ETHNOMATHEMATICS IN THE AMAZON: PEDAGOGICAL PRACTICES AND TEACHER EDUCATION

ETNOMATEMÁTICA NA AMAZÔNIA: PRÁTICAS PEDAGÓGICAS E FORMAÇÃO DOCENTE

ETNOMATEMÁTICA EN LA AMAZONÍA: PRÁCTICAS PEDAGÓGICAS Y FORMACIÓN DOCENTE

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ABSTRACT

Ethnomathematics has emerged as a relevant approach for contextualizing the teaching of Mathematics in specific sociocultural realities, such as the Amazon. This article aims to analyze the contributions of Ethnomathematics to Rural Education and to riverside communities, with an emphasis on pedagogical practices and teacher education. This is a qualitative study of a bibliographic nature, based on the analysis of scientific articles, dissertations, and theses that discuss the articulation between traditional knowledge and Mathematics teaching and learning processes. The results indicate that, although academic production on Ethnomathematics in the Amazon is still limited, there is consistent evidence of mathematical knowledge embedded in cultural practices such as agriculture, artisanal fishing, Brazil nut harvesting, and the production of utensils. It was also observed that teacher education constitutes one of the main challenges, due to the lack of specific preparation for working in Rural Education. It is concluded that Ethnomathematics represents a promising

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perspective for the construction of a critical, inclusive, and contextualized mathematics education, by valuing local knowledge and strengthening students' cultural identity.

Keywords: Ethnomathematics. Rural Education. Teacher Education. Amazon. Traditional Knowledge.

RESUMO
A Etnomatemática tem se destacado como uma abordagem relevante para a contextualização do ensino de Matemática em realidades socioculturais específicas, como a Amazônia. Este artigo tem como objetivo analisar as contribuições da Etnomatemática para a Educação do Campo e para comunidades ribeirinhas, com ênfase nas práticas pedagógicas e na formação docente. Trata-se de uma pesquisa de abordagem qualitativa, de natureza bibliográfica, fundamentada na análise de artigos científicos, dissertações e teses que discutem a articulação entre saberes tradicionais e processos de ensino-aprendizagem em Matemática. Os resultados indicam que, embora a produção acadêmica sobre Etnomatemática na Amazônia ainda seja limitada, há evidências consistentes de conhecimentos matemáticos presentes em práticas culturais como a agricultura, a pesca artesanal, a coleta da castanha e a confecção de utensílios. Observou-se também que a formação docente constitui um dos principais desafios, em razão da insuficiência de preparo específico para a atuação na Educação do Campo. Conclui-se que a Etnomatemática se configura como uma perspectiva promissora para a construção de uma educação matemática crítica, inclusiva e contextualizada, ao valorizar os saberes locais e fortalecer a identidade cultural dos estudantes.

Palavras-chave: Etnomatemática. Educação do Campo. Formação Docente. Amazônia. Saberes Tradicionais.

RESUMEN
La Etnomatemática se ha destacado como un enfoque relevante para la contextualización de la enseñanza de las Matemáticas en realidades socioculturales específicas, como la Amazonía. Este artículo tiene como objetivo analizar las contribuciones de la Etnomatemática a la Educación Rural y a las comunidades ribereñas, con énfasis en las prácticas pedagógicas y en la formación docente. Se trata de una investigación de enfoque cualitativo y de carácter bibliográfico, basada en el análisis de artículos científicos, disertaciones y tesis que discuten la articulación entre los saberes tradicionales y los procesos de enseñanza y aprendizaje de las Matemáticas. Los resultados indican que, aunque la producción académica sobre Etnomatemática en la Amazonía aún es limitada, existen evidencias consistentes de conocimientos matemáticos presentes en prácticas culturales como la agricultura, la pesca artesanal, la recolección de la castaña y la elaboración de utensilios. Asimismo, se observó que la formación docente constituye uno de los principales desafíos, debido a la insuficiente preparación específica para actuar en la Educación Rural. Se concluye que la Etnomatemática se configura como una perspectiva prometedora para la construcción de una educación matemática crítica, inclusiva y contextualizada, al valorar los saberes locales y fortalecer la identidad cultural de los estudiantes.

Palabras clave: Etnomatemática. Educación Rural. Formación Docente. Amazonía. Saberes Tradicionales.

