Article

Mathematics marks from the schooling process and its influences on teaching practice

***Rayane de Jesus Santos Melo[1], **Keli Cristina Conti[2], ***Carmen Lúcia Brancaglion Passos[3]**

*Federal University of Maranhão (UFMA), São Luís-MA, Brazil
**Federal University of Minas Gerais (UFMG), Belo Horizonte-MG, Brazil
***Federal University of São Carlos (UFSCar), São Carlos-SP, Brazil

Abstract
This article, an expansion of the text "The marks of Mathematics in the schooling process and their influences on teacher training and practice", presented in the International Seminar on Research in Mathematics Education (Sipem), stems from a Curricular Activity of Teaching, Research and Extension Integration (Aciepe) and presents the objective of identifying, from written narratives, the marks of Mathematics of the schooling process and how they influence, or have influenced, the teaching practice. We sought to hear from the participants what they had to say about the ways of teaching Mathematics in their classrooms; what materials are used; and which practices are remembered from their schooling process. The research has a qualitative approach, and the data was constructed through an invitation to write a narrative, sent to the 20 participants, presented in this article with fictitious names. The narratives were analyzed from two focuses: "the practices of teaching experienced in the schooling process"; and "the influences of the marks from the school Mathematics in teaching practice". The invitation to write enabled the participants the movement of looking at themselves, remembering their experiences, producing stories and reflecting on their formation and constitution processes. It is expected that this article contributes for teachers in practice and/or undergraduate students to perceive how much writing narratives and remembering and sharing experiences with Mathematics in a study group can become a formative moment for the expansion of their repertoire of knowledge and for reflection on their teaching practice.

Keywords: Mathematics Education, Narratives, Relation with Mathematics, Teaching practice.

[1] Assistant Professor in the Department of Biological Sciences at the Federal University of Maranhão (UFMA). Member of the Study and Research Group in Mathematics Education (GEM – UFSCar). ORCID: https://orcid.org/0000-0002-8080-3086. E-mail: rayane.melo@ufma.br
[2] Assistant Professor in the Department of Teaching Methods and Techniques at the Faculty of Education (FAE) of the Federal University of Minas Gerais (UFMG). Member of the Study and Research Group in Mathematics Education (GEM – UFSCar). ORCID: https://orcid.org/0000-0001-5662-2923. E-mail: keli.conti@gmail.com
[3] Full Professor - Senior - in the Department of Theories and Pedagogical Practices and in the Graduate Program in Education at the Federal University of São Carlos (UFSCar). Coordinator of the Study and Research Group in Mathematics Education (GEM – UFSCar). ORCID: https://orcid.org/0000-0002-5501-3584. E-mail: carmen@ufscar.br

1. Introduction

The article was expanded based on discussions from the text "The marks of Mathematics in the schooling process and their influences on teacher training and practice". These discussions took place within the scope of Working Group 07, Teacher Training in Mathematics, of the Brazilian Society for Mathematics Education (BSME), during the VIII International Seminar on Research in Mathematics Education (VIII Sipem). The article presents a research study conducted as part of a Curricular Activity of Teaching, Research and Extension Integration (Aciepe)[4].

There are numerous marks that we carry with us throughout our lives, and they are what shape and make us who we are. Some of them are left by different individuals, for example, from our family environment, our educational and academic journey, and/or our experiences in the workplace; while others are self-imposed.

Just like Moura (2018, p. 209), we believe that the "marks left by people in our life journey, in some way, impact our choices, attitudes, decision-making, and can be seen in our actions". Therefore, it is necessary to remember and reflect upon these marks to recognize their influences on our actions and thoughts in the present time and on our future perspectives, as well as to make sense of what has happened and what is currently happening (PASSEGGI, 2021).

In this sense, we conceive narrative as a way to relive a past that has left marks, aiming not only to recall events but also to ascribe meaning to the experiences we have lived and that reshape our lives. Nacarato and Passeggi (2013) assert that, when we create narratives, we not only bring forth the meanings we ascribe to our experiences but also the history of a community, the ideas of a collective, and this contributes to understanding how we have been shaping ourselves over time.

According to Benjamin (2012, p. 216), every narrative is laden with intentionality, which may not be explicit to the reader but is always present. Furthermore, based on the author, a narrative "always carries with it, in an open or latent form, a utility. This utility may sometimes consist of a moral lesson or practical suggestion, or even a proverb or guideline for life [...].". Therefore, a person who narrates the events experienced by himself/herself, in the form of oral or written communication, can understand the utility of his/her narrative for comprehending his/her process of human development, reconstructing the path he/she has traveled, and giving it new meanings.

Regarding teacher education, Nacarato and Passeggi (2013, p. 291) argue that "different authors have discussed how much teachers are influenced by models of teachers with whom they lived during their student trajectory [...]", that is, when we start studying in teacher education programs, we already carry with us a classroom culture and a pedagogical tradition that we have appropriated from our teachers during our schooling. In light of this understanding, the authors argue that, in the teacher training process,

> [...] if the representations and beliefs constructed throughout schooling are not problematized and not subjected to reflection

[4] Conducted with support from PROEX-UFSCar. Process No. 23112.018496/2020-68.

