Ethnomathematics: a systematic review of Brazilian academic works (2005-2023)

Etnomatemáticas: una revisión sistemática de trabajos académicos brasileños (2005-2023)

Ethnomathématiques : une revue systématique des travaux universitaires brésiliens (2005-2023)

Etnomatemática: uma revisão sistemática de trabalhos acadêmicos brasileiros (2005-2023)

Antonio Alison Pinheiro Martins[1]
Universidade Federal do Pará (UFPA)
PhD in Science and Mathematics Education
https://orcid.org/0000-0002-7199-2428

Isabel Cristina Rodrigues de Lucena[2]
Universidade Federal do Pará (UFPA)
PhD in Education
https://orcid.org/0000-0001-9515-101X

Jeirla Alves Monteiro[3]
Universidade Federal do Pará (UFPA)
PhD in Science and Mathematics Education
https://orcid.org/0000-0002-9329-5930

Abstract

This study, of a bibliographic nature, is characterized as a systematic review, whose objective consisted of mapping the panorama of Brazilian academic research in Ethnomathematics, from 2005 to 2023. The search base used was the catalog of theses and dissertations of the Coordination of Improvement of Higher Education Personnel (Capes). 501 works were found, 418 dissertations and 83 theses. The preparation of the study was based on a guide formulated for systematic reviews in the area of Teaching and Mathematics Education, which is constituted, respectively, by the following five stages: objective and question; search for jobs; selection of studies; analysis of productions and presentation of the systematic review. The study has a theoretical foundation centered on theoretical contributions from the Ethnomathematics Program. According to the data collected, the research mapped in this study

[1] alisonp.martins@gmail.com
[2] ilucena@ufpa.br
[3] jeirla.monteiro@iemci.ufpa.br

is focused on issues involving the teaching and learning process, the curriculum, models aimed at Mathematics Education, as well as describing or presenting parts or Ethnomathematics. The studies cover a diversity of cultural contexts, however, there is a focus on investigations focused on peasant and indigenous culture.

Keywords: Cultural, Mathematics education, Ethnomathematics, Systematic review.

Resumen

Este estudio, de carácter bibliográfico, se caracteriza por ser una revisión sistemática, cuyo objetivo consistió en mapear el panorama de la investigación académica brasileña en Etnomatemática, de 2005 a 2023. La base de búsqueda utilizada fue el catálogo de tesis y disertaciones de la Coordinación de Perfeccionamiento de Personal de Educación Superior (Capes). Se encontraron 501 trabajos, 418 disertaciones y 83 tesis. La elaboración del estudio se basó en una guía formulada para revisiones sistemáticas en el área de Didáctica y Educación Matemática, la cual está constituida, respectivamente, por las siguientes cinco etapas: objetivo y pregunta; búsqueda de empleo; selección de estudios; análisis de producciones y presentación de la revisión sistemática. El estudio tiene una fundamentación teórica centrada en los aportes teóricos del Programa de Etnomatemática. De acuerdo con los datos recabados, la investigación mapeada en este estudio se centra en temas que involucran el proceso de enseñanza y aprendizaje, el currículo, modelos dirigidos a la Educación Matemática, así como la descripción o presentación de partes de la Etnomatemática. Los estudios abarcan una diversidad de contextos culturales, sin embargo, hay un enfoque en investigaciones centradas en la cultura campesina e indígena.

Palabras clave: Cultural, Educación matemática, Etnomatemática, Revisión sistemática.

Résumé

Cette étude, de nature bibliographique, se caractérise comme une revue systématique, dont l'objectif consistait à cartographier le panorama de la recherche universitaire brésilienne en ethnomathématique, de 2005 à 2023. La base de recherche utilisée était le catalogue de thèses et de mémoires de la Coordination d'Amélioration du personnel de l'enseignement supérieur (Capes). 501 ouvrages ont été retrouvés, 418 mémoires et 83 thèses. La préparation de l'étude s'est basée sur un guide formulé pour des revues systématiques dans le domaine de l'enseignement et de l'enseignement des mathématiques, qui est constitué respectivement par les cinq étapes suivantes : objectif et question ; Chercher du travail; sélection d'études; analyse

des productions et présentation de la revue systématique. L'étude repose sur un fondement théorique centré sur les contributions théoriques du programme d'ethnomathématiques. Selon les données recueillies, la recherche cartographiée dans cette étude se concentre sur des questions impliquant le processus d'enseignement et d'apprentissage, le curriculum, les modèles destinés à l'enseignement des mathématiques, ainsi que la description ou la présentation de parties d'ethnomathématiques. Les études couvrent une diversité de contextes culturels, mais l'accent est mis sur les recherches axées sur la culture paysanne et indigène.

Mots-clés: Culturelle, Enseignement des mathématiques, Ethnomathématiques, Revue systématique.