1 INTRODUCTION

Ethnomathematics has been consolidated as a relevant field of investigation in the field of Mathematics Education by understanding mathematical knowledge as a historical construction, produced in the social, cultural and symbolic practices of different human groups. This perspective breaks with universalist and excessively abstract views of traditional teaching, by recognizing that knowledge is elaborated in specific contexts, linked to the ways of life, work, and social relations of peoples (D'Ambrosio, 2019). In the Amazonian context, marked by wide cultural, territorial and social diversity, this approach takes on special relevance as it enables the valorization of local knowledge and its articulation with school educational processes.

The Amazonian reality is made up of riverside, rural and peasant communities whose ways of life are deeply linked to the relationship with the land, the forest and the rivers. In these communities, practices such as family farming, artisanal fishing, and extractivism organize daily life and mobilize implicit mathematical knowledge related to counting, measuring, estimating, and organizing collective work (Serrão, 2018). However, such historically produced knowledge remains, to a large extent, invisible in the formal teaching of Mathematics.

In this sense, the school, as a formative space, needs to dialogue with the sociocultural reality of students, valuing the knowledge built in daily life and enabling its articulation with school content. Lopes, Ghedin and Mascarenhas (2019) highlight that recognizing sociocultural practices as a pedagogical basis is a fundamental step towards the construction of meaningful learning, especially in contexts such as the Amazon, where community knowledge plays a central role in the formation of subjects.

From this perspective, mathematical knowledge is produced and mobilized in different social contexts and cultural practices, which evidences the existence of multiple mathematics linked to the cultures, contexts and social experiences of human groups (Ascher, 2002). This understanding displaces mathematics from an abstract and universalizing conception, allowing it to be understood as a symbolic construction related to the ways of life and sociocultural relations of the subjects, still little incorporated into pedagogical practices in the Amazonian context.

As Rodrigues, Ferreira and Matos (2024) point out, in many schools, the teaching of Mathematics remains decontextualized, prioritizing abstraction and memorization, which hinders the dialogue between school content and the reality experienced by students. In addition, it is observed that academic production on Ethnomathematics in the Amazon is still incipient, especially with regard to the articulation with Rural Education (Silva; Leite, 2021).

Another relevant aspect refers to teacher training. Research shows that many teachers did not receive, during their initial training, specific preparation to work in riverside and rural contexts, which limits the incorporation of traditional knowledge into pedagogical practices (Almeida; Antunes, 2020; Lopes; Ghedin; Mascarenhas, 2019). This formative gap contributes to the reproduction of urban and homogeneous pedagogical models, little sensitive to the cultural and territorial specificities of the Amazon.

Given this scenario, there is a need to deepen the understanding of how Ethnomathematics has been discussed and mobilized in academic productions focused on the Amazonian context. Thus, the question that guides this study is: how has Ethnomathematics contributed to pedagogical practices and teacher training in the Amazon, especially in the context of Rural Education and riverside communities?

Based on this problematization, this article aims to understand, through a bibliographic review, the contributions of Ethnomathematics to pedagogical practices and teacher training in the Amazon, considering the sociocultural specificities of riverside and rural populations and the challenges that are imposed on teaching in this context.

2 ETHNOMATHEMATICS IN THE AMAZONIAN CONTEXT: PERSPECTIVES AND CONTRIBUTIONS

Ethnomathematics, as proposed by D'Ambrosio (2019), understands Mathematics as knowledge produced in the cultural contexts and social practices of different peoples. In the Amazonian context, this perspective contributes to valuing local knowledge and to bringing the teaching of Mathematics closer to the daily experiences of riverside and peasant communities, strengthening contextualized and culturally significant pedagogical practices.

2.1 ACADEMIC PRODUCTIONS ON ETHNOMATHEMATICS IN THE AMAZONIAN CONTEXT

The choice of the title of this subtopic is justified by the need to show how Ethnomathematics, beyond the original conception proposed by D'Ambrosio, has been discussed in the Amazonian scenario through academic productions. Studies carried out in the region seek to articulate the teaching of Mathematics with the cultural practices of riverside, rural and indigenous communities, recognizing the relevance of this knowledge for the educational process.

