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Teaching degrees in Field, Indigenous, and Quilombola Education: affirmative public policies that qualify Mathematics teachers

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Abstract: The article deals with affirmative public policies for the education of teachers who teach mathematics in specific sociocultural contexts, in particular, on teaching degree courses in field, Indigenous, and quilombola education. It is based on concepts and concerns from critical mathematics education (CME) to reflect on qualification in these courses, experienced in alternating formative times and spaces. Bibliographical research, whose corpus of analysis consists of seven articles published in thematic dossiers that discuss the interface between mathematics education and the specificities of the contexts mentioned before, is presented. The research results reveal that investigation, dialogue, and criticality, principles of CME, are present in the sociocultural practices experienced in the courses under analysis. There was a concern with political and social aspects in the teaching of mathematics to emancipate rural people and traditional communities included in the qualification.

Keywords: Affirmative Public Policies. Specific Sociocultural Contexts. Mathematics Teacher Education. Teaching Degrees. Critical Mathematics Education.

Licenciaturas en Educación del Campo, Indígenas y Quilombolas: políticas públicas afirmativas que califican a los profesores de Matemáticas

Resumen: El artículo aborda políticas públicas afirmativas para la formación de docentes que enseñan matemáticas en contextos socioculturales específicos, en particular, en carreras de enseñanza en educación de campo, indígena y quilombola. Se parte de conceptos e inquietudes desde la educación matemática crítica (EMC) para reflexionar sobre la formación en estos cursos, vividos en alternancia de tiempos y espacios formativos. Se presenta una investigación bibliográfica, cuyo corpus de análisis consta de siete artículos publicados en dossiers temáticos que discuten la interfaz entre la educación matemática y las especificidades de los contextos antes mencionados. Los resultados de la investigación revelan que la investigación, el diálogo y la criticidad, principios de la EMC, están presentes en las prácticas socioculturales vividas en los cursos analizados. Hubo una preocupación por los aspectos políticos y sociales en la enseñanza de las matemáticas para emancipar a la población rural y a las comunidades tradicionales incluidas en la formación.

Palabras clave: Políticas Públicas Afirmativas. Contextos Socioculturales Específicos. Formación de Docentes de Matemáticas. Licenciatura. Educación en Matemática Crítica.

Licenciaturas em Educação do Campo, Indígena e Quilombola: políticas públicas afirmativas que formam professoras(es) de Matemática

Resumo: O artigo versa sobre políticas públicas afirmativas para a formação de professoras(es) que ensinam matemática em contextos socioculturais específicos, em particular, cursos de Licenciatura em Educação do Campo, Indígena e Quilombola. Ampara-se em conceitos e preocupações da Educação Matemática Crítica com o objetivo de proporcionar uma reflexão sobre a formação nesses cursos, vivenciados em alternância de tempos e espaços formativos. Apresenta-se uma pesquisa bibliográfica, cujo *corpus* de análise é constituído por sete artigos publicados em dossiês temáticos que discutem a interface entre a Educação Matemática e as especificidades dos referidos contextos. Os resultados da pesquisa revelam que a investigação, o diálogo e a criticidade, princípios da Educação Matemática Crítica, estão presentes nas práticas socioculturais vivenciadas nos cursos investigados. Observou-se uma preocupação com aspectos políticos e sociais no ensino da matemática, visando à emancipação dos povos do campo e das comunidades tradicionais contempladas na formação.

Palavras-chave: Políticas Públicas Afirmativas. Contextos Socioculturais Específicos. Formação de Professoras(es) de Matemática. Licenciaturas. Educação Matemática Crítica.

1 Introduction

Since the 1990s, the collective struggle of people from traditional communities for affirmative public policies has been highlighted with greater intensity. This struggle has been represented by social and trade union movements in the fields, waters, and forests. Teachers and researchers got organized in research groups and observatories, among other collectives, in various institutions in Brazil to join this fight.

