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Territory and social justice in Mathematics curriculum: between silencing and invisibility

Abstract: This research aims to reflect on the possibility of a Mathematics Education that considers the territories of schools and students, promoting a territorially referenced approach. The study contrasts official curriculum documents in Brazil with academic production in the field, with the aim of providing a Mathematics Education that, based on the territories of each school and its students, constitutes a tool for reading, interpreting, and intervening in these realities, with a view to promoting social justice. The methodology involved the analysis of recent national curriculum documents and a bibliographic review on the CAPES Journal Portal, culminating in proposals to rethink the Mathematics curriculum, incorporating the concept of territory, based on two professional master's degrees.

Keywords: Territory. Territorially Referenced Education. Mathematics Curriculum. Inequalities.

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ARTICLE

El territorio y la justicia social en los currículos de Matemáticas: entre silenciamientos e invisibilidades

Resumen: Esta investigación busca reflexionar sobre la posibilidad de una Educación Matemática que considere los territorios de las escuelas y los estudiantes, promoviendo un enfoque territorialmente referenciado. El estudio analiza los documentos curriculares oficiales de Brasil y la producción académica del área, con el objetivo de proporcionar una Educación Matemática que, a partir de los territorios de cada escuela y sus estudiantes, se constituya como una herramienta de lectura, interpretación e intervención en esas realidades, promoviendo la justicia social. La metodología incluyó el análisis de los documentos curriculares nacionales recientes y una revisión bibliográfica en el Portal de Periódicos de CAPES, culminando en propuestas para repensar el currículo de Matemáticas, incorporando el concepto de territorio, basado en dos tesis de maestría.

Palabras clave: Territorio. Educación con Referencia Territorial. Currículo de Matemáticas. Desigualdades.

O território e a justiça social nos currículos de Matemática: entre silenciamentos e invisibilidades

Resumo: Esta pesquisa visa refletir sobre a possibilidade de uma Educação Matemática que considere os territórios das escolas e dos alunos, promovendo uma abordagem territorialmente referenciada. O estudo tensiona os documentos curriculares oficiais do Brasil e a produção acadêmica da área, com o objetivo de proporcionar uma Educação Matemática que, a partir dos territórios de cada escola e de seus alunos, se constitua como ferramenta de leitura, interpretação e intervenção nessas realidades, visando à promoção de justiça social. A metodologia envolveu a análise dos documentos curriculares nacionais recentes e uma revisão bibliográfica no Portal de Periódicos da CAPES, culminando em propostas para repensar o currículo de Matemática, incorporando o conceito de território, com base em dois mestrados profissionais.

Palavras-chave: Território. Educação Territorialmente Referenciada. Currículo de Matemática. Desigualdades.

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1 Introduction

This text is an extension of the work carried out by the author during her master's degree under the guidance of the co-author. In fact, after defending her dissertation entitled *Matemática e território sob uma perspectiva crítica: uma análise das propostas elaboradas por professores* [Mathematics and territory from a critical perspective: an analysis of proposals developed by teachers] (Rubim, 2024), the reflections made by the examining board during the defense suggested possible ways to broaden and deepen the connections developed in the text presented at that time.

In this sense, when revisiting the aforementioned master's thesis, we read that the main objective of the research was to understand how Critical Mathematics Education, by Ole Skovsmose (2007), can guide proposals for teaching Mathematics that take territory into account. The relevance of the topic was justified at the time by the lack of guidance in current Mathematics curriculum regarding work that links Mathematics and territory, which can cause difficulties for teachers. Another reason is that textbooks are based on these curriculum and tend to present global or even artificial contexts, as well as examples that dominate Western culture to the detriment of other ethnic and racial issues that could be addressed (Manoel and Coradetti, 2019). It is worth emphasizing that they are often the only work tool, or one of the most common, available to teachers in the classroom, as emphasized by Macêdo, Brandão, and Nunes (2019).

Methodologically, the work consisted of analyzing the teaching productions of Mathematics based on the territory, prepared by teachers participating in a continuing education course of an extensionist nature. The course itself was a product of the work developed, due to its link to a professional master's program, and was therefore also described in the text presented for defense.

The productions developed by the participating teachers were understood in terms of their ability to recontextualize the content presented during the course, using as parameters what makes sense in their realities and contexts of action, as well as their ability to materialize, in pedagogical proposals, the theoretical perspectives that were reflected upon and discussed during the training meetings. Thus, the entire repertoire produced and analyzed in the dissertation revealed paths, possibilities, but also obstacles and restrictions for pedagogical work with Mathematics involving *landscapes of investigation* (Skovsmose, 2000) in Basic Education.