This understanding is directly related to the Ethnomathematics Program, conceived by Ubiratan D'Ambrosio, whose central objective is to investigate the various forms of production of mathematical knowledge in specific cultural contexts. As the author states,

the great motivator of the research program that I call Ethnomathematics is to seek to understand mathematical knowing/doing throughout the history of humanity, contextualized in different interest groups, communities, peoples, and nations (D'Ambrosio, 2019, p. 17).

Such a definition shows that Ethnomathematics goes beyond the limits of school mathematics, recognizing the knowledge produced in everyday practices as a legitimate part of mathematical knowledge. In this sense, Ethnomathematics is configured as a field of investigation that makes it possible to understand Mathematics as a culturally situated knowledge, built in the social relations and ways of life of the different peoples of the Amazon.

When considering the Amazonian reality, researchers have highlighted that academic production on Ethnomathematics needs to take into account the territorial and historical specificities of the region. Studies such as those by Serrão (2018) demonstrate that the organization of the Amazon territory, marked by the centrality of rivers, floodplains, and terra firme, directly influences the ways of life, productive practices, and forms of social organization of communities. Municipalities on the middle Amazon River, such as Urucará, had their socioeconomic base historically linked to subsistence agriculture, extractivism and fishing, configuring a set of knowledge that crosses generations and structures implicit mathematical practices.

In this context, the processes of peasant territorialization have been shaped by the exchange of knowledge, collective work, and adaptation to the environmental conditions of the Amazon region (Serrão, 2018). The construction of the territory, understood as the projection of work, energy and information in space, reveals that knowledge emerges from social practice and from the relationships established between subjects and the environment. This perspective reinforces the importance of research that investigates how such knowledge can be recognized and integrated into the teaching of Mathematics through Ethnomathematics.

Despite this potential, Lopes, Ghedin and Mascarenhas warn that efforts to identify and value ethnomathematical practices as a pedagogical basis are still recent. According to the authors,

> "efforts to identify Ethnomathematical practices and recognize them as a basis of great value in education are relatively recent, and the full potential of a pedagogical model in mathematics based on the transition from practices prior to schooling or to practices of an academic nature has not yet been analyzed" (Lopes; Ghedin; Mascarenhas, 2019, p. 455).

This finding highlights the existence of gaps in academic production, especially with regard to the consolidation of contextualized pedagogical models. Although Ethnomathematics was conceived several decades ago, the recognition of its practices as a pedagogical foundation is still a recent movement in the educational scenario. It is, therefore, a gap to be overcome: to build a pedagogical model capable of articulating the previous knowledge brought by students from their communities with the formal knowledge of school mathematics.

Other studies reinforce that, even in the face of the Amazonian cultural richness, the teaching of Mathematics is still presented in a decontextualized way in many schools, prioritizing abstraction and memorization (Rodrigues; Ferreira; Matos, 2024). Such a scenario highlights the distance between school content and the sociocultural reality of students, which makes it difficult to build meaningful learning. On the other hand, pedagogical experiences reported in the literature, such as the use of didactic games contextualized in the fauna and conservation units of the Amazon, demonstrate concrete possibilities of approximation between local knowledge and formal education.

In addition, academic production has also emphasized the importance of collective work and teacher training for the consolidation of Ethnomathematics in the Amazonian context. Gomes and Melo (2020) highlight that aligning the interests of teachers in the region with the production and resignification of pedagogical knowledge has been fundamental for the strengthening of contextualized practices. Thus, the analyzed research indicates that the advancement of Ethnomathematics in the Amazon depends both on theoretical deepening and on teacher engagement and the expansion of studies that give visibility to the educational experiences developed in the region.

At this juncture, Silva and Leite (2021, p. 132) add that "although ethnomathematics is defined and theoretically referenced in the works presented at CBEm[10], this did not occur with rural education", pointing out a gap that still exists in research. This data reinforces that academic production needs to expand the dialogue between the references of Ethnomathematics and the foundations of Rural Education, in order to build curricula that are more connected to the reality of riverside and rural populations.

2.2 PEDAGOGICAL PRACTICES AND TRADITIONAL KNOWLEDGE IN THE AMAZON

In Amazonian schools, the daily experience of students reveals practices permeated by mathematical knowledge that cannot be ignored by teaching. Lopes, Ghedin and

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[10] CBEm refers to the Brazilian Congress of Ethnomathematics, the main national scientific event focused on the discussion of this area, in which researchers and teachers socialize practices and reflections that articulate mathematics to different cultural contexts.