Among these collectives are research groups that study the relationships between mathematics teaching and specific sociocultural contexts. As an example, we can mention the Grupo de Pesquisa em Educação Matemática nos Contextos da Educação do Campo (Gpemce) and the Núcleo de Pesquisa, Extensão e Formação em Educação do Campo (Nupefec) at the Universidade Federal de Pernambuco (UFPE), which research field education and its interfaces. Also noteworthy is the Grupo de Trabalho Formação de Professores que Ensinam Matemática-GT 7, a member of the Sociedade Brasileira de Educação Matemática (Sbem), which, as explained in its menu, develops research on teaching and teacher education in different sociocultural contexts of teacher learning (Sbem, 2018).

The relevance and strength of this topic were discussed during the opening conference of the VIII Fórum Nacional de Formação Inicial de Professores que Ensinam Matemática (FPMat), held in December 2023 in the city of Teresina, PI. Indeed, one of the emphases of the thematic table (Lima, 2023) that gave rise to this article was the reflection on public policies for initial teacher education in interface with the diversity of sociocultural contexts, in particular, field education, Indigenous school education, and quilombola school education.

Field education, the result of the demands of people who live and work in rural areas, organized in social movements, recognizes and values their knowledge and cultures and the struggle for land — and expands to waters and forests. The origin of field education is linked to a critique of rural education — a result of the advance of industrialization in the Brazilian rural areas — which antagonistically disregards the participation and protagonism of women and men who live and work in rural areas, neglects their specificities and denies them the right to a socially referenced quality education.

Field education is therefore anchored in three structuring roots: collective struggle, agroecological-based field agriculture, and emancipatory education (Caldart, 2019). In this way, it defends the valorization of the diversity of rural areas and cultures, the recognition of

the identity and work of the rural population, the autonomy of people, the complementary country-city relationship, and the non-hierarchization of knowledge.

Human emancipation and respect for cultural diversity are also part of the history and demands of the Indigenous Movement in Brazil (Munduruku, 2012). The defense of education and the fight for a societal project that respects their histories and cultures predate the *Federal Constitution* (Brasil, 1988). However, Machado and Leon (2019) emphasize that although the right to Indigenous school education was guaranteed by the Constituição Federal and Lei de Diretrizes e Bases da Educação Nacional (LDBEN) n. 9.394/1996 (Brasil, 1996), it became contemplated with Law 10.172/01 (Brasil, 2001), which established the Plano Nacional de Educação (PNE). Twenty-three years after the approval of the law above, Indigenous school education still struggles to affirm ethnic identities, recover historical memory and interculturality, and value their mother tongue.

The black and quilombola movement also embraces the banner of affirming ethnic-racial identity in the country and fights against the enslavement of people, combined with different and perverse types of racism (Almeida, 2019). As stated by Domingues (2007), the black movement had a significant advance between 1978 and 2000, with the political reorganization and the rise of popular, union, and student movements, as well as with the creation of the Movimento Negro Unificado-MNU and the Movimento Unificado Contra a Discriminação Racial-MUCDR. The author states that the movement was created "aiming at holding political events to fight against racial oppression, violence, unemployment and underemployment, and the marginalization of the black population" (p. 114).

Campos and Gallinari (2017) emphasize that the strong mobilization of black and quilombola movements in favor of rebuilding the social function of schools was essential in boosting the approval of Resolution n. 8 of November 20, 2012 (Brasil, 2012b), which provides for the Diretrizes Curriculares Nacionais para a Educação Escolar Quilombola. Quilombola school education (henceforth QSE) demands an approach that respects and recognizes the remaining Quilombo communities' history, memories, territories, and knowings. Therefore, it is a historical reparation demanded by the black and quilombola movement and constitutes an affirmative public policy that guarantees this ethnic-racial social group, still invisible in Brazilian society, access to education from the perspective of equity and social justice — because, as Tierra (2020, p. 7) portrays, "we are the children of 300 years of slavery. That is why we dream of freedom every day, a dream that only leaves us when we sleep."

