades and in high school. We point out that the main concern with multiplication is whether the student knows the multiplication tables, but the “why” of doing so is set aside, causing countless students to never truly understand. Upon reading this section, even while observing each mental process and the progression of their discovery, the students were hesitant to comment on the meaning of multiplication; this is where CluMat plays a role in enabling its members to think about routine topics from a different, more theoretical perspective.

According to Lopes (2009, p. 74),

[...] the teacher (or future teacher), upon acquiring new knowledge, reconfigures teaching practices, which, when put back into practice, are already transformed, as they have taken on a different quality, characterizing a new educational practice. And since we are dealing with initial teacher education, this transformation will occur in pedagogical practice through the shared reinterpretation of established knowledge.

The author notes that as they acquire new knowledge, teachers or future teachers modify their teaching practices, and CluMat at this point caused them to reflect on the true meaning of multiplication. We believe that from this point forward, they can consider alternative approaches to teaching and learning this concept, and that their pedagogical practices will influence the learning developed by their students in their classroom.

Collaborator 1 asks whether, when they work on multiplication in schools, they would look at each mental action or think of other ways; what surprises us is that Mariana, in statement 25, would work as she learned in school, since she would already know how to do it, while Amélia, in utterance 26, refers to working with both approaches: the way she learned in school and the method based on mental actions. We can note that Mariana is pursuing a Bachelor's degree in Geography and often mentions her difficulties with mathematics; perhaps she prefers to stick with traditional teaching methods because it is something she is already familiar with. Julia and João, in statements 28 and 29 respectively, comment that they would focus on the playful aspect before mental actions; here, they are thinking about techniques to support the methodology rather than the meaning itself.

Finally, even though they commented on what they understood from the text and were able to explain the meaning of multiplication at that moment, we believe there are still gaps in their learning. When they read the text, they did not pay much attention to the theoretical part and focused on the pedagogical practices described in the text; however, throughout the development of classroom activities, they indicated that they were able to express themselves satisfactorily with the children.

This episode addresses the construction and discussion of the concept of multiplication, designed for the early grades, from its discovery and use by different people to the systematization of their mental processes. It also reflects on how to engage students in approaching the concept in question, linking their daily lives to the needs of the era in which it was used. Sharing the study highlights different ways of thinking about and organizing an activity. Furthermore, what one person understands may differ from another's, and thus, when knowledge is shared, it converges and is reflected in their practices both inside and outside the classroom.

5 Final Considerations

In this master's research, we sought to examine the initial training of preservice teachers who are part of CluMat and the pathways that support this process. Consequently, the study was guided by the general objective: To investigate the training of future teachers who are part of UFSM's CluMat within a specific context of organizing multiplication instruction for the early years of elementary school. Meanwhile, our article,

as a segment of the research, aims to analyze the understandings of students in initial training regarding the concept of multiplication based on moments of study and theoretical discussions.

The analyses showed that the reading and discussion of the texts that formed the basis of the group's theoretical sessions enabled the students to reflect on the concept of multiplication beyond the memorization of the multiplication table, considering its historical origins, its purposes, and the mental processes involved in its understanding. This process fostered a broader understanding among the pre-service teachers regarding the meaning of the concept and the importance of its approach in elementary school.

It was also evident that group discussions helped participants share ideas, questions, and different ways of approaching the teaching of multiplication. This process of dialogue and reflection fosters the construction of new knowledge and helps future teachers devise teaching strategies that bring the concept closer to the students' reality.

Regarding the study of the concept of multiplication — seemingly simple, yet rarely explored in depth in the Mathematics Education program — did it enable future teachers, within the context of the project, to see themselves as learners of what they already know? We can analyze and answer that yes, CluMat brought aspects to be discussed and perhaps reorganized regarding this topic. But beyond that, through its shared and formative activities, it enabled the students to collectively appropriate numerous elements and knowledge inherent to the teaching of mathematics.

Finally, it is worth noting that CluMat stands out as a relevant training space in initial teacher education, as it promotes opportunities for study, planning, and reflection on teaching practice. The interactions analyzed indicate that participation in this collective helps student teachers develop a more critical and well-founded understanding of the organization of mathematics education.

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