Mascarenhas (2019) highlight that these learnings emerge from social interactions and are manifested in their own ways of measuring, constructing, comparing and organizing work, constituting logical instruments present in community action.

In the Amazonian context, such practices are directly linked to peasant, riverside and extractivist ways of life, historically built in territories marked by floodplains, terra firme and forest (Serrão, 2018). By recognizing this knowledge, the school expands its pedagogical possibilities and brings formal knowledge closer to the realities experienced by students.

Traditional production practices, such as the cultivation of cassava, cocoa, guarana, artisanal fishing, and extractivism, constitute cultural matrices that structure the daily lives of Amazonian communities (Serrão, 2018). These actions not only guarantee subsistence, but organize time, space and collective work, mobilizing implicit mathematical knowledge related to counting, estimation, proportion and measurement.

This means that when incorporated into the school context, such practices allow the teaching of Mathematics to dialogue with the concrete experience of students, valuing the historicity and identity of the subjects who build their lives from the relationship with the land, water and forest.

In this sense, Mattos, Mattos, and Ferreira Neto (2022) point out that pedagogical practices linked to extractivism, such as the collection of Amazon nuts, can subsidize the teaching of mathematical content such as ratio and proportion. The relationship between collection time, quantity obtained and organization of collective work enables the teacher to mobilize local knowledge as a didactic resource, making Mathematics closer to the daily life of students. This integration shows that Amazonian cultural contexts not only contain mathematics, but also offer concrete conditions for the development of meaningful and contextualized learning.

The valorization of community practices is also fundamental for an education committed to the social reality of rural populations. Barreto and Vaz (2023) argue that pedagogical practices articulated with family farming, artisanal fishing, and the making of utensils strengthen the cultural identity of students and break with the logic of a school detached from the territory.

In the case of the Amazon, this approach becomes even more relevant in the face of the multiplicity of territorialities experienced by the subjects, who act simultaneously as farmers, extractivists, and fishermen, articulating different knowledge according to the relationship established with the land, the forest, and the river (Serrão, 2018).

Another relevant aspect refers to the possibility of using forest elements as pedagogical resources in the teaching of Mathematics. Filho and Nicot (2021) highlight that

materials from the Amazonian environment itself can be used to build authentic didactic resources, capable of meeting the lack of instructional materials in schools. Elements such as the tucumã seed and the buriti bush can assume symbolic representations of geometric solids, such as spheres, prisms and polyhedra, making it possible to work with spatial geometry concepts in a concrete and contextualized way.

In addition, the use of these materials allows the exploration of different mathematical contents, such as fractions, measurements and spatial relationships, through the construction of rulers, puzzles and other pedagogical artifacts (Filho; Nicot, 2021). By employing elements of the forest as objects of manipulation, analogy and construction, the teacher values local knowledge and recognizes the Amazon region as a legitimate space for the production of knowledge. This perspective reinforces the idea that the forest is not only a source of natural resources, but also a promoter of learning, contributing to the consolidation of contextualized and culturally significant pedagogical practices.

2.3 TEACHER TRAINING AND CHALLENGES IN RURAL AND RIVERINE EDUCATION

Teacher training in the Amazon faces challenges that dialogue with historical national problems, but that take on their own contours due to the territorial, cultural, social and geographical specificities of the region. Lopes, Ghedin and Mascarenhas (2019) point out that there is still a significant distance between the initial training offered in teaching degree courses and the concrete demands of pedagogical practice in rural schools and riverside communities.

Such distancing is expressed, above all, in the fragile articulation between theory and practice, in the limited approach to digital technologies and, mainly, in the little appreciation of the socio-cultural knowledge of Amazonian communities as legitimate foundations of the educational process.

In this scenario, the teaching performance ends up being marked by pedagogical practices that reproduce urban and homogeneous teaching models, little sensitive to local realities. This logic compromises the construction of contextualized educational proposals, making it difficult for the school to dialogue with the ways of life, times, and knowledge of riverside and peasant populations (Serrão, 2018). In a complementary way, Lopes, Ghedin and Mascarenhas (2019) point out that this disconnection between teacher training and the sociocultural reality of students weakens pedagogical practice and limits the appreciation of local knowledge in the educational process.