Among public policies, the vigor and plenitude of the field education and the QSE are justified by their rooting in fertile land watered by dialogue, solidarity, and humanization, virtues taught by master Paulo Freire. These virtues also drive the mathematics education movement, areas that are united in the fight for inclusion and social justice. Within this movement, we highlight critical mathematics education (CME) (Skovsmose, 2001, 2014) for its close connection with the struggle of different social and trade union movements for social justice.

In effect, CME presents interfaces between mathematics teaching and social, political, and cultural societal issues (Lima, 2018). By recognizing the critical nature of mathematics teaching — with Freire's theory as one of its anchors —, it contributes to highlighting the social responsibility mathematics education has played in the different educational, political, and sociocultural contexts in which teaching and learning occur. Thus, this theory is interested not only in people's past or present experiences but also in students' future possibilities in the face of contemporary issues — insofar as it considers "students' future horizons, critical

mathematics education turns into the pedagogy of hope" (Skovsmose, 2007, p. 76).

Based on EMC and Brazilian sociocultural diversity in its specificities, we created this article to reflect on the teaching degree courses in Indigenous, field, and quilombola education as affirmative public policies for the initial education of mathematics teachers. To this end, we carried out bibliographical research on works published in thematic dossiers of periodicals that intertwine mathematics education with Indigenous, field, and/or quilombola education. We weave our reflections on the education of mathematics teachers in the courses above.

To organize our reflections, in the following two sections, we present a brief foray into affirmative public policies, teacher education, and CME in the sociocultural contexts we have delimited to better situate our reflections. After that, we describe the methodological procedures we adopted in the bibliographic research and our remarks on the study.

2 Affirmative public policies and teacher education

The *Constituição da República Federativa do Brasil* (Brasil, 1988) supports affirmative public policies that defend the diversity of traditional Brazilian peoples, which impact the normative frameworks that regulate each specificity. For example, we have National Decree n. 6.861 (Brasil, 2009b), providing for Indigenous school education and defining its organization in ethno-educational territories, the National Decree n. 7.352 (Brasil, 2010), providing for the field education policy, and the Programa Nacional de Educação na Reforma Agrária — Pronera and Ordinance n. 470 (Brasil, 2024), establishing the Política Nacional de Equidade, Educação para as Relações Étnico-Raciais e Educação Escolar Quilombola — Pneerq.

These regulatory frameworks represent an achievement of civil society organized through social movements. They are the basis for implementing the public policies necessary to confront the social and educational inequalities still prevailing in Brazil today. Despite the solidity of the current legal framework, Molina (2023) emphasizes that the strength of backward elites, which include large oligopolies and estates, is a barrier that challenges the people in the field, quilombos, waters, and forests on a daily basis. However, while they seem insurmountable, these barriers are also the driving force of the resistance movement that unifies these peoples in their diversity. The creation of the Secretaria de Educação Continuada, Alfabetização, Diversidade e Inclusão (Secadi) in 2004 within Ministério da Educação — initially named Secretaria de Educação a Distância, Alfabetização e Diversidade (Secad) — is an example of this resistance.

Among the initial education actions — resulting from this achievement — for teachers, the Programa de Apoio a Licenciaturas Interculturais Indígenas (Prolind), 2005 and the Programa de Apoio à Formação Superior em Licenciatura em Educação do Campo (Procampo), 2006. These programs boosted the publication of notices with public calls for offering intercultural teaching degrees in Indigenous and field education in public universities in all Brazilian regions. Currently, they are offered in more than 23 federal and state universities (Sanchez & Leal, 2021). However, even before these programs, education courses for Indigenous teachers were created without the support of Ministério da Educação (MEC), such as the intercultural Indigenous teaching degree proposed in 2001 by the Universidade Estadual do Mato Grosso (Unemat) and recognized by Ordinance n. 321/04 – CEE/MT published in the Diário Oficial do Estado on September 21, 2004 (Jodas, 2012).

The first teaching degree courses in field education were implemented in 2007 through a pilot project proposed by the MEC in partnership with four public universities — Universidade Federal de Minas Gerais, Universidade de Brasília, Universidade Federal da

Bahia, and Universidade Federal de Sergipe —, later expanded to other institutions through four MEC notices (Brasil, 2008, 2009a, 2012a). The courses aim to contribute to the education of field, water, and forest teachers to overcome the historical omission of the rights of the people who live in rural areas to an education that respects their identities, ways of life, and production. They result from the collective struggle of social and trade union movements, people from traditional communities, teachers, research groups, observatories, and representatives of different public institutions.