> […], future teachers may continue to reproduce teaching practices in Mathematics that they experienced and that often left negative marks on them regarding this subject (NACARATO; PASSEGGI, 2013, p. 291).

Cunha (1997, p. 189) suggests that when a teacher organizes narratives of lived experiences, whether about teachers who marked them or pedagogical practices experienced during their schooling, they have the possibility of experiencing a profoundly pedagogical and formative process, because "through narrative, they discover the meanings they have attributed to the events they have experienced, and, thus, they rebuild their understanding of themselves". Additionally, Kenski (1994, p. 47) adds that analyzing and discussing the past allows teachers to

> [...] take initiatives to overcome specific issues, reformulating one's personal conceptions about how they teach, their relationship with the subject, the methods they use to assess their students, etc. Additionally, it involves reclaiming the image of a "good teacher," constructed based on the interactions made throughout their entire educational journey.

Oliveira (2011, p. 291), supporting the idea of the importance of reflecting on the marks of the past in teacher training, states that there are different types of records that can be used, such as "teacher narratives, autobiographies or school life stories, classroom ethnography, teaching cases, and the explicit discussion and reflection on what we call significant episodes". The author also adds that:

> [...] these tools come to play a significant mediating role in the training and professional development of teachers, serving as a reflective element for the future practices of pre-service teachers. They help to alleviate the anxiety that often occurs in teaching professionals, especially during the initial years of teaching. In this sense, the self-forming role of these tools is undeniable, as teachers generate knowledge and share the knowledge produced by other groups (OLIVEIRA, 2011, p. 291-292).

Passos, Oliveira and Gama (2013, p. 333) emphasize the importance of Mathematics teachers writing about what they refer to as "experiences with Mathematics". According to the authors, when teachers write, they "reveal how they conceive their learning and certain didactic activities as students in Basic Education" (PASSOS; OLIVEIRA; GAMA, 2013, p. 333). They also add that "this process of pedagogical reflection allows them to understand the consequences in their teaching practice" (PASSOS; OLIVEIRA; GAMA, 2013, p. 333) and "also enables them to design new teaching strategies, and reveals evidence of the expansion of the knowledge repertoire necessary for professional practice" (PASSOS; OLIVEIRA; GAMA, 2013, p. 333).

Figueiredo and Leite (2019, p. 3) explored the relation between affectivity and teaching by examining the marks left by Mathematics based on narratives from two teachers about unforgettable teachers, and they assert that:

> Teaching is the daily practice of personal relationships, filled with meaning; they form and transform. If students are engaged in academic success, both teacher and student are subjects of that action. The ways in which academic outcomes affect teachers are linked to the ways they affect their students.

Therefore, our objective in this article is to identify, through written narratives, the marks of school Mathematics on the schooling process and how they influence, or influenced, teaching practices. Specifically, based on Nacarato and Passeggi (2013, p. 289), we were interested in hearing from the teachers what they had to say "about their schooling – what were the forms of Mathematics instruction in their classrooms; what materials were used, and what practices they remembered".

We believe that allowing teachers to remember the past through the act of writing a narrative contributes to their quest for knowledge that has been acquired and can be valued for the development of their teaching practice. It also helps them identify knowledge that needs to be deconstructed and redefined (NACARATO; PASSEGGI, 2013). Nonetheless, we believe that understanding the life stories of other teachers and "perceiving how past experiences have influenced their professional practices helps others to reflect and identify the issues encountered in their roles as educators" (KENSKI, 1996, p. 48).

We hope that this article contributes to helping teachers in training or in professional practice realize how writing narratives and the process of remembering and sharing experiences within a study group can become a formative moment for expanding their knowledge repertoire and for reflecting on their teaching practice.

We will now present some information about the context and the participants of this research, and subsequently, we will discuss the marks of the Mathematics schooling process by analyzing the teachers' narratives.

2. The context and the research participants

The proposal for this article emerged within the context of a Curricular Activity of Teaching, Research and Extension Integration (Aciepe) titled "Teaching and Learning Processes: Statistics in Early Childhood Education and Initial Years of Elementary School". It is linked to the Pro-Rectory for Extension at the Federal University of São Carlos (UFSCar). The activity was organized by Professors Ph.D. Keli Cristina Conti and Ph.D. Carmen Lúcia Brancaglion Passos. It was integrated with two other projects: "Teachers Who Teach Mathematics in the Initial Years of Elementary School: Formative Dimension in their (Auto)Biographical Narratives"[5] and "Narratives of teachers in the exercise of teaching and in the initial teacher training and the social dimensions in Mathematics Teaching in the Initial Years of Elementary School"[6].

With the principle of the inseparability of teaching, research and extension in mind, and aiming to impact the education of the university community and the generation of knowledge, UFSCar holds various Aciepe activities as complementary curriculum activities that bring together university professors,

[5] Postdoctoral project by Professor Ph.D. Keli Cristina Conti.
[6] CNPq Productivity Research Grant project by Professor Ph.D. Carmen Lúcia Brancaglion Passos.

undergraduate and postgraduate students, and partners from different segments of the external community on a semester-by-semester basis. An Aciepe with a duration of 60 hours provides curriculum credits to undergraduate students and issues certificates for postgraduates, Basic Education teachers, as well as other external participants.