Thus, teacher training in the Amazon needs to be understood as a process that goes beyond the mere transmission of disciplinary content, requiring a critical preparation that

considers the territory, culture and social practices as constitutive elements of teaching.

The understanding of what is meant by formal mathematical knowledge occupies a central place in this debate. Dall'Agnol and Soares (2016) define formal mathematics education as that acquired within school institutions, characterized by the systematization of contents and pedagogical mediation exercised by the teacher, through didactic materials and socially legitimized practices. Although this dimension of knowledge is fundamental, its absolute centrality tends to reinforce an abstract mathematics, decontextualized and distant from the reality experienced by students in the countryside and riverside communities.

In view of this, Ethnomathematics presents itself as a theoretical-methodological perspective capable of tensioning the limits of traditional school mathematics. For Dall'Agnol and Soares (2016), one of the main proposals of Ethnomathematics consists of valuing and rescuing the mathematical knowledge produced in cultures and social practices, as well as recognizing the knowledge that students bring with them from their community experiences. This approach allows the teaching of Mathematics to move away from its excessively abstract routine, approaching concrete and socially significant applications.

This valorization of local knowledge implies recognizing that there are different forms of production of mathematical knowledge, often made invisible by the school. Fiorentini (1994) calls these productions non-academic or non-systematized mathematics, characterized by oral, informal and spontaneous practices, developed by specific cultural groups. In the Amazonian context, such practices emerge from the daily lives of communities, manifesting themselves in agriculture, fishing, extractivism, the construction of utensils and the collective organization of work, revealing their own ways of classifying, ordering, measuring and modeling reality.

In order for this knowledge to be incorporated into teaching, the role of the teacher becomes central. Mattos, Mattos, and Ferreira Neto (2022) highlight that the teacher is the main mediator between traditional knowledge and school content, being responsible for transforming community experiences into formal learning situations. This mediation is not limited to the technical domain of the discipline, but involves relational, communicative and affective aspects, such as how to welcome students, listen to their experiences and build a respectful and dialogical pedagogical environment.

From this perspective, Barreto and Vaz (2023) argue that the Rural Education teacher should assume a critical-reflective posture, understanding himself as a link between the school and the community. This mediation requires a solid training, which allows the teacher to understand the fundamentals of Ethnomathematics and translate them into consistent pedagogical practices. By integrating academic mathematics with everyday knowledge, the

teacher contributes to the construction of an emancipatory education, capable of strengthening the cultural identity of students and expanding the social meaning of the school.

However, teacher training in the Amazon still faces structural limitations that make it difficult to consolidate this perspective. Fraiha-Martins and Gonçalves (2021) point out that there are multiple challenges that discourage and intimidate the continuing education of Science and Mathematics teachers in the interior of the region, highlighting the geographical difficulties, the precariousness of the infrastructure, and the restricted access to training programs. These conditions directly impact the quality of teaching, restricting the possibilities of pedagogical innovation and theoretical deepening.

In addition, the process of internalization of education in the Amazon requires that training policies consider the diversity of regional contexts. Fraiha-Martins and Gonçalves point out that the use of different teaching modalities can represent a viable alternative to meet the specificities of each micro or mesoregion, as long as it is based on local research. This approach reinforces the need for flexible, contextualized teacher training that is sensitive to the sociocultural particularities of the communities served.

Another recurring challenge refers to the concrete working conditions of teachers, which directly influence the implementation of contextualized pedagogical practices. Filho and Nicot (2021) report that many teachers claim not to have enough time to build instructional materials aimed at teaching Mathematics and Physics. This limitation highlights the work overload faced by teachers and the need for institutional policies that guarantee better conditions for pedagogical planning.

Despite these difficulties, the same authors point out that the teacher's creativity demonstrates the feasibility of building an Amazonian didactics, anchored in the elements of the forest and in local knowledge. This finding reinforces that, even in adverse contexts, it is possible to develop innovative pedagogical practices, as long as the teacher is supported by consistent training processes and educational policies committed to the regional reality.