Thus, as a suggestion for further development after the defense, the examining board recommended conducting another research project, focusing on Brazilian curriculum standards, as well as on academic production relevant to the field of Mathematics Education, with a view to continuing to identify these possibilities, as well as these obstacles, perspectives, and limits for pedagogical work with the concept of territory in Mathematics classes.

In Mathematics Education, the discussion about territory is important because it dialogues with the concerns of Critical Mathematics Education, especially those highlighted by Alrø and Skovsmose (2021, p. 18): “how learning mathematics can contribute to the development of citizenship” and “how individuals can be empowered through mathematics”. Thus, considering territory in Mathematics Education is a path toward a sociocritical approach, which not only helps to solve real-world problems through Mathematics, but also promotes the recognition and appreciation of the territory itself.

To this end, this text is dedicated to these two movements as developments of the suggestions presented during the defense: the first is a documentary analysis of the most recent national curriculum documents, as described below, after highlighting the understanding of the concept of territory and part of the theoretical framework that supported the work carried out

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for the writing of the dissertation; and the second is a bibliographic survey on the Journal Portal of the Coordination for the Improvement of Higher Education Personnel (CAPES).

2 Theoretical and methodological orientation

To understand the concept of territory, we turn to the contribution of geographer Santos (2002), who explains:

> Territory must be understood as the territory used, not the territory itself. The territory used is the land plus identity. Identity is the feeling of belonging to what belongs to us. Territory is the foundation of work; the place of residence, of material and spiritual exchanges, and of the exercise of life.

Koga (2013) reinforces this concept, highlighting territory as a space for living and for feelings of identification. Freire (1996, p. 50) affirms the possibility of linking territory to teaching when he says: "there is an indisputable pedagogical aspect to the materiality of space". Freire's contribution to understanding how to consider territory in teaching also comes through the concept of the *generating theme.*

It is in the third chapter of Freire's book *Pedagogia do Oprimido* [Pedagogy of the Oppressed] (1987), which discusses the importance of dialogue in education, that the meaning of the generating theme is presented. In this chapter, Freire (1987) explains that it is in the educational process that one becomes conscious of one's reality and it is through this awareness that one can perceive contradictions in different fields, whether social, political, economic, among others, and seek to act to transform them. In the words of Freire (1987, p. 55, emphasis added): "What we have to do, in fact, is to propose to the people, through certain basic contradictions, their existential, concrete, present situation as a problem that, in turn, challenges them and thus demands a response, not only at the intellectual level, but at the level of action."

In this sense, Freire (1987) proposes that generative themes be explored as problems and derivatives (generated from) *limit situations*, which the author explains as obstacles that limit freedom, but which should not be understood as insurmountable, quite the contrary. Otherwise, when a limit situation is perceived, one begins to investigate the causes and strategies to overcome the situation.

> [...] limiting situations are those that systematically limit/reduce our ontological vocation to "be more": the lack of basic sanitation in a neighborhood, racism in our society, or even our flagrant inequality can be understood as limiting situations with which pedagogical work can interact. (Valle, 2021, p. 3).

In communities, extreme situations are often encountered, frequently related to issues such as transportation, housing, health, basic sanitation, work, leisure, and coexistence. It is no coincidence that these were the themes chosen by schools to be addressed in the São Paulo curriculum in the 1990s, as highlighted by Pires (2008).

It is understood that the territory is closely related to the generative themes, since extreme situations occur there, that is, in the neighborhood where people live, in the community where schools are located, in the spaces where people live. Thus, focusing on the generative themes and the relationship between their concept and the territory, we present a documentary analysis of important national curriculum documents: the *Parâmetros Curriculares Nacionais* [National Curriculum Parameters — PCN], the *Diretrizes Curriculares Nacionais* [National Curriculum Guidelines — DCN], and the *Base Nacional Comum Curricular* [National

Common Curriculum Base — BNCC] with the aim of investigating whether these concepts are mobilized in these curriculum.

From the perspective of Critical Mathematics Education (Skovsmose, 2007), the pedagogical work of teaching Mathematics characterized as territorially referenced is understood as a subset of the practices contained in the learning environment (6). This environment is described by Skovsmose (2000) as a learning space established by a landscapes of investigation with reference to real-life situation (Table 1). It is said to be a subset because, while all territorially referenced investigative or problematizing pedagogical practices characterize a landscapes of investigation with reference to real-life situation, not every landscape with this reference is necessarily linked to the territory. For example, a statement presenting data on unemployment in different European countries by age group may constitute a landscapes of investigation with reference to real-life situation, but it does not constitute a territorially referenced practice for Brazilian students.