The development of the Aciepe described here, strictly following health guidelines, took place in a remote mode during the COVID-19 pandemic from November 9, 2020 to January 16, 2021, with weekly meetings. Its main objective was to empower teachers who teach Mathematics, with a focus on the teaching and learning of Statistics in Early Childhood Education and in the Initial Years of Elementary School. It was not a course for teachers, but rather the establishment of a continuous training space with practicing teachers, pre-service teachers, and postgraduates. We believe that giving teachers the opportunity to share their experiences with others and considering them to expand the participants' knowledge is an important role that the public university can play.

The teaching practice is deeply rooted in the space and time in which the teacher's work takes place, and is based on their knowledge and on the know-how built through teaching. That is why we argue that a training proposal needs to maintain dialogue between participants, and narratives (oral or written) are conducive to that.

The participants in the Aciepe included undergraduate students from the Pedagogy, Mathematics, and Special Education programs, as well as other interested individuals: Early Childhood and Elementary School teachers, Mathematics teachers from both public and private schools, and postgraduate students. Especially, due to the remote nature of the meetings, participants from four Brazilian states were able to register and take part, which was previously impossible with in-person meetings.

20 participants completed the activities: 4 students from UFSCar and 16 external participants: 19 females and 1 male. 15 of them resided in the state of São Paulo; 3, in Minas Gerais; 1, in Espírito Santo; and 1 participant, in the state of Maranhão. It is worth noting that, following research ethics guidelines, all participants are presented in the article with fictitious names, and have signed the Free and Informed Consent Form (FICF)[7], authorizing the use of their narratives as long as their anonymity is preserved.

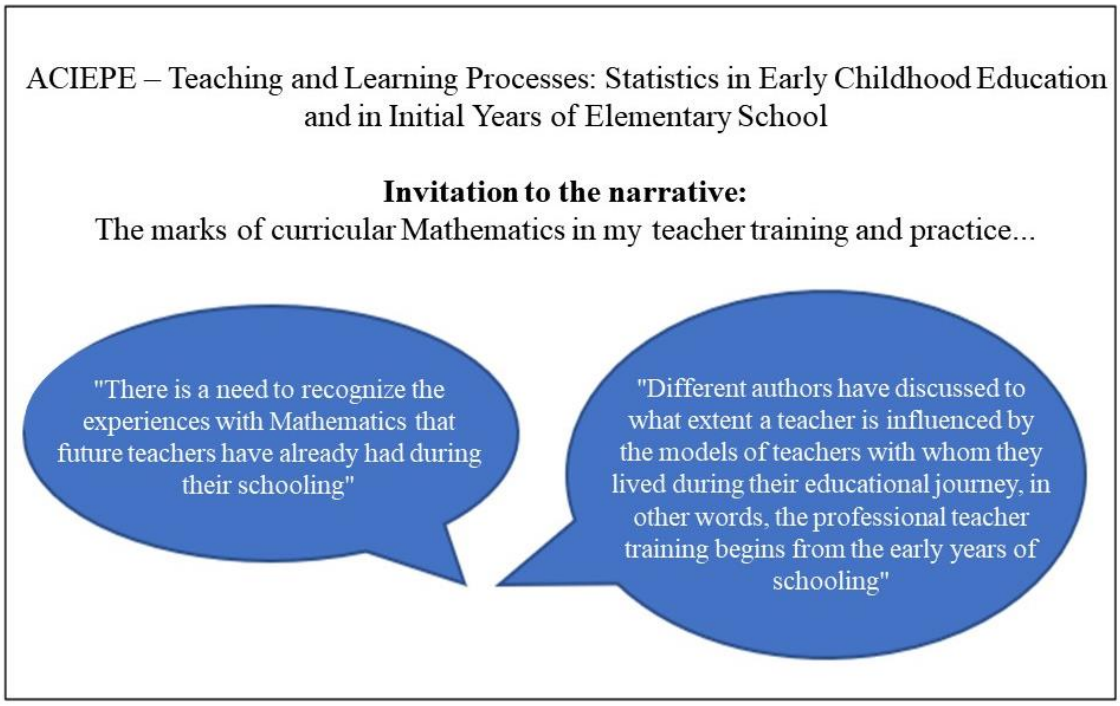
Regarding initial training, our group was quite diverse: four participants were studying Pedagogy, and three were studying Special Education Teaching at UFSCar. Moreover, seven participants had a degree in Pedagogy, four, in Mathematics, and two participants had two degrees: Pedagogy and Mathematics.

During the online meetings via Google Meet platform, there were debates and studies that led to discussions about the importance of undergraduates, teachers and researchers participating in a group like the one that was organized to discuss Statistics at the beginning of schooling. One of the themes that emerged early in the meeting was precisely the marks of Mathematics in the teachers' training and practice, and, with that, we made our first invitation to write a narrative (Figure 1). Our focus in this activity was precisely an invitation to narrate about the marks of school Mathematics in teacher training and practice.

[7] It is worth noting that this research was approved by the Ethics Committee – CAAE No. 5582022.4.0000.5149. Opinion No. 5.715.751.

It is worth noting that other invitations to write narratives were proposed to participants during the meetings but are not discussed here.

Figure 1 – Invitation to writing[8]



Source: The authors.