Finally, the analyzed research converges in indicating that teacher training in Rural Education and in riverside communities needs to assume a critical, reflective and culturally situated character. Silva (2022), Almeida and Antunes (2020) and Silva and Leite (2021) point out that many teachers were not prepared, during initial training, to work in rural and riverside contexts, evidencing significant training gaps. Overcoming these gaps implies investing in initial and continuing education that articulates Ethnomathematics with the foundations of Rural Education, strengthening teaching in the Amazon and promoting a mathematics education committed to the knowledge, identities and ways of life of traditional populations.

3 METHODOLOGY

This article is characterized as a qualitative research, of a bibliographic nature, whose objective was to analyze the contributions of Ethnomathematics to pedagogical practices and teacher training in the Amazonian context, with emphasis on Rural Education and riverside communities. The qualitative approach was adopted because it allows an in-depth understanding of educational phenomena based on their meanings and sociocultural contexts, and is indicated for studies that seek to interpret the experiences and perspectives of the subjects (Sampieri; Collado; Lucio, 2013).

As for the technical procedures, it is a bibliographic research, developed from the analysis of scientific articles, dissertations and theses that address Ethnomathematics in the Amazon. According to Gil (2010), this type of investigation makes it possible to systematize knowledge already produced, identify trends and theoretical gaps, and deepen the understanding of the investigated field. The corpus consisted of productions selected based on criteria of thematic relevance and alignment with the objectives of the study.

The analysis of the material occurred through exploratory and interpretative reading, allowing the organization of the results into thematic axes that guided the discussion of the article. The methodology adopted made it possible to articulate theory and practice, contributing to the critical reflection on the challenges and possibilities of Ethnomathematics in the teaching of Mathematics and in teacher training in Amazonian contexts.

4 RESULTS AND DISCUSSIONS

The analysis of academic productions on Ethnomathematics in the Amazonian context shows that the field has been gradually consolidating, although marked by theoretical and empirical gaps, especially with regard to Rural Education and riverside communities.

The studies analyzed converge in recognizing Ethnomathematics as a powerful perspective to understand Mathematics as culturally situated knowledge, produced in the social practices and ways of life of Amazonian populations, in line with the Ethnomathematics Program proposed by D'Ambrosio (2019). However, the results indicate that this conception has not yet been systematically translated into consolidated pedagogical models in the school routine.

With regard to academic productions, it was observed that a large part of the studies emphasize the need to consider the territorial, historical and cultural specificities of the Amazon as structuring elements of educational practices. Research such as that of Serrão (2018) demonstrates that mathematical knowledge emerges from the relationships established between the subjects and the territory, marked by the floodplain, the terra firme,

the rivers, and the forest, configuring implicit practices of counting, measuring, estimating, and organizing work.

However, as Lopes, Ghedin and Mascarenhas (2019) point out, efforts to recognize these practices as a pedagogical basis are still recent, which reveals a distance between the theoretical potential of Ethnomathematics and its effective incorporation into school curricula.

The results also show that, despite the sociocultural richness of the Amazon, the teaching of Mathematics remains, in many contexts, centered on decontextualized practices, with a strong emphasis on abstraction and memorization, as pointed out by Rodrigues, Ferreira and Matos (2024). This data confirms the persistence of a homogeneous school model, little sensitive to local realities, which contributes to the distancing of students from mathematical knowledge.

On the other hand, pedagogical experiences reported in the literature, such as the use of contextualized didactic games and problem-situations anchored in the Amazonian daily life, demonstrate that it is possible to build strategies that bring school knowledge closer to the lives of students.

In the axis of pedagogical practices, the results indicate that traditional knowledge constitutes a significant repertoire for the teaching of Mathematics, especially when articulated with the productive activities of the communities, such as family farming, artisanal fishing and extractivism. Studies analyzed show that practices such as the collection of Amazon nuts allow working on formal mathematical concepts, such as ratio, proportion and data organization, based on real situations experienced by students (Mattos; Mattos; Ferreira Neto, 2022). This articulation reinforces the idea that learning becomes more meaningful when the school content dialogues with the concrete experience and cultural identity of the subjects.

Another relevant point refers to the use of forest elements as pedagogical resources. The experiences described by Filho and Nicot (2021) show that materials from the Amazon environment itself, such as tucumã seeds and buriti bushings, can be used in the construction of concepts of spatial geometry, measurements, and fractions. These practices demonstrate that the scarcity of teaching materials in schools can be addressed by valuing local knowledge and teacher creativity, while reaffirming the forest as a legitimate space for the production of knowledge and learning.