Table 1: Learning environments

	Exercises	Landscapes of investigation
References to pure Mathematics	(1)	(2)
References to semi-reality	(3)	(4)
References to real-life situation	(5)	(6)

Souce: Skovsmose (2000, p. 74)

It is important to understand this articulation, explored in Rubim (2024) and in Ramos (2024), as it presents a way of conceiving territorially referenced practices in direct dialogue with the different socio-environmental and political concerns of Skovsmose's Critical Mathematics Education (2000, 2007).

From the methodological perspective of this systematic work, we refer to Lüdke and André (1986, p. 46), for whom, in documentary analysis, the objective is to "select specific segments of content for analysis, determining, for example, the frequency with which a word, topic, theme, expression, or specific item appears in the text". This procedure was carried out in the text of the main national curriculum documents, searching for the expression *territory*, but also searching for possibilities for work from this perspective, as stated below regarding the generating themes and cross-cutting themes.

It is relevant to inquire in official texts about the possibilities, even if they are loopholes, for territorially referenced pedagogical work, since "the questions that the researcher formulates to the document are as important as the document itself, giving them meaning," according to Kripka, Scheller, and Bonotto (2015, p. 245).

To carry out the bibliographic survey, elements of bibliographic research were considered, as systematized by Sousa, Oliveira, and Alves (2021), both in terms of the choice of search platform and the selection of expressions to be searched, as will be explained later.

3 Documentary analysis of national curriculum documents

Pires (2008) presents and discusses the evolution of the Mathematics curriculum in Brazil, especially from the 1960s, when the Modern Mathematics Movement began to influence education, until the beginning of the 21st century, highlighting the changes and educational reforms that influenced the way Mathematics is taught. An important period for this development, which is present in the author's analysis and will be explored in more detail, is the late 1980s and early 1990s, when the Municipal Secretariat of Education of São Paulo, the state capital, launched the *Curriculum Reorientation Movement* and chose interdisciplinarity as

the main axis of the curriculum project for pedagogical action in schools. To develop interdisciplinary proposals, the Municipal Secretariat of Education opted for generative themes.

At the end of the 1990s, in response to Federal Law n. 9,394 of December 20, 1996, the federal government, in collaboration with states, the Federal District, and municipalities, established its authority to define guidelines for curriculum with a common basic education. In this context, the PCN emerged, which are aligned with Paulo Freire's generative themes, since both emphasize the need for teaching that connects school content to students' experiences and realities.

Focusing on Mathematics as an area of knowledge, the following are examples taken from the PCN (cross-cutting themes) on how to relate mathematical content to cross-cutting themes (Table 2). In addition, each of these examples identifies the generative themes that are connected to the cross-cutting themes.

Table 2: Generative themes identified in the PCN for Mathematics and possible Mathematics content to be addressed

Cycle	Contents	Cross-cutting themes (PCN)	Generative themes (identified)	Observations
1st (1st and 2nd grades) and 2nd (3rd and 4th grades)	Concepts (averages, areas, volumes, proportionality, etc.) and mathematical procedures (formulating hypotheses, performing calculations, collecting, organizing, and interpreting statistical data, practicing argumentation, etc.).	Environment	Pollution, deforestation, limits on the use of natural resources, waste.	Understanding environmental issues requires interdisciplinary work that includes Mathematics. Quantifying aspects involved in environmental problems provides a clearer view of them, helping in decision-making and enabling necessary interventions (recycling and reuse of materials, for example).
	Information processing	Work and consumption	Unemployment and underemployment, child labor and slave labor, labor rights, consumerism and indebtedness, the influence of advertising on consumption habits, consumer rights, misleading advertising, etc.	The study of causes that determine increases/decreases in employment; research on job supply/demand; forecasts about the future job market based on current indicators; student research within the school or community about the values that young people today attribute to work.
3rd (5th and 6th grades) and 4th (7th and 8th grades)	Statistical measures	Health	Conditions of care in public health clinics and hospitals, basic sanitation, hunger, malnutrition, infant mortality.	The analysis of these situations, which are so present in the lives of most students, is very helpful in enabling them to understand the relativity of statistical measures and how they can be manipulated to serve certain interests.

Source: Own elaboration (2024)

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It should also be noted that, from 1995 to 2002, in addition to the Ministry of Education beginning the process of developing the PCN, the National Education Council presented the National Curriculum Guidelines (DCN). This document presents general standards that define principles, foundations, and procedures for Basic Education, including Early Childhood Education, and Elementary, Middle, and High School.