This research follows a qualitative approach, and the data were gathered through written narratives about the marks left by Mathematics in the schooling process. It is worth noting, based on Moura (2018, p. 203), that our intention in presenting teachers' narratives "is not related to the search for truth or the legitimization of this or that theoretical assertion", as, according to Benjamin (2012), the art of narrative lies in avoiding explanations of what is said. The reader is free to interpret the narrative as they wish, which can lead to a breadth of understanding beyond what is presented in the information.

We also draw on Benjamin (2012, p. 217), who states that "the narrator takes what he/she tells from experience, either his/her own or that reported by others. And, in turn, he/she incorporates the things narrated into the experience of the listeners". Here, we aim to use narratives with a pedagogical and formative purpose, as we believe that by reading the reports of the narrating teachers, the reader (receptive subject) can reflect on the experiences of others and on their own experiences during their schooling process. They can recall events that, often without realizing it, influence their practice and assign meaning to each experience. This allows them to appropriate experiences that need to be valued, as well as to deconstruct and reinterpret those that contain elements that do not contribute to their education.

[8] The citations included in this invitation were taken from Nacarato, Mengali and Passos (2011, p. 23) and Nacarato and Passeggi (2013, p. 291).

For the analysis of the narratives, we have chosen as focal points the teaching practices experienced during the schooling process and the influences of the marks of school Mathematics on teaching practice. We will now present them along with the participants' narratives in the following sections.

3. Mathematics teaching practices experienced in the schooling process

According to Valente (2008, p. 12), "the profession of being a Mathematics teacher, like most professions, inherits practices and knowledge from different eras". Amalgamated, reworked, discarded, and transformed practices make up the legacy "from which the production of new knowledge and the creation of new practices in the current pedagogical landscape are possible" (p. 12). The author further adds that "being aware of the contexts of different times in the teaching of Mathematics enables an understanding of what constitutes novelty and continuity in the daily task of teaching Mathematics to children, youth and adults" (p. 11). Based on this, in this section, we aim to identify the Mathematics teaching practices experienced by the participants of Aciepe during their educational journey and how they reinterpret these practices in their current role as educators.

In almost all the written narratives, we identify indications of pedagogical tendencies developed in Brazil over time, which were inherited from the strong influence of the experiences lived and the social context in which teaching actions are carried out. Pedagogical tendencies are understood here, based on Fiorentini (1995, p. 3), as:

> it is a functional knowledge, that is, a form of knowledge socially developed and shared, created in everyday pedagogical practice. This knowledge is nourished not only by scientific theories (Psychology, Anthropology, Sociology, Philosophy, Mathematics) but also by significant cultural influences, formalized ideologies, research, classroom experiences, and daily communication.

Teacher Maria, when reminiscing about the practices of her Mathematics teachers, recalls the memory of the homework exercise lists written on the chalkboard, titled "Review exercises." These lists represented a moment of sadness for her because she did not know how to solve them without the presence of a teacher sitting beside her to explain the content, address her doubts, or assist her in solving the exercises.

> *I have no memory of a teacher sitting beside me or showing me different ways to complete an exercise. I remember, at the end of the class, the teacher writing a list of homework activities on the chalkboard titled "Review exercises", and that was the saddest time for me because it made no sense at all as I did not know how to solve them. Another method she used was "follow the example and solve the exercise X, page X...* (Maria, 54 years old).

Teacher Lúcia added other memories to these: she recalled the multiplication table tests and the absence of a teacher who would suggest group

assignments and observe how students were solving the activities. She recounts that the teaching practice model in Mathematics that persisted throughout her schooling was one in which the teacher always stood ahead of the class, imparting knowledge, conducting class lectures, and administering tests with extensive exercise lists.

> *The vague memories I have from the 1st to 4th grade revolve around oral calculations and frequent multiplication table verification tests.*
> *[...] I took a trip down memory lane with these recollections and realized that they do not include an image of a teacher who proposed group work or walked around the classroom observing how we were doing the activities, even though they always checked our notebooks. The model that persisted in these experiences was that of the teacher always ahead of the class, explaining through lectures and testing us with a large list of exercises* (Teacher Lúcia, 38 years old).

On the other hand, teacher Nara brought back memories of the way her teachers were: she recalls the teaching practices of three teachers during her schooling process, each with distinct characteristics. The narrative she crafted about her 5th-grade teacher suggests the presence of an authoritarian teacher, in contrast to the other teacher, and her experiences with each of them left different marks in her memory. Nara portrays the image of a more flexible teacher who allowed activities in pairs but presented Mathematical content in a traditional manner, emphasizing the exposition of concepts and solving numerous exercises. She also mentions her first male Mathematics teacher, whom she found entertaining but who had a rigid approach to the content, relying on workbooks and extensive exercises, with a focus on preparing for college entrance exams.

> *I do not have many memories of my journey with Mathematics in the Initial Years of Elementary School. However, my memory of the teacher I had in the old 5th grade is quite vivid: before entering the classroom, she would stop at the door, look at the class, and say "Attention! Posture!", and all of us would sit up straight in our seats. I do not recall the specific content or the approach used, but I do remember feeling very afraid to talk during those Mathematics classes.*
> *I remember another teacher from this period who was not as strict as the one in the 5th grade. She was a bit more flexible when it came to the noise a classroom generates. I recall sitting in pairs many times in her classes and also going to desks to help my classmates. The way she approached the content was traditional – introducing and defining the topic, providing examples, and assigning lots of exercises to the class.*
> *When I went to a private school, I had classes with a male Mathematics teacher. It was the first time I had a male Mathematics teacher. He was quite fun, and he made it a point to tell a joke in every class. The approach was even more rigid than in the public school, with many workbooks to be completed, lots of exercises in each topic, and a strong focus on preparing for college entrance exams* (Teacher Nara, 33 years old).