However, the analysis of the studies also reveals that the consolidation of these pedagogical practices depends, in a decisive way, on teacher training. The results indicate that many teachers did not receive, during their initial training, specific preparation to work in Rural Education and in riverside communities, which makes it difficult to incorporate

Ethnomathematics as a pedagogical foundation (Almeida; Antunes, 2020; Silva, 2022). This training gap reinforces the reproduction of urban teaching models, which are not very sensitive to Amazonian realities, as already pointed out by Lopes, Ghedin and Mascarenhas (2019).

The discussion on teacher training also shows that the understanding of formal mathematical knowledge as the only legitimate knowledge contributes to the invisibility of mathematics produced in cultural practices. As discussed by Dall'Agnol and Soares (2016) and Fiorentini (1994), non-academic mathematics, oral and informal, constitutes a legitimate form of knowledge production, especially in specific cultural contexts. Recognizing this plurality implies rethinking teacher training, so that he or she is able to act as a mediator between traditional knowledge and school content, transforming community experiences into formal learning situations.

The results also point out that the structural and geographical conditions of the Amazon represent additional challenges to the continuing education of teachers. Fraiha-Martins and Gonçalves (2021) highlight that the difficulty in accessing training programs, combined with the precariousness of the infrastructure and the overload of teaching work, limits the possibilities of pedagogical innovation. Even so, the studies analyzed indicate that, even in adverse contexts, there are experiences that demonstrate the feasibility of building an Amazonian didactics, as long as the teacher is supported by public policies and contextualized training processes.

In general, the results and the discussion show that Ethnomathematics represents a promising path for the construction of a critical, inclusive and contextualized mathematics education in the Amazon. However, its consolidation depends on the expansion of research in the area, the strengthening of initial and continuing teacher training and the construction of curricula that systematically integrate traditional knowledge with formal mathematical knowledge. Thus, Ethnomathematics is not only configured as a pedagogical approach, but as an ethical and political perspective of valuing the identities, territories and ways of life of Amazonian populations.

5 CONCLUSION

This study aimed to analyze the contributions of Ethnomathematics to pedagogical practices and teacher training in the Amazonian context, with emphasis on Rural Education and riverside communities. From the bibliographic review carried out, it was possible to show that Ethnomathematics is configured as a powerful theoretical-methodological perspective

for the valorization of traditional knowledge and for the construction of a more contextualized, critical and socially referenced Mathematics teaching.

The results showed that, although the academic production on Ethnomathematics in the Amazon has been expanding, there are still significant gaps, especially with regard to the articulation between this approach and the foundations of Rural Education. The analyzed research demonstrates that mathematical knowledge is intrinsically present in the cultural practices of Amazonian communities, manifesting itself in activities such as family farming, artisanal fishing, extractivism and the collective organization of work. However, such knowledge is still little recognized and systematized in the school environment.

With regard to pedagogical practices, the study showed that educational experiences that incorporate elements of the local culture and the Amazonian environment enable more significant learning, by bringing formal mathematical content closer to the reality experienced by students. The use of resources from the forest, as well as problem situations anchored in the daily life of the communities, proved to be a viable strategy to resignify the teaching of Mathematics and strengthen the cultural identity of the students.

However, the consolidation of these practices is directly related to teacher training. The analysis revealed that many teachers did not receive, during their initial training, specific preparation to work in rural and riverside contexts, which makes it difficult to incorporate Ethnomathematics as a pedagogical foundation. Added to this are the structural and geographical challenges of the region, which impact continuing education and limit the possibilities of pedagogical innovation.

In view of this scenario, it is concluded that the strengthening of Ethnomathematics in the Amazon requires investments in initial and continuing education policies that consider the territorial, cultural and social specificities of the region. In addition, the need to expand research on the subject is highlighted, in order to consolidate theoretical and methodological references that support curricula that are more connected to the reality of rural populations and riverside communities. Thus, Ethnomathematics reaffirms itself as a promising path to promote a mathematical education committed to the appreciation of local knowledge, social justice and the recognition of Amazonian cultural diversity.