Molina's research (2023) reveals the operation of 44 teaching degree courses in field education in 33 universities and federal institutes based in the five Brazilian regions, with permanent offerings in the following areas of knowledge: art, language & literature; human and social sciences; agricultural sciences; and natural sciences and mathematics. At the time of the research, the courses had 585 certified teachers to serve around 5,300 prospective teachers. The author believes that,

> alone, these numbers reveal the importance of this public policy. However, in addition to the quantitative dimension, the conceptions and formative strategies proposed by the teaching degree in field education present important changes in the processes of teacher education and knowledge production in Brazilian public universities, given the leading role of the subjects who live in rural areas in carrying them out. (Molina, 2023, p. 77)

The teaching degree in field education is an affirmative public policy that fights social inequalities and organizes teaching based on the needs of different territories. In this way, it integrates the counter-hegemonic movement that characterizes workers in the field, water, and forests by qualifying professionals to work in the final years of elementary education and in high school.

3 Initial education of Mathematics teachers and CME

We begin this reflection with the following question: Why fight for public policies to qualify teachers who teach mathematics in specific sociocultural contexts? Our response in defense of this fight is anchored, on the one hand, in principles outlined collectively by social movements of traditional peoples and communities in defense of public, free, democratic, plural, intercultural, inclusive, bilingual, and secular education. On the other hand, we are firm believers that mathematics is not neutral and, therefore, constitutes an instrument that contributes to understanding the world, societies, and people. Therefore, we consider that mathematics teachers' education — in the teaching degree in the field, Indigenous or quilombola education — intertwines political, social, and cultural education with specific mathematical education to respect prospective teachers' cultural diversity.

The data produced by researchers linked to the GT 7 of Sbem (Lima, Lima, Wagner, & Khidir, 2023) showed that among the 44 teaching degree courses in field education in operation, 13 qualified teachers in mathematics: four in the Northeast; three in the North; two in the Midwest; two in the Southeast; and two in the South region. Although these courses adopt the same fundamentals and principles as a starting point, the projects differ in the objectives and organization of the curriculum matrices. This finding denotes the flexibility and autonomy of educational institutions in constructing their courses to truly meet each territory's identity.

Regarding the intercultural Indigenous teaching degrees that qualify mathematics teachers, Bicho, Auarek, and Miola (2023) identified 15 courses, six of which are in the

Northeast region, five in the North, two in the Midwest, one in the Southeast and one in the South region. The authors say that the political-pedagogical projects of the investigated courses privilege school mathematics, providing studies on mathematical knowings typical of Indigenous communities and relating different mathematical knowledge in teacher education.

The results of the research by Lima, Khidir, and Fernandes (2023) show that there were no teaching degree courses in quilombola school education included in the Cadastro Nacional de Cursos e Instituições de Educação Superior – e-MEC. Hence, these authors point to the need to implement these teaching degrees and highlight the importance of other teaching degrees offering curriculum components that work on the sociocultural diversity of quilombola peoples in addition to the Education for Ethnic-Racial Relations component.

Mathematics education in the teaching degrees above is conceived from human formation and social justice perspectives beyond the mathematics necessary for teaching in the final years of elementary and high school. Contemplating these aspects requires understanding the possibilities of establishing relationships between mathematical content and the political, social, and cultural dimensions of each sociocultural context. It is about building teaching based on activities that allow investigation, dialogue, and criticism. We believe CME favors this construction to the extent that, as Gutstein (2006) states, it foreshadows a way of reading and interpreting the world through mathematics.