Teacher Mirian adds to the aspects mentioned by her colleagues the teaching practices of her Mathematics teachers regarding the use of computers and mobile phones in the classroom. They were the first to allow their use. The young teacher highlights significant events related to the use of digital technologies and investigations, which contrast with the negative experiences shared by other participants. She recalls a Mathematics activity aimed at conducting research to understand how the calculator on a mobile phone works, as well as the differences compared to a regular calculator.

> *[...] my Mathematics teachers were the first to realize how useful the use of cell phones in the classroom could be and that it was pointless to prohibit them. They were the ones who started allowing the use of devices in classroom activities (I remember a specific activity in which we had to use computers or other research methods to discover how the calculator on the cell phone worked, as well as the differences from a regular calculator)* (Teacher Mirian, 24 years old).

Teacher Carolina's narrative enriches our data: she recounts, in her schooling process, a teaching practice that heavily relied on using the textbook. This contributed to her having a certain "aversion" to its use in the classroom today. In the 2nd grade (currently 3rd grade) of Elementary School, Carolina remembers her teacher's practice of using the golden material and a technique to learn multiplication table without having to "memorize" them. Carolina also recounts that, in High School, the practice used by her Mathematics teachers was to copy from the board and solve exercises for practice, and the prevailing assessment approach was summative. When recalling these episodes, she states that she can see that the practices developed by her teachers were disconnected from real-life contexts.

> *During my journey in the Early Childhood Education (including the 3rd grade), I remember my teacher being concerned with "finishing" the textbook and telling the class, "only those who complete the book will 'graduate'". Since this experience left a negative mark on me, I think it is because of this experience that I have a certain "aversion" to textbooks. Besides having to complete the textbook, she introduced disconnected content like syllables and dotted lines. Regarding Mathematics, I do not even think it was covered... a very traditional practice.*
> *[...] In the Initial Years of Elementary School, in the 2nd grade, I remember a teacher who tried to implement more contextualized practices. We worked with the golden material, and she also taught us a way to do multiplication without having to 'memorize the multiplication table', using our fingers (I jokingly call it the human calculator).*
> *[...] In High School, I only remember copying content from the board and doing practice exercises.*
> *When I recall my journey in Basic Education, I realize that the practice of disconnecting from students' reality was what prevailed. Not to mention the assessment model, which prioritized summative assessment* (Teacher Carolina, 30 years old).

Based on the narratives of the participants, among the different pedagogical trends that have influenced Mathematics teaching in Brazil over the past decades, it is possible to observe that the teaching practices developed by their schoolteachers were influenced by the classical formalist and modern formalist, as well as behaviorist trends. This is in line with the idea that the practices of Mathematics teachers are influenced by different historical periods and contexts, as highlighted by Valente (2008).

According to Fiorentini (1995, p. 7), The classical formalist trend, which prevailed until the end of the 1950s, "was characterized by an emphasis on the ideas and forms of classical Mathematics, especially the Euclidean model[9] and the Platonic conception of Mathematics[10]", and during this period, Brazilian textbooks implicitly followed the Euclidean model, which means they began with primitive elements and definitions, then presented the theory (theorems and proofs), and finally provided application exercises. *Didactically*, teaching in the classical formalist trend, according to Fiorentini (1995, p. 7):

> [...] strongly bookish and teacher-centered, with the teacher playing the role of a content transmitter and expositor through lectures or theoretical developments on the chalkboard. Student learning was considered passive and involved memorization and precise reproduction (imitation/repetition) of the reasoning and procedures dictated by the teacher or the textbooks.

The modern formalist trend began in the 1950s with the organization of five Brazilian Congresses on Mathematics Education (1955, 1957, 1959, 1961 and 1966) and the involvement of Brazilian mathematicians and educators in the international movement to reform and modernize the school curriculum, known as the Modern Mathematics Movement (MMM) (FIORENTINI, 1995).

According to Fiorentini (1995, p. 14), the modern formalist trend reverts to the classic formalist approach but "under a new foundation: the algebraic structures and the formal language of contemporary Mathematics". As for the teacher-student relationship and the teaching-learning process, there were no significant changes. Teaching remains centered and significantly authoritarian, with the teacher's role being dominant, and the student, considered passive, is still required to reproduce the language and logical-structural reasoning dictated by the teacher. The author also adds that the teaching approach in the modern formalist trend "seemed to aim not at the formation of the citizen per se, but at the formation of the Mathematical specialist" (p. 14).

The technicist trend, according to Fiorentini (1995, p. 15), was the "official" pedagogy of the post-1964 military regime, and was "social and philosophically based on functionalism, for which society was considered an organized and functional system, a harmonious whole in which conflict was seen as an anomaly, and the maintenance of order, as a condition for progress". Thus, the school, as part of this system, had the important role of ensuring maintenance

[9] The Euclidean model is characterized by the logical systematization of mathematical knowledge starting from primitive elements (definitions, axioms, postulates). This systematization is expressed through theorems and corollaries that are deduced from the primitive elements.