REFERENCES

Almeida, S. P. N. de C. e, & Antunes, F. M. (2020). Educação do campo e etnomatemática: Uma articulação possível? Educação Matemática Debate, 4, Article e202009. https://doi.org/10.24116/emd.e202009

Barreto, K. F. S., & Vaz, M. A. B. (2023). As influências do Programa Etnomatemática nas práticas pedagógicas dos professores da Educação do Campo no interior do Amazonas. In Anais do 10º Congresso Nacional de Educação (CONEDU). Editora Realize. https://www.editorarealize.com.br/editora/anais/conedu/2023/TRABALHO__EV185_MD1_ID138_TB6928_20062023214316.pdf

D'Ambrosio, U. (2019). Etnomatemática: Elo entre as tradições e a modernidade (6ª ed.). Autêntica Editora.

Dall'Agnol, L., & Soares, M. R. (2016). Relação do conhecimento formal e informal: Valorizando a etnomatemática. In Educação matemática na contemporaneidade: Desafios e possibilidades. Anais do 12º Encontro Nacional de Educação Matemática (ENEM) (pp. 1–10). Sociedade Brasileira de Educação Matemática.

Filho, J. de A., & Nicot, Y. E. (2020). A utilização de elementos da floresta na produção de recursos metodológicos para o ensino de Ciências e Matemática no contexto amazônico. REAMEC – Revista da Rede Amazônica de Educação em Ciências e Matemática, 8(3), Article e810133. https://doi.org/10.26571/reamec.v8i3.10133

Fiorentini, D. (1994). Rumos da pesquisa brasileira em educação matemática: O caso da produção científica em cursos de pós-graduação [Tese de doutorado, Universidade Estadual de Campinas].

Fraiha-Martins, F., & Gonçalves, T. V. O. (2021). Experiência formativa mediatizada por ambiente virtual de aprendizagem: Formação de professores de Ciências e Matemática na Amazônia. REAMEC – Revista da Rede Amazônica de Educação em Ciências e Matemática, 9(2), Article e21016. https://doi.org/10.26571/reamec.v9i2.11951

Gil, A. C. (2010). Métodos e técnicas de pesquisa social (6ª ed.). Atlas.

Lopes, E. B., Ghedin, E., & Mascarenhas, S. A. do N. (2019). Desafios na formação de professores na Amazônia brasileira na perspectiva da etnomatemática. Revista Ensino de Ciências e Humanidades – Cidadania, Diversidade e Bem-Estar, 3(2), 446–459.

Mattos, S. M. N. de, & Mattos, J. R. L. de. (2019). Etnomatemática e prática docente indígena: A cultura como eixo integrador. Hipátia – Revista Brasileira de História, Educação e Cultura Matemática, 4(1), 102–115.

Mattos, S. M. N. de, Mattos, J. R. L. de, & Ferreira Neto, A. (2022). A etnomatemática e a castanha-da-Amazônia: Subsídios para o ensino da Matemática escolar. Acta Latinoamericana de Matemática Educativa, 35(1), 49–59.

Rodrigues, C. D. V., Ferreira, R. L. da S., & Matos, F. C. de. (2024). Jogo do trunfo animais da Amazônia – unidade de conversão: Instrumento facilitador para compreender a conversão de comprimento na matemática nos anos finais do ensino fundamental. Revista Caderno Pedagógico, 21(13), 1–19. https://periodicos.ufpel.edu.br/index.php/cadped/article/view/69162

Sampieri, R. H., Collado, C. F., & Lucio, M. del P. B. (2013). Metodologia de pesquisa (5ª ed.). Penso.

Serrão, A. M. (2018). Colônias agrícolas e campesinato: Raízes de uma nova territorialidade no médio Rio Amazonas, município de Urucará – AM [Dissertação de mestrado, Universidade Federal do Amazonas].

Silva, C. R. S. da. (2022). Etnomatemática: Das ideias às propostas de práticas docentes [Dissertação de mestrado, Universidade do Estado do Amazonas]. https://pos.uea.edu.br/data/area/titulado/download/127-10.pdf

Silva, M. R. de S., & Leite, K. G. (2021). Educação do Campo nos Anais do Congresso Brasileiro de Etnomatemática. Revista de Educação do Vale do Arinos – RELVA, 8(1), 132–145. https://periodicos.unemat.br/index.php/relva/article/view/5526/4213