Resumo

Este estudo, de caráter bibliográfico, se caracteriza como revisão sistemática, cujo objetivo consistiu em um mapeamento do panorama de pesquisas acadêmicas brasileiras em Etnomatemática, no período de 2005 a 2023. A base de busca utilizada foi o catálogo de teses e dissertações da Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (Capes). Foram encontrados 501 trabalhos, sendo 418 dissertações e 83 teses. A elaboração do estudo baseou-se em um guia formulado para revisões sistemáticas da área de Ensino e Educação Matemática, que é constituído, respectivamente, pelas cinto etapas: objetivo e pergunta; busca dos trabalhos; seleção dos estudos; análise das produções e apresentação da revisão sistemática. O estudo possui fundamentação teórica centrada em aportes teóricos do Programa Etnomatemática. De acordo com os dados coletados, as pesquisas mapeadas neste estudo estão voltadas para questões que envolvem o processo de ensino e aprendizagem, o currículo, os modelos direcionados para a Educação Matemática, assim como para descrever ou apresentar partes ou uma Etnomatemática. Os estudos abrangem uma diversidade de contextos culturais, no entanto, há uma centralização em investigações voltadas para a cultura camponesa e indígena.

Palavras-chave: Cultural, Educação matemática, Etnomatemática, Revisão sistemática.

Ethnomathematics: a systematic review of Brazilian academic works (2005-2023)

Ethnomathematics originated in the 1970s, based on the speculations of the Brazilian researcher Ubiratan D'Ambrosio (Knijnik et al., 2019). D'Ambrosio, who also coined the term, points out that ethnomathematics is a research program that seeks to "give visibility to the stories of those who have been systematically marginalized because they do not constitute the hegemonic sectors of society" (Knijnik, 2006, p. 22).

D'Ambrosio also criticizes Euclidean teaching models based on a "Platonic, static and dogmatic conception of mathematical knowledge" (Conrado, 2005, p. 57).

The Ethnomathematics program emerged in a period "marked by the possibility of social changes and transformations, in which many reflections on the importance of the role of education were reconstructed and elaborated" (Conrado, 2005, p. 57).

Ethnomathematics has thus become a way of examining and giving meaning to the knowledge that comes from the different cultural groups in society - with an emphasis on their ways of measuring, calculating, reasoning, and deducing - that is considered non-scientific, in an attempt to problematize what science has considered scientific knowledge (Knijnik, 2006). This is not based on a perspective of overcoming one kind of knowledge over another, but on an attempt to value traditional knowledge that does not "constitute the production of those who are considered in Western society to be the ones who can/should/are capable of producing science" (Knijnik, 2006, p. 22).

According to D'Ambrosio (2006, p. 47), the Ethnomathematics program "originated in the search for understanding the mathematical knowledge and practice of marginalized cultures," not only limiting itself to knowing the knowledge/practice, but also seeking to understand the generation, organization, and dissemination of that knowledge, organization, and dissemination of that knowledge.

In this way, it seeks to "better understand how the subject has non-formal knowledge to solve everyday situations that involve mathematical reasoning, and to direct them to the spontaneous practice of this action" (Andrade & Silva, 2020, p. 258).

The word Ethnomathematics comes from the roots tica, matema and etno, "with the aim of emphasizing that there are different ways, techniques, skills (ticas) to explain, understand, manage and live with (matema) different natural and socio-economic contexts of reality (etnos)" (D'Ambrosio, 2006, p. 47).

Ethnomathematics allows for the "recognition of different ways of doing mathematics that are used by social groups in their daily practices in an attempt to solve and manage specific

realities that would not always be identified from the perspective of academic mathematics[4]" (Halmenschlager, 2001, p. 15). According to Clareto and Miarka (2020), ethnomathematics recognizes ways of understanding mathematics and culture and their possible connections. For ethnomathematics, culture is understood as a tense and variable production, not limited to something fixed, ready-made, and hegemonic. Mathematical practices are not considered knowledge that is disseminated like "baggage," but frequently reinvent themselves and acquire new meanings; they are products and generators of culture (Knijnik et al., 2019).

From this perspective, ethnomathematics investigates practices that do not belong to the school environment, exploring mathematical knowledge that is different from school mathematical knowledge. It means reflecting on other possibilities for mathematics education used in schools (Knijnik et al., 2019), based on "reflective attitudes and didactic applications that are more humane and sensitive to knowledge outside the school, that is, the sociocultural environment" (Silva & Giongo, 2021, p. 192). The ethnomathematics program is structured around six dimensions: conceptual, historical, cognitive, epistemological, political, and pedagogical (D'Ambrosio, 2019).

In the conceptual dimension, mathematics, like general knowledge, consists of answers created by humans to justify and explain the existential phenomena of everyday life (D'Ambrosio, 2019). According to this author, "the species creates theories and practices that solve the existential question. These theories and practices are the basis for the elaboration of knowledge and behavioral decisions based on representations of reality" (D'Ambrosio, 2019, p. 24).