[10] In the Platonic conception of Mathematics, this field is not invented or constructed by humans; instead, through intuition and reminiscence, they can discover mathematical ideas that preexist in an ideal world and lie dormant in their minds.

and stability, meaning its role "was to prepare and 'integrate' the individual into society, making them capable and useful to the system" (p. 15).

The learning of Mathematics in the behaviorist trend consists of developing skills and attitudes, and consolidating concepts and principles. According to Fiorentini (1995, p. 17), "this can be reinforced through games and other stimulating activities that facilitate the memorization of facts and the operant exercise to develop these skills and attitudes". Furthermore, based on the author, the pedagogy of the behaviorist trend was not centered on the teacher or the student, but on instructional objectives, resources (instructional materials, calculators, etc.), and on teaching techniques that would ensure their attainment.

Therefore, the excerpts from the narratives of teachers Maria, Lúcia, Nara, Mirian and Carolina indicate that the classical formalist, modern and technicist trends influenced the teaching practices of their teachers during their school years, which occurred around the 1980s and 1990s. It is possible to observe that they experienced the presence of authoritarian teachers and passive students, memorization of content, imitation or reproduction of the language and logical-structural reasoning dictated by the teachers, extensive sets of application exercises, and the predominant use of chalkboard and textbooks.

We also highlight in the narratives of Mirian and Nara the emphasis on the technicist tendency. The first, when she discusses that her Mathematics teachers started using technological devices in the classroom, which were rarely used up to that point. The second, when she narrates that her Mathematics teacher's practice was focused on a rigid and tedious teaching approach, with a predominant use of workbooks and solving numerous exercises, as the class was centered around instructional objectives – in this case, good preparation for college entrance exams.

4. The influences of the marks of school Mathematics on teaching practice

According to Kenski (1996), working with teachers on the process of reminiscence can provide them with valuable insights into their teaching practice, thereby offering additional elements to understand the various constitutive aspects of their professional life. The author also adds that remembering enables the teacher

> [...] to take measures to overcome certain issues, reformulating personal conceptions about how they teach, their relation with the subject, the methods they use to assess their students, etc. Additionally, it involves reclaiming the personal image of a good teacher, constructed based on the interactions made throughout their entire educational journey (KENSKI, 1996, p. 106-107).

Based on this, in this section, our goal is to present how the marks of Mathematics in the educational process influence, or influenced, the teaching practices of the participants and how they reinterpret these experiences in their professional roles, believing, based on Tardif (2014, p. 230), that:

> a professional teacher is not just someone who applies knowledge produced by others; they are not solely an agent determined by social mechanisms. They are an actor in the

> strongest sense of the term, meaning they are an individual who shapes their practice based on the meanings they themselves give it. They are a subject with knowledge and know-how derived from their own activity, which they use to structure and guide their practice.

Professor Lúcia shared, in her narrative, various experiences from her educational journey, including the memories of multiplication table quizzes, the characteristics of teachers, the teaching practices used, as well as reflections on these experiences. Among her reflections, she narrates how the teaching practices used by her teachers – those who were always ahead of the class, who gave tests with extensive lists of practice exercises – influenced her early years of teaching and her teaching practice, as we can observe in the excerpt:

> *[...] I realized that this was the model I tried to follow in 2016 and 2017, my first two years as a Mathematics teacher. In my mind, they [the children] should arrive in the 4th grade knowing many things and having ease in solving problems. From 2018 onwards, I see that it is not quite like that. They do arrive knowing many things, but that does not necessarily mean they truly understand, and that is where the challenge lies in advancing and retreating in the teaching and learning process with balance, trying to cater to both the students with ease and those who face difficulties, so that they can progress compared to themselves* (Teacher Lúcia, 38 years old).

In teacher Maria's narrative, we identify traumatic experiences with learning Mathematics. As she narrates, she struggled to memorize the fundamental facts taught by her teachers, which made her learning experience chaotic. Later, she was diagnosed with a learning disability, and the negative experiences she went through sparked her interest in pursuing a degree in Teaching, and later, Pedagogy. Today, she mentions that she tends to approach students who have learning difficulties, aiming to prevent them from experiencing the same traumas and hardships she went through during her educational journey.

> *I start by stating that I do not have memories of all the stages of my schooling, but what I can recall are not pleasant moments. I was greatly penalized as I could not memorize the fundamental facts. This made my journey chaotic. I had in mind that if I did not know the fundamental facts by heart, I would not be able to perform well on exams. My grades were always in the red, and I spent several years in remedial classes. I even failed twice.*
> *[...] My school life was full of ups and downs, and I diagnosed myself with a learning disability. It was from this tragic experience that I wanted to study Teaching, and then, Pedagogy. I have a strong inclination to connect with students who have learning difficulties. [...] My traumas have strengthened me. I am confident that everyone is capable of learning; it depends on how you work on it* (Teacher Maria, 54 years old).