The CME was born from the critical reflections of Skovsmose and his collaborators (2001, 2007, 2014) on the role that mathematics education plays in the lives of teachers and students, and one of its main inspirations is Paulo Freire's work addressing concepts such as awareness, emancipation, autonomy, and dialogue. These authors discussed the role traditionally attributed to mathematics, characterized by the universality of knowledge and the urgency of having an affirmative and inclusive role that advocates the establishment of relationships between sciences and society. Aiming to contribute to a fairer world, CME goes beyond teaching specific content to present proposals and address issues related to society's political and cultural contexts.

Regarding the possibilities for working with CME in the education of mathematics teachers, Penteado and Skovsmose (2022) propose promoting social justice by experiencing alternative practices to those that education systems commonly offer. To the mathematicians,

> prospective teachers can also explore economic inequalities in countries during different eras. Investigating, for example, the mathematics behind the so-called Gini index, used to indicate economic inequalities. It is also important that prospective teachers address cases of sexism, homophobia, racism, and systemic poverty. All of those investigations are considerable for establishing mathematics education for social justice. (Penteado & Skovsmose, 2022, p. 8)

In line with this proposal, we consider that experiencing scenarios for investigation in the qualification of prospective mathematics teachers opens up ways to discuss, for example, issues inherent to the struggle for land and decent work. The experience of a scenario for investigation in mathematics classes is opposed to teaching that adopts only lists of exercises that, often, aim solely at a mathematical solution based on rote learning and formulas, without requiring investigation and critical reflections for the resolution. Proposing a landscape of investigation implies anticipating an investigative process in mathematics classes — with references to *pure mathematics, semi-reality, or real life* — and in practicing social justice through mathematics teaching. Therefore, dialogue and criticality are essential to learning

regarding the mathematical content studied and the social issues that permeate the landscape.

Dialogue in CME is based on Freire's theory (Freire, 1987), which differentiates it from a simple conversation in that it is based on the premise that "dialogue is a fundamental element for freedom to learn" (Alrø & Skovsmose, 2006, p.13). From this perspective, dialogue is a link between investigation and criticality to constitute a political act that allows people to interpret reality to intervene in it. Lima, Lima, and Oliveira (2020) affirm that teacher education from a critical perspective consists, on the one hand, of highlighting ways for the teaching of mathematical content to support the student in understanding real-life facts and, on the other hand, to assist in the search for solutions to social problems.

We, therefore, consider that mathematical qualification in courses in the teaching degree in the field, Indigenous, and quilombola education from the perspective of CME is concerned, on the one hand, with the political and social purposes of mathematics taught in basic education. On the other hand, it proposes different ways of teaching and learning mathematical content to emancipate traditional peoples and communities.

4 Methodological procedures

To constitute the analytical corpus of the bibliographical research (Deslauriers & Kérisit, 2014), we present in this article, we chose three thematic dossiers organized by mathematics education national journals in the last decade:

- Educação do Campo: contribuições da Educação Matemática e da Tecnologia [Field Education: contributions from mathematics education and technology], published in 2014 by *Em Teia*, from UFPE (Monteiro & Carvalho, 2014);
- Mathematical knowledge and practices in Indigenous (school) education, published in 2018 by *Zetetiké*, from the Universidade Estadual de Campinas (Mendes & Tamayo-Osório, 2018);
- Educação Matemática em diálogo com a Educação do Campo, Indígena e Quilombola [Mathematics education in dialogue with field, Indigenous, and quilombola education], published in 2023 by *Revemat*, from the Universidade Federal de Santa Catarina (Wagner & Lima, 2023).

These thematic dossiers were chosen because they gather in special editions research on the education of teachers who teach mathematics in specific sociocultural contexts. However, we do not ignore the existence of other publications, such as Lima et al. (2020), Lima and Lima (2020), and Lima, Khidir, and Fernandes (2023). Initially, we read the 43 articles that comprise the dossiers to identify the publications on the topic: 12 articles in *Em Teia*, 14 in *Zetetiké*, and 17 in *Revemat*. The reading resulted in the selection of seven articles published in the last two journals that constitute the analysis corpus, as presented in Chart 1 below.

After constituting the corpus, we chose one characteristic of the teaching degree courses in Indigenous education and quilombola education — *alternate qualification with emancipatory sociocultural practices* — to guide our analysis of the selected articles. Next, we reflect on the results obtained by the research in light of CME.