When searching for the word *territory* in the DCN, this term is addressed in several dimensions, especially in the valorization of cultural identities. The DCN encourages schools to develop pedagogical projects that take into account the local reality, which helps to integrate the potential and community needs present in the territory into the curriculum. In addition, the document includes specific guidelines for education in rural areas and indigenous communities, promoting a curriculum that recognizes and values local knowledge and practices. Below are some excerpts in which the territory is referenced:

> The school community embraces the political-pedagogical project not as a constituent part of bureaucratic logic, much less as a magic bullet capable of solving all the school's problems, but as an instance of collective construction that respects the subjects of learning, understood as citizens with rights to protection and social participation, in such a way that: I — it encourages careful reading of the local, regional, and global reality, through which horizons, trends, and possibilities for development can be perceived [...] (Brasil, 2013, p. 57).
>
> High School presents itself to indigenous communities as one of the means of strengthening students' bonds of identity with their social groups of origin, favoring the sociocultural continuity of community groups in their territories. [...] Thus, the departure of students from their communities to attend secondary education in non-indigenous locations has been perceived as a way of weakening their political projects for school education and territoriality (Brasil, 2013, p. 296).
>
> [...] All knowledge organized as an educational curriculum must be questioned. When we ask, for example, why the curriculum of basic education schools located in quilombola territories or that serve these students generally do not reflect their sociocultural reality, *we question why certain voices and cultures are still silenced and invisible in the curriculum and why others remain so audible and visible* (Brasil, 2013, p. 296, emphasis added).

Analyzing the BNCC, one of the specific competencies for Mathematics in Middle School is the importance of:

> Develop and/or discuss projects that address, above all, *issues of social urgency*, based on ethical, democratic, sustainable, and solidarity principles, valuing the diversity of opinions of individuals and social groups, without prejudice of any kind (Brasil, 2017, p. 267, emphasis added).

However, it should be noted that the document does not contain guidelines for Mathematics teachers on how to link the subject content to the territory, which is also not directly mentioned in this curriculum component. Although it is understood that issues of social urgency may be related to extreme situations present in the territory, not even social inequality — an issue of social urgency present throughout Brazil — is explicitly mentioned in this document. Consequently, no connection with mathematical content is highlighted. Despite this scenario in the BNCC, some works that mobilize this theme of territory in the curriculum were identified, which are presented below.

4 Bibliographic survey on the CAPES Journal Portal

To conduct the bibliographic survey, we chose the CAPES Periodicals Portal due to its recognized institutional status, as mentioned above. In the first search, we used the terms *mathematics* and *territory*, which resulted in 282 papers. By applying the filters *national production* and papers published in peer-reviewed journals, a subset of 67 results was obtained.

To develop the bibliographic survey, the titles and abstracts of the 67 selected papers were read in order to exclude texts in which the word *territory* was used in the following conditions: a) in reference to different fields of knowledge, such as in expressions such as *in the territory of Mathematics Education*; b) to indicate the scope of the study, especially in examples such as *throughout the national territory*. Based on these criteria, 32 texts were discarded.

In addition, 21 texts were identified in which the word *territory* was central to the text but had no direct relationship with Mathematics. This set was also discarded because it addressed different relevant socio-territorial aspects, but these were disconnected from Mathematics and its teaching, or even from education in a broader sense. Examples include studies on socio-territorial econometric models, data on the spread and prevention of Covid-19, discussions arising from the arts, the geodiversity of the Rio Doce, mental health, among others.

Three editorials or texts presenting dossiers in academic journals were also found in which the word *territory* did not seem to be decisive for the constitution of the discussions. However, another editorial and an interview proved relevant by highlighting expected relationships between territory and Mathematics. These two texts are part of a subset of the 11 results identified as relevant, added to the other nine papers that also explore this relationship in a focused manner.

In the second search, the expressions *curriculum, mathematics*, and *territory* were used, resulting in 23 papers after applying the same filters mentioned above. Of these, 11 papers used the expression *territory* in conditions (a) and (b) previously described. Two other texts used the term to characterize something specific to the curriculum field, as in *curriculum as a territory in dispute*. Of the remaining 10 papers, three had already been identified as relevant in the first search, and the other seven were added to the previous results, comprising the corpus for analysis in the bibliographic survey.

Thus, a total of 18 papers were selected that have some substantive relationship with the search terms and that can contribute to the formulation of answers to the guiding question of this study. In addressing each of the texts considered relevant, we sought to highlight the specific contributions they offer to this work, based on the bibliographic survey conducted. These contributions may be definitions used, contexts and modes of use, research intentions, or even the tensions produced from them in the curriculum field.

Initially, Silva, Tamayo and Souza (2023) use the expression *territory* in the struggle for the right to land demarcation and the preservation of Yanomami history, memory, and culture, thus configuring it as indigenous territory. Along the same lines, Conti *et al.* (2018) treat territory as a sociocultural means of addressing practices in the Intercultural Training of Indigenous Educators with qualifications in Mathematics.