Teacher Marcos shares his experience in the "Math Enthusiasts" project organized by his school for students who were passionate about the subject. His

participation in this project – despite not having as much ease with the subject, even though he loved Mathematics – is now considered by him as a polarized experience. On one hand, he experienced verbal aggression from the Mathematics teacher, which caused him fear and could have potentially led to an aversion to the subject. On the other hand, it contributed to his current ability to reflect on the kind of teacher he wants to be for his own students when he remembers this experience.

> *I remember that the school I attended had a project called "Math Enthusiasts", in which students who liked Mathematics could deepen their knowledge and tackle certain challenges. However, I believe that my participation in this project, which was voluntary, did not do much good for my education.*
> *While participating in this project, I remember that I genuinely liked Mathematics, but that did not mean I had an aptitude for the subject. In this way, I fulfilled half of the profile that seemed to be ideal for participating in this extracurricular activity. Some verbal aggressions from the teacher were constant, asking "why I was there" or "why I insisted on staying in the project, despite having difficulties in Mathematics".*
> *Even though I attended school with fear on the days when there were classes for the project, I persisted in staying (I really do not understand the reason for it to this day, but perhaps because I wanted to spend less time at home and had a genuine love for Mathematics). I summarize my experience in this project as something that was extremely negative and difficult to overcome. I do recognize that, in fact, the particularly bad experience during my time in the "Math Enthusiasts" project is remembered incessantly. I consider this "positive" (in quotes, of course), because it made me a more humane Mathematics teacher – by knowing exactly how not to be a Mathematics teacher, given the example I had at that time as a student* (Teacher Marcos, 27 years old).

Teacher Nara, when reminiscing about her experience with Mathematics during her schooling process, describes the characteristics of some of her teachers and highlights the teaching practices they employed. She explains that her current teaching practice is, in some aspects, influenced by the practices used by her former teachers. However, she also tries to employ different teaching methodologies, moving away from the traditional methodology in which she was taught.

> *[...] the teachers that taught me used the traditional approach to Mathematics. They were good teachers, and quite open to dialogue. This influenced my teaching practice in some aspects. I try to move away from the idea of defining the mathematical concept first; I like to start with a guiding question and build the concept with the class before moving on to exercises. I also aim to be a teacher whom students can trust to discuss their doubts in a general sense, not just in Mathematics* (Teacher Nara, 33 years old).

Teacher Vânia shares, in her narrative, her experiences with her High School teachers - the teacher from the 1st year, who had little interaction with the class, and the teacher from the 2nd and 3rd years, who provided an engaging Mathematics class with student participation. As she reflects on her past experiences, she reveals how the impressions left by these teachers during her schooling process influence her current teaching practices.

> *In High School, I remember my 1st-year Mathematics teacher. He did not talk to any of the students. He would come into the classroom, face the whiteboard, deliver his lesson, and when the class time ended, he would gather his belongings and leave. When he explained, we understood almost nothing of what he was saying because he used a very low tone of voice, and even when we listened, we could not comprehend what he was explaining. [...] His assessments consisted of nothing more than lists of activities with numerous questions. Each week, there was a new list to turn in. However, the questions he assigned were quite complex, and we always had to seek help from students in the 2nd or 3rd year to assist us.*
> *When I remember this teacher, I think about how the dialogue between the teacher and the student is important. Perhaps if he had given me and the other students the opportunity to express our ideas and doubts, to build knowledge together, to share experiences, and to discuss the applicability of the content studied, the learning would have been much more meaningful for everyone. Today, I carry this experience with me: dialogue is essential in every teaching practice.*
> *I also remember my Mathematics teacher from the 2nd and 3rd years of High School. He was and still is passionate about Mathematics and the act of teaching. I remember that all of his classes were quite interesting, enjoyable, and we were able to learn the content. He made us feel very comfortable to ask questions, to inquire, and to clarify our doubts. He always brought different methodologies to teach new content. He would enter the classroom with just a marker and an eraser because the entire content was in his head. He organized the board in an admirable way, dividing the class into groups, pairs, trios... it all depended on the purpose of that particular lesson. He used to say that one had to help each other understand the content. When he put all the theory on the board, the formulas and demonstrations, showed the applicability, and gave meaning to what we were studying, he would look at the board and then at the class and say, "All of this is beautiful!", and, sometimes, he would make a gesture as if he were hugging the board. We used to smile a lot; these were very enjoyable classes, and it was a pleasure to learn Mathematics with him.*
> *His classes were always a show, as we used to say. I can say that he was my greatest inspiration to decide to pursue a degree in Mathematics Education, and from him, I bring significant influences into my teaching practice* (Teacher Vânia, 29 years old).

When we analyze the narratives of the participants in Aciepe, we can see how the experiences they went through with Mathematics in the past, that is, during their schooling processes, influence their roles and teaching practices in the present. This aligns with Dubar's (2005, p. 19) concept, in which the author asserts that "each of the actors has a history, a past that also plays a role in their identities as actors". In other words, the experiences lived during the educational journey contribute to the formation of our teaching identity. In light of this, we understand, based on Kenski (1996, p. 48), that the act of teaching is "a profoundly artisanal activity, continually reconstructed by the teacher from their theoretical and methodological knowledge, the influences they have received in their lives, and the existing circumstantial relationships".