Chart 1: *Corpus* of analysis

Periodicals / Dossiers	Article	Author(s)/Year
Zetetiké	Percurso formativo de professores que ensinam matemática em escolas	Monteiro (2018)

Periodicals / Dossiers	Article	Author(s)/Year
Dossier: Saberes e práticas matemáticas na educação (escolar) indígena [Mathematical knowledge and practices in Indigenous (school) education]	indígenas do Acre [Formative path for teachers who teach mathematics in Indigenous schools in Acre]	
	Formação de professores Guarani e Kaiowá: interculturalidade e decolonialidade no ensino de matemática [Guarani and Kaiowá teacher education: interculturality and decoloniality in mathematics teaching]	Oliveira & Mendes (2018)
	Percurso formativo de professores que ensinam matemática em escolas indígenas do Acre [Formative path for teachers who teach mathematics in Indigenous schools in Acre]	Silva, Souza, & Silva (2018)
Revemat Dossier: Educação Matemática em diálogo com a Educação do Campo, Indígena e Quilombola [Mathematics education in dialogue with field, Indigenous, and quilombola education]	Interculturalidade e a formação em Matemática de professores indígenas: investigando elementos essenciais em projetos curriculares [Interculturality and mathematics education of Indigenous teachers: investigating essential elements in curriculum projects]	Bicho et al. (2023)
	Relações entre a matemática e o seu ensino, e a dimensão sócio-político-cultural: o que nos dizem os PPCs de Licenciaturas em Educação do Campo [Relationships between mathematics and its teaching, and the socio-political-cultural dimension: what the PPCs of teaching degrees in field education tell us]	Fernandes, Magnus, & Roseira (2023)
	Licenciatura em Educação do Campo: elementos estruturantes de cursos que integram as Ciências da Natureza e a Matemática [Teaching degree in field education: structuring elements of courses that integrate natural sciences and mathematics]	Lima et al. (2023)
	Educação do Campo, Estágio Supervisionado e Matemática: uma experiência cartográfica [Field education, supervised practicum and mathematics: a cartographic experience]	Schmitz & Wagner (2023)

Source: Prepared by the researchers based on Wagner and Lima (2023) and Mendes and Tamayo-Osório (2018)

5 Results of bibliographical research: alternate qualification with emancipatory sociocultural practices

The titles of the articles that compose Chart 1 indicate that a teaching degree in quilombola education is nonexistent, as we will discuss later. Therefore, we organized the analysis around the *Indigenous intercultural teaching degree* and the *teaching degree in field education*.

5.1 Indigenous Intercultural Teaching Degree

Monteiro (2018) demonstrates how relevant it is that Indigenous teachers understand, in their formative path, the intersection between school mathematics and aspects of the culture of an Indigenous community. The author emphasizes that

> Indigenous culture is rich in knowledge that can serve as motivators for generating themes for educational practices in the classroom, such as making utilitarian and ritual objects, body painting, ritual festivals, and activities such as hunting, fishing, and activities farming, and collection. This diversity involves traditional knowledge in an integrated way, where mathematical knowledge is present. (Monteiro, 2018, p. 206)

Regarding mathematics teaching centered on cultural practices, Monteiro (2018), anchored in the foundations of the Programa de Pesquisa Etnomatemática (D'Ambrosio, 2002), points out as examples of mathematical practices that can be related to elements of indigenous culture, quantification, measurement, spatiality, and inference. According to the author: "Dialogical mediations must be established with school mathematics, valuing, strengthening, and expanding their cultural practices, in addition to promoting access to other forms of knowledge and cultures" (Monteiro, 2018, p. 219). In this article, we adopt the expression "sociocultural practices," which several mathematics education researchers (Bishop, 1999; Mendes & Farias, 2023; Mendes & Silva, 2017) have been using in studies that are interested in the relationship between mathematics teaching and the social and cultural aspects of the realities experienced by students.