Still in the context of indigenous territories, Charry, Jaramillo and Tamayo (2020) problematize the Mathematics curriculum from the local perspective present in their research. The tensions generated by these authors reveal weaknesses and inconsistencies in the claim to universality of official curriculum and of Mathematics itself, questioning the adequacy of these curriculum to indigenous realities.

Tamayo and Valle (2020), in an editorial, use the expression *deterritorializing* to

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describe the context of school closures during the Covid-19 pandemic and the apparent disconnection of students from their physical territories. This perspective suggests not only a spatial but also a sociocultural distancing.

Barros *et al.* (2020) treat territory as a concept of geography that can be mobilized in interdisciplinary practices in basic education aimed at mapping the spread of Covid-19 cases in a municipality in the state of Minas Gerais, Brazil.

Lopes and Gondim (2018, p. 97) introduce the concept of "re-existential territories" to refer to the moment *when the power game is reconfigured"*, which, for the authors, "means that forces have been redistributed in this *spatium continuum* that are the existential territories". By mobilizing the expression *territory* combined with multiple possibilities, such as "female territory", "territory of the home", "domestic territory" in addition to the title of the paper itself, Souza and Fonseca (2013, p. 263) explain that

> the choice of the word territory to compose the title of this paper and this section is not accidental. For cultural Geography, from a postmodern perspective, places, landscapes, and ultimately spaces are not objects in themselves, "things", but are social constructs and should be analyzed as such.

In another paper by the same authors, included in this survey, a relevant justification for the use of the term *territory* is highlighted. The authors argue that, based on the territorial studies they conducted, they

> understanding that our places of life are not merely spatially delimited, but are configured as territories with historical, economic, political, symbolic/cultural, affective, and other characteristics. Understanding these places as territories encourages us to reflect on how the places we live in influence the ways we experience different relationships, including mathematical relationships. (Souza and Fonseca, 2018, p. 141).

In a study on the pedagogical possibilities involving the concepts of territory and landscape, derived from geography, Piccoli Neto and Silva (2018, p. 1176) explain that "territories are geographical and political spaces in which social subjects carry out their life projects with a view to better development, organizing themselves through social relations in order to develop it".

Vieira and Moreira (2020, p. 186) focus on the "conceptual construction of place and territory to understand the rights of immigrants in territorial displacements and their processes of territoriality in different spaces, especially the school space, as well as to understand these issues as a human right". In this sense, they explain that "social subjects also build, negotiate, and fight for their territories, which is a cultural struggle, with discourses, representations, identities, and symbolisms that mobilize subnational spaces or parts of this sub-space" (Vieira and Moreira, 2020, p. 190). Mobilizing, as in this paper, the theoretical contribution of Milton Santos, the authors argue for the existence of

> more than one dimension to understand the territory, through the immaterial (norms, controls, engineering systems, movements, and circulation) and scales articulated by verticalities (neighboring places brought together by territorial continuity) and horizontalities (formed by points distant from each other, connected by all forms and social processes). In this sense, territory goes beyond the idea of an "enclosure" defined by the state. Thus, territory is

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> a contemporary construction of multiterritorialities and multiple territories, spatial appropriation in networked territories and networked territories, and the overlapping of territorialities in the same physical space (Vieira and Moreira, 2020, p. 191).

Gomes and Valle (2020) argue in favor of a territorially referenced education for indigenous schools in the São Vicente District, in São Paulo, based on the establishment of a specific calendar and curriculum during the pandemic. The authors highlight examples of interdisciplinary experiences, also using the concept of a generative theme to guide pedagogical work during this period.

Based on the concept of curriculum as a territory in permanent dispute, Oliveira and Souza (2017, p. 93) state that:

> The central issue of looking with suspicion at a curriculum-text-discourse-document and questioning it in its spaces-territories, whether in textbooks, teachers' narratives, schools, or research in the field of Mathematics Education, is to interrogate a set of regulated procedures for the production of truths about a mathematics curriculum in the light of the modern world. It is to question our position as researchers.

Reflecting on a curriculum-text-discourse-document-space-territory, the authors further reflect:

> In the field of education, our choices produce silences, delimit geographical spaces for action in the development of a whole series of truths about what the student is, how he should be, what he must be in order to become socially useful and productive: curriculum-space-territory. A game that can take the mathematics curriculum as a discursive instrument for adjusting behaviors and abilities and, thus, constitute regulatory and concordant systems to drive a technology of social exclusion. What can the discursive movement of mathematics do in this context? What silences does it reproduce? (Oliveira; Souza, 2017, p. 99).