The narratives also refer to the conception of Cunha (1997, p. 2) when the author states that:

> [...] at the same time that a person organizes his/her thoughts for a narrative – whether written or spoken – he/she reconstruct his/her experience in a reflective manner. Consequently, the person ends up conducting a self-analysis that creates new foundations for understanding his/her own practice. Narrative provokes changes in how individuals comprehend themselves and others.

Therefore, engaging in pedagogical reflection on the marks of the past contributes to teachers in practice or students in teacher education programs realizing how much they are influenced by school cultures and teaching practices of their past teachers. It also highlights how we construct ourselves over time through the reinterpretations we make of our lived experiences (PASSOS; OLIVEIRA; GAMA, 2013). In the narratives, we observe this movement of teachers - recalling past experiences, reflecting on what they have lived through, and ascribing new meanings and significance to those experiences.

5. Some considerations

The development of this research, which aimed to identify, through written narratives, the marks of Mathematics of the schooling process and how they influence, or influenced, teaching practices, has allowed us, as researchers, to reflect on the importance of creating formative spaces with teachers, pre-service teachers, and postgraduate students. This provides an opportunity for the sharing of experiences, as well as for considering them to expand our knowledge about teaching practices.

We believe that the provision of Extension activities like the one that was organized highlights the crucial role that public universities can play, enabling the creation of these formative spaces for collaboration and partnerships with various educational institutions and for the exchange of experiences among teachers from Elementary School, High School, Higher Education, pre-service teachers, and postgraduate students, even in remote settings (online meetings). In this Extension proposal, the aim was also to give prominence to teachers who teach Mathematics, with a focus on teaching and learning Statistics in Early Childhood Education and in the Initial Years of Elementary School, as well as their productions.

Examining the narratives written by the Aciepe participants, in which they revealed teaching practices that can be valued or practices that need to be deconstructed, reinforces the importance of critically examining the marks of Mathematics in the schooling process. This applies to both initial teacher training and continuing teacher training. As Nacarato and Passeggi (2013) emphasize, if these marks are not critically examined and subject to reflection, [future] teachers may continue to reproduce teaching practices that they experienced and which often left them with negative perceptions of this discipline.

When we highlight the teaching practices experienced in the schooling process of the participants, we emphasize that we found marks such as multiplication table verification tests and the absence of a teacher who would suggest group work, sit next to the students to explain the content or answer questions, and observe how the students were working on the activities; teacher always ahead of the class, transmitting knowledge, delivering lectures, and administering tests with extensive lists of exercises, etc. – practices which harken back to classical, modern and technicist formalist tendencies. They highlight a teaching practice that produced authoritarian teachers and passive students, emphasizing the memorization of content, application exercises, and the primary use of chalkboard, chalk and textbooks.

When we emphasize the influences of the marks of school Mathematics on teaching practices, we observe that teachers, when reflecting on their formative journeys, aim not to replicate the models they experienced in the past. Instead, they strive to become different teachers, offering diverse experiences to their students. By sharing their experiences within the formative group, the teachers, pre-service teachers, and postgraduate students provide the other participants in Aciepe with a moment of reflection and the opportunity to reframe their practices.

We emphasize, based on Moura (2018), that our concern in presenting the narratives of the Aciepe participants was not related to seeking the truth or legitimizing a particular theoretical assertion, as the art of narration lies in avoiding explanations about what is said (BENJAMIN, 2012). We understand that narratives have a pedagogical and formative character, and the reader should be free to interpret the story in their own way. In this manner, they have the opportunity to reflect on the experiences of others and achieve a depth of understanding that goes beyond the information presented.

Regarding the use of narratives in the context of research and Aciepe, we believe that inviting participants to write allowed them to reflect on themselves, recall their experiences, create stories, and consider their processes of training and development. This aligns with the perspective of Delory-Momberger (2016, p. 141) when the author argues that "in and through the narrative, the subject performs a process of 'configuration and interpretation' – giving shape and meaning – to the lived experience". In this way, we reinforce "the invaluable value of narrative for understanding the human being and their development" (COSTA *et al.*, 2018, p. 263), specifically in their professional development and practice.

As educators in Higher Education, listening to individuals recounting unforgettable moments with Mathematics in their education reinforces the importance of teacher-student relationships and emotional connections in this level of education.

From a training perspective, the development of this research has allowed for an expansion of the theoretical and methodological competence of the researchers. It enabled us to reflect on the formative potential that narratives offer in teacher training, as they allow for the remembrance of experiences, reflection on lived events, and a reframing of professional practice. It has provided participants in Aciepe, both current Mathematics teachers and future teachers, with an understanding of the importance of continuing teacher training and participation in formative groups for sharing experiences and expanding their knowledge of teaching practices. It has also allowed for the reframing of the marks left in their training journeys and their professional roles, as well as reflections on their teaching practices, understanding that their teaching is influenced by experiences lived in the past. Additionally, it has prompted a reframing of teaching and learning Statistics in Early Childhood Education and in the Initial Years of Elementary School (which was not the focus of this article).

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English translation of the original in Portuguese MELO, R. J. S.; CONTI, K. C.; PASSOS, C. L. B. Marcas da matemática do processo de escolarização e suas influências na prática docente by Isabelly Raiane Silva dos Santos, e-mail: isabellysantosifpa@gmail.com

Submitted on: November 08, 2022 | Approved on: July 20, 2023