Oliveira and Mendes (2018) state that the relationships between mathematical knowledge of different shades/origins, originating from the cultural practices of a specific ethnic group and the academic and school world, can be studied in the process of initial and continuing education of Indigenous teachers. The authors elucidate the intercultural perspective the courses take by recognizing the different ways of producing knowledge "where mathematics, alongside the mother tongue, constitutes an important symbolic field of cultural resistance" (p. 176).

By valuing diversity and recognizing the specificity of the education of mathematics teachers in Indigenous intercultural teaching degree contexts, Silva et al. (2018), based on anthropology studies, argue that Indigenous teachers must propose practices that bring mathematical-academic content closer to traditional peoples' knowledge. They state that the education of Indigenous teachers plays an essential role in consolidating a specific and differentiated school education, as it emphasizes mathematics teaching through practices based on respect and appreciation of Indigenous culture. The authors argue that developing sociocultural practices in mathematics classes, according to the experiences of Indigenous teachers from Acre, "made it possible to enrich and bring academic mathematical content closer to the reality of these people, valuing their culture and rescuing everyday practices" (p. 202).

The offer of Indigenous intercultural teaching degrees in universities is undoubtedly a field for affirming the rights and recognition of traditional peoples. Bicho et al. (2023, p. 9) state that

> one of the focuses of interculturality in Indigenous schools is to affirm and value the diversity and complexity of the cultures and ways of being of Indigenous peoples, and that is one of the riches of these peoples and their territories.

Consonant to the authors, we understand that Indigenous land is not replaceable by another area since it is a sacred place with history, where each person's way of being is cultivated beyond the material and geographic territory.

5.2 Teaching Degree in Field Education

Lima *et al*. (2023) show that to develop or propose mathematical activities, the courses investigated considered the cultural identity and social practices of field communities in the fight for land and in defense of agroecology. For the authors, the teaching degree in field education

> is an affirmative public policy, and this characteristic brings with it the social responsibility of, on the one hand, including and recognizing the protagonism of its educational subjects and, on the other hand, providing education intrinsically linked to territories in all their dimensions. (Lima et al., 2023, p. 16)

The study by Schmitz and Wagner (2023) presents a social practice experienced in a course that works in natural sciences and mathematics in the Supervised Practicum curriculum component. The practicum was narrated by a prospective teacher of the Teaching Degree in Field Education course at Universidade Federal de Santa Catarina (UFSC). To problematize socioeconomic and political aspects of social inequalities, the degree student used statistical data from a municipality published in the 2010 Census of the Instituto Brasileiro de Geografia e Estatística (IBGE). According to the authors, mathematics worked in the narrated practicum "as a strategy to provoke, analyze, and demonstrate aspects related to social inequality" (p. 14).

Fernandes et al. (2023, p. 5), who also studied the relationships between mathematics teaching and the socio-political-cultural dimension, found that territory, land, and culture are among the structuring elements of the sociocultural practices of field communities worked in mathematics classes:

> Identity (of the field) is the link that articulates territory, land, culture, and rural school, present and linked to collective struggles for rights, by recognizing and valuing relationships of belonging with the territory, with agroecological modes of production, with the ways of life — of being in rural areas.

Indeed, the fight for the right to land, education, health, housing, and decent work, among others, is one of the main motivations for investigating and dialoguing with cultural diversity in the mathematics education of teaching degree students who will teach in field, Indigenous, and quilombola schools. By referring to those struggles, the courses open ways to build an education project based on human emancipation.

6 Our considerations: intertwining with CME

The research that makes up the corpus of analysis points out emancipatory sociocultural practices that align with the concepts of investigation, dialogue, and criticality recommended by the CME. The prospective teacher's narrative that Schmitz and Wagner (2023) presented about an investigation based on statistical data is an example of sociocultural practices that enable the construction of landscapes of investigation.

According to Skovsmose (2014), when the student accepts the invitation to participate in a landscape of investigation from a critical perspective, she/he assumes the autonomy to research and initiate a dialogue relationship with the teacher(s), colleagues, and other people who participate in it, in a relationship of equality. From Freire's (1987) perspective, dialogue takes place through action and reflection and is characterized by the intentionality of the involved people to reflect on their realities, analyze them, and transform them for social well-being.