Zanlorenzi and Oliveira (2017) introduce the notion of curriculum as contested territory to reflect on the possibilities, limits, and obstacles of a differentiated curriculum for the islands off the coast of Paraná. To this end, the authors recall the words of Miguel Arroyo:

> Every enclosed territory is exposed to occupation and disputes, just as every sacred territory is exposed to desecration. Historical struggles in the field of knowledge have been and continue to be struggles to desacralize truths, dogmas, rituals, professors, and professorships. Doubt has advanced science and turned knowledge into a territory of disputes (Arroyo, 2017, p. 17, apud Zanlorenzi and Oliveira, 2017, p. 212).

The authors use these ideas to show that, in curriculum reflection, “the territory stands out as a fundamental element, not only in the constitution but also in the continuity of group identities” (Zanlorenzi and Oliveira, 2017, p. 213). As argued in this paper, the authors converge on the idea that “the presence of these subjects, with their ways of life and their knowledge, requires that schools on the islands of Paraná implement educational processes that recognize these subjects in the context in which they live” (Zanlorenzi and Oliveira, 2017, p.

227).

In Valle and Conrado (2019), they argue in favor of the concept of otherness as an identity principle of recognition of the other, to affirm the possibility of curriculum that subvert the top-down logic with its verticalized structure. In this sense, they refer to the results of their doctoral thesis to illustrate how to recognize the time of local actors in/from the school, as well as how to reverse the vector of curriculum policies. They conclude the paper by stating that

> the radical revival of the public meaning of education leads us to understand that the curriculum cannot be predetermined, since any form of prior conception would isolate fundamental aspects of its policies that only become apparent in everyday school life, such as tensions, limitations, possibilities, and the unique potential of each community (Valle and Conrado, 2019, p. 119).

The other papers, such as Barbosa and Costa (2020) or Terçariol and Teixeira (2021), addressed the concept in a peripheral manner and were therefore disregarded at this stage of analysis.

To conclude this topic, we return to the main contributions gleaned from the bibliographic survey as a methodological procedure. Among these, we highlight, first, the perception that the concept of territory is already being used in the field of curriculum with the aim of challenging the universality intended by official national documents. In addition, in the academic literature, there are already studies that problematize socio-territorial inequalities and the apparent disregard for this territorial component, which has been largely neglected, if not ignored, in the development of curriculum guidelines. These studies show that social injustices are exacerbated when the sociocultural characteristics of each territory are not taken into account.

In the first texts discussed, the term *territory* is linked to identity disputes and indigenous land rights in different communities (Charry, Jaramillo, and Tamayo, 2020; Silva, Tamayo, and Souza, 2023). The recognition of the cultural identity of communities that establish themselves in direct connection with the land emerges in these texts as a fundamental category or axis for the organization of school curriculum, as in Gomes and Valle (2020). In these cases, the dimension of social justice evidenced by the movements fighting for land demarcation is indisputable, problematizing curriculum as disputed territories capable of favoring or opposing the colonization already experienced by these people.

Other papers, although they also have perspectives on different struggles in the field of emancipation, such as Souza and Fonseca (2013, 2018) in relation to gender relations, have contributed to the improvement of the theoretical conceptualization of territory and how to think about it in a multifaceted way, as an organizational category of Mathematics curriculum. The same is true for Piccoli Neto and Silva (2018) and Vieira and Moreira (2020), who draw on authors from the field of Geography to help flesh out the concept, defining and reworking it in the context of each work. Zanlorenzi and Oliveira (2017), Oliveira and Souza (2017), and Valle and Conrado (2019) are works that discuss and challenge curriculum, especially in the context of educational policies and the curriculum as a prescribed and official text.

In these papers, territory emerges as a category of confrontation between discourses that claim to be universal and homogeneous and that, to some extent, argue in favor of the possibility of doing the same thing at the same time, everywhere, as if this were possible and desirable in the field of education. Thus, the bibliographic survey carried out allows us to understand how territory has already been mobilized in academic literature and, in particular, at the interface

with the field of curriculum and Mathematics, teaching them: perspectives of mobilization, authors and references that have theoretically grounded these works, research methodologies appropriate for working with the concept and, above all, what has been possible to do based on the tensions and movements in each work.

These lessons can be summarized through the expressions that constitute the subtitle of this paper, that is, the bibliographic survey also teaches about urgencies, emergencies, and social inequalities. This is evident in the field of the struggle for rights and the demarcation of indigenous lands, for gender equality, and, finally, in the field of curriculum, which is evident as a disputed and contested territory.

It is hoped, then, that this movement can be strengthened and improved in future work, revisiting these same mapped papers. This is also because the mapped works do not present pedagogical practices related to the teaching of Mathematics that effectively consider an articulation with the concept of territory, with the exception of Gomes and Valle (2020), who do so in an illustrative manner to understand the changes promoted in the curriculum policy of indigenous schools during the pandemic.