The historical dimension includes the development of mathematics during the evolution of civilization, with the Middle Ages as the starting point, in which quantitative reasoning (with the emergence of arithmetic) gained ground over qualitative reasoning (D'Ambrosio, 2019). "Modern science itself develops the intellectual tools for its critique and for incorporating elements from other knowledge systems" (D'Ambrósio, 2019, p. 24). These intellectual tools depend on historical interpretations of past knowledge. With the progress of civilization recently, "we are now living in a moment that resembles the intellectual effervescence of the Middle Ages. It is therefore justified to speak of a new renaissance. Ethnomathematics is one of the manifestations of this new renaissance" (D'Ambrosio, 2019, p. 25).

The cognitive dimension is presented as the human ability to establish explanations and justifications in contact with the new. This dimension focuses on the ability to relate existing

---

[4] Mathematics that "originated and developed in Europe, having received important contributions from the East and Africa, and which reached its current form in the 16th and 17th centuries" (D'Ambrósio, 2006, p. 47).

knowledge to current knowledge to solve new situations and produce new knowledge (D'Ambrosio, 2019).

The epistemological dimension, on the other hand, focuses on issues related to the integration of knowledge systems with human survival and transcendence; it is committed to the relationship between knowing and doing in a culture (D'Ambrosio, 2019). According to D'Ambrósio (2019), the relationship between the empirical and the theoretical can be summarized in three questions that serve as the basis for explaining the evolution of knowledge: "How did we move from ad hoc observations and practices to experimentation and method? How do we move from experimentation and method to reflection and abstraction? How do we get to inventions and theories?" (D'Ambrosio, 2019, p. 31). This relationship consists of how knowledge is acquired, structured, organized, and disseminated, and how it contributes to the reality that surrounds it.

The political dimension of ethnomathematics seeks to value and preserve the cultural knowledge of each people's roots (D'Ambrosio, 2019), which is passed down from generation to generation. D'Ambrósio (2019, p. 35-36) points out that "the most promising strategy for education in societies in transition from subordination to autonomy is to restore the dignity of their individuals by recognizing and respecting their roots".

The pedagogical dimension values and contextualizes the mathematics of cultural groups (informal) in school mathematics (formal) (D'Ambrósio, 2019; Isolani, 2015). "It is not a matter of ignoring or rejecting modern knowledge and behavior. Rather, it is about improving them by incorporating the values of humanity that are synthesized in an ethic of respect, solidarity, and cooperation" (D'Ambrósio, 2019, p. 33).

The Ethnomathematics Program emerges as a research system that seeks a holistic, multiple and plural perception of mathematics education, with a creative commitment to those who will deal with it, with respect for their history and culture, to explore and trace paths for teaching mathematics that overcome the hegemonic model that is still very much rooted in different realities. It is possible to observe that this field is consolidating, and more and more researchers are developing research in this area (Knijnik, 2019). According to Passos and Vieira (2021), from 1985 to 2019, 525 theses and dissertations were defended in Brazil regarding ethnomathematics, with 82.86% of these productions carried out between 2006 and 2019.

It is with the academic curiosity of this vast scenario of research in ethnomathematics that this article is inserted. Brazil, as a mixed country, complex in its origins, with peoples distributed in different regions and contexts, with countless geographical, climatic and historical differences, among many others, encourages those who perceive it in this way to

develop research from the perspective of Ethnomathematics. Therefore, it is with the perspective of knowing, with a given organization, what has been produced in Brazil in terms of theses and dissertations, in a given period, that this article presents an overview of academic studies in Ethnomathematics based on a systematic review of theses and dissertations defended in Brazilian Higher Education Institutions (HEIs) in the period from 2005 to 2023[5].

It is important to note that this study is not the first to catalog academic work on ethnomathematics with a focus on the Brazilian cultural context. In 2002, Knijnik published the study **Itineraries of ethnomathematics: questions and challenges on the cultural, social and political in mathematics education,** which mapped the research itineraries of theses and dissertations on ethnomathematics defended up to 2002. The works were grouped into five themes: "Ethnomathematics and indigenous education; Ethnomathematics and urban education; Ethnomathematics and rural education; Ethnomathematics, epistemology and history of mathematics; and Ethnomathematics and teacher training" (Knijnik, 2002, p. 162). This work served as an inspiration and starting point for what has been developed here. We would like to point out that, compared to the work presented above, our work is more advanced in terms of time (2005-2023), maps the studies in a different database, and uses a different methodology for cataloging and expressing the results.

Another similar study is **Ethnomathematical Itineraries: 35 years of research in a thematic movement through the different regions of Brazil** (Passos & Vieira, 2021). In this work, the authors map the theses and dissertations defended