The lack of dialogue between social and educational subjects contributed to decades of enslavement, silencing, and oppression of traditional peoples. The achievements built in recent decades do not nullify the still-existing cruelty toward traditional peoples. Indigenous, quilombola, Roma, and field populations, among others, face expulsion from their lands, the exploitation of natural resources, and the lack of access to the minimum conditions necessary for a dignified life with food sovereignty, health, education, and fair work. Such considerations above are at the basis of our advocacy for the recovery of dialogue in mathematics classes and beyond as an element of epistemic vigilance aiming at inclusion and social justice. This is a fundamental principle of the affirmative public policies that guide our reflection: the initial education of teachers who teach mathematics in Indigenous, quilombola, field, water, and forest schools.

Criticality, according to Skovsmose (2001, p. 101), is related to: "1) an investigation of conditions for obtaining knowledge; 2) an identification of social problems and their assessment and 3) a reaction to problematic social situations." From this perspective, it is not restricted to a transversal theme or content to be taught but integrates the conception of education and teaching. In this way, criticism is inseparable from emancipatory sociocultural practices. Regarding this, Professor Paulo Freire teaches us that "the critical reading of the world is a pedagogical-political what-to-do that cannot be dichotomized from the political-pedagogical what-to-do, that is, of the political action that involves the organization of groups and popular classes to intervene in the reinvention of society" (Freire, 2000, p. 21).

The methodological organization of courses in the pedagogy of alternation is also a vehicle for experiencing sociocultural practices that characterize the education of teachers in these courses. When defending the alternate qualification in schools in rural areas and universities, Fernandes *et al*. (2023) argue that one of the objectives of this pedagogy (Begnami, 2019; Gimonet, 2007) is to reduce the distance between the school/university and the community as they alternate formative times and spaces: school/university time and community time. The first occurs in school or university spaces and is dedicated to teaching curricular content in conjunction with students' realities. The second, experienced in the communities — territories where students reside — allows them to experience their sociocultural practices with families, school communities, social movements, and other social groups that comprise the territories. This formative time is fundamental for education because it enables both the integration of knowledge and critical reflection, necessary ingredients for teaching, regardless of the sociocultural context of the school or university.

As noted, QSE — unlike field and Indigenous education, which had national public policies to encourage and support initial teacher education — does not have a specific program to qualify professionals. However, with the resumption in 2023 of Secadi-MEC under the current government — after the policies of exclusion and necropolitics imposed by the far-right government — this situation begins to change through the implementation of new affirmative policies and others that had been emptied or discontinued. Among the programs that include initial and/or continuing education, we cite Abdias Nascimento, Parfor Equidade, Escola da Terra, Escola Quilombo, and the Plano Nacional da Educação Escolar Quilombola.

The Parfor Equidade program, for example, aims to qualify teachers in specific degrees to serve public basic education networks. Notice n. 23⁄2023 of the Coordination for the Improvement of Higher Education Personnel (Capes, 2024) approved the creation of 22 teaching degree courses in *quilombola school education*, 22 new teaching degree courses in field education, and 33 Indigenous intercultural teaching degree courses. The creation of these courses represents, from the outset, a historic milestone in repairing the right of quilombola teachers to access quality initial education socially referenced in their cultures and histories, ancestries, and traditions. We intend to develop research on the implementation of these courses to understand their political-pedagogical projects, how the work, the mathematics worked on, and the relationships established with quilombola communities.

As we conclude our reflection, we highlight the pressing need to destroy any types of *fences* or *walls* still existing in mathematics teachers' formative processes that contribute to the invisibility and marginalization of field, water, and forest populations, which include Indigenous peoples, quilombolas, Roma people, family farmers, extractivists, artisanal fisherwomen, riverside dwellers, settlers and camped people of the agrarian reform, salaried workers, and caiçaras.

Freire (2000, p. 13) states, and we agree, that "The future does not make us. We make ourselves in the struggle to make it."

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