Therefore, to illustrate how the concept of territory is presented in curriculum reflection, we draw on the results discussed in two dissertations produced in the context of professional master's degrees that mobilize it concretely in the struggles for social justice in Mathematics classes. The first specifically addresses social inequalities (Lopes, D'Ambrosio and Corrêa, 2017) and was mapped by the author of this paper during her bibliographic survey (Rubim, 2024). The second, prepared by another researcher (Ramos, 2024), brings environmental justice to the agenda, as advocated by Skovsmose (2023).

5 Example of mobilizing the territory in Mathematics classes

As a first example of classroom work involving the territory in Mathematics lessons, we chose the paper by Lopes, D'Ambrosio, and Corrêa (2017), entitled *Atos de insubordinação criativa promovem a ética e a solidariedade na Educação Matemática [Acts of creative insubordination promote ethics and solidarity in Mathematics Education]*. This paper analyzes the narratives of the lessons of teacher Solange, a second-grade elementary school teacher who developed a proposal with her students that was not aligned with the school curriculum. For this reason, the authors characterize this attitude as an act of creative insubordination.

The school where Solange teaches is part of a private network and is located in the interior of São Paulo, serving an elite audience in the city. Because of this, she wanted to propose a project to her students that would allow them to reflect on the different social realities that exist in the country. The theme chosen for the project was *School of Play*, because play can reveal deep social inequalities. This theme would also help students reflect on solidarity.

The teacher read an excerpt from the Universal Declaration of Human Rights with her students, specifically the 7th Principle of the Declaration of the Rights of the Child, which states that children have the right to education and to play and have fun. Together with her class, the teacher created a landscapes of investigation, inviting students to answer questions that were asked to compose the project, such as: Which spaces in the school are suitable for playing? Why are they suitable?

Reflection was also proposed through the reading of two books: *Brinquedos [Toys]*, by André Neves, which shows that children from different social classes share a common desire to play; and *Serafina e a criança que trabalha [Serafina and the Child Who Works]*, by Jô Azevedo, Iolanda Huzak, and Cristina Porto, which raises the issue of child labor, which prevents many children from playing.

The readings helped raise students' awareness of their privileges, but Solange wanted them to get closer to a reality different from the one they were used to. So she planned a visit to a public school located in a poor area of the city. On this visit, her students took toys to donate and also prepared a survey with questions such as: What do you like to play at school?; Who do you usually play with?; What activities do you do outside of school?; and, What do you like to play at home?

In particular, the question *What activities do you do outside of school?* showed that most public school students did not participate in any activities, unlike Solange's students, who take ballet and English classes, among others. Based on the analysis of the data collected in the survey conducted by the students, it was possible to discuss sociocultural differences and social inequality. For teacher Solange, bringing this perception to light is the first step toward building a more caring society.

Although Lopes, D'Ambrosio, and Corrêa (2017) do not explicitly state in the paper that the territory is being mobilized, it is clear that the experience of second-year students with an unknown reality shows that understanding one's own territory from the territory of others is a way of recognizing privileges and the lack thereof, which is a fundamental step towards understanding social justice.

Finally, it should be noted that the work carried out by teacher Solange with her 2nd grade class leads to a profound reflection on the issue of play, revealing that not all children have equal access to this right. It was observed that extracurricular activities are often restricted to groups with higher social status. This is a pressing social problem, mainly because it has the potential to reinforce existing social inequalities, which leads to the question: In order to address this issue in Mathematics classes, will teachers always have to subvert their creativity in the face of the prescribed school curriculum?

The other example referred to involves some reflection on the social inequalities that are expressed in different territories, but to a lesser extent than the previous one, as its emphasis is on the issue of environmental justice (Skovsmose, 2023). In Ramos (2024, p. 75), we read about the example mentioned:

> The landscapes of investigation was entitled “Green City: The Mathematics of Sustainable Space” and designed with the aim of enhancing dialogue and investigation in different territories. Based on an analysis of the work produced by teachers during their continuing education, we present a coordinated set of activities that address these aspects and environmental issues. In his recent research, Skovsmose (2023) highlights the evolution in the perception of nature, moving from a view of infinite resources to an understanding of limited resources and fragile ecosystems, which require a more careful and sustainable approach on the part of human beings.

The pedagogical work based on the landscapes for research has as its main theme the existence of green areas, more specifically the ratio between green areas and the number of inhabitants per neighborhood in the municipality where the author teaches, Taubaté (SP, Brazil). To teach 7th grade Middle School students about ratios and proportions, the author begins by presenting newspaper headlines about the importance of green areas and the ratio “established by the World Health Organization (WHO), which recommends that cities have a minimum of 12 m² of green area per inhabitant, well distributed in urban areas, in order to contribute to social well-being” (Lopes and Guerra, 2016, p. 5).

As reported by Ramos (2024, p. 76), her proposal aims to “bring to the classroom the discussion of environmental problems, such as the importance of tree planting in urban centers

and the benefits it can offer in terms of people's physical and emotional well-being". In her master's thesis, the author explains how to conduct pedagogical work with reference to territorial research:

> To calculate the green area around the school, each student would receive a map of the area surrounding the school and a sheet of paper to perform the calculations. They would observe the green areas on the map and mark them using only straight lines to form closed polygons. Using a grid and the scale provided on the map, students would calculate the areas of each polygon formed by the lines they drew. It is important to note that the areas of each polygon correspond to the green area in the region. Students could conduct research with the municipal government to estimate the number of inhabitants in the area near the school. They would then calculate the amount of green area available per inhabitant (Ramos, 2024, p. 78).

To expand the project, the author divided the students in her class into groups, so that each group was responsible for a set of neighborhoods in the city. They had to estimate the amount of green space and find out the number of inhabitants by contacting the city hall. They then filled out a table in which they entered the amount of green space, in square meters, in the first column; the number of inhabitants in the second; and, in the third, they calculated the proportions, with the neighborhoods of the municipality in each of the rows of the table. The final product was a map of the municipality in which the legend indicated, by color, how close or far the neighborhoods were from meeting the WHO recommendation for green space.

Returning to the social urgency issues mentioned earlier, which can be addressed in Mathematics classes through this geographically referenced educational project, the author states that "the production of this map could even help many Brazilian municipalities recognize how their green areas have been preserved or even damaged" (Ramos, 2024, p. 80). In her view, with which we agree, "it would raise public awareness of yet another right and an emerging need in today's world" (Ramos, 2024, p. 80). Thus, little by little, these examples consolidate possibilities for educational work that addresses the issues raised in this paper, in the context of the urgent and emergency situations related to social inequality that plague Brazil.

6 Final considerations

By provoking reflection on how to consider and challenge official curriculum documents, as well as research in the field, it became clear that teaching Mathematics with a territorial reference creates learning opportunities from a critical perspective, which allows students to go beyond purely mathematical content and brings them closer to real-life situations that require attention and reveal social injustices.

It is understood that contributing significantly to the reduction of extreme situations, such as social inequality, is indeed a complex and multifaceted challenge. However, it is believed that by promoting the recognition of these urgent issues in Mathematics classes — which, when not addressed, can turn into emergencies—students are being equipped with tools to interpret and, when possible, intervene in these realities, even outside of school.

It is important to note that, based on the results identified in the bibliographic survey, many studies recognize these intersections and put pressure on curriculum, whether in the form of research in the field of curriculum or the development of official curriculum documents, to recognize the socio-territorial dimension underlying pedagogical practices, including Mathematics teaching, as seen above.

From the point of view of research on the curriculum in Mathematics Education and

even on curriculum reflection more broadly, it is important to note that this work contributes both in highlighting that there is already some production in the field that has been dealing, in different ways, with the concept of territory, highlighting its relevance for thinking about pedagogical developments and implications for Mathematics teaching, but also in addressing possibilities, within the scope of curriculum policy, specifically in Mathematics, so that such developments and implications can materialize in the classroom.

In this regard, in particular, the first part of the text highlights the parts of official curriculum documents that can be used as a basis for pedagogical work linked to the concept of territory. In this sense, it is also understood that, based on this paper, the polysemy of the concept of territory now constitutes relevant perspectives for the materialization of pedagogical work with Mathematics, whose focus is effectively the social emergencies and profound socio-territorial inequalities in Brazil.

Finally, it should be noted that there are already curriculum productions that discuss these issues, such as the works of Peralta (2022), Silva (2023), and Taveira (2024) which address the importance of social justice in Mathematics Education, highlighting the role of Critical Mathematics Education in building a more equitable and inclusive society. For example, Taveira (2024) emphasizes the importance of curriculum justice in Mathematics Education, while Peralta (2022) discusses, from a historical perspective, how women have faced androcentric attacks in unjust social settings and inequalities in the struggle to learn and teach Mathematics. Finally, Silva (2023) explains how epistemic racism affects the production and transmission of knowledge, especially in Mathematics Education.

Thus, this research follows these recent efforts, contributing to the development of a school curriculum that seeks to align Mathematics with the values of social justice.

Conflicts of Interest

The authors declare no conflicts of interest that could influence the results of the study presented in the article.

Data Availability Statement

The data collected and analyzed in the article will be made available upon request to the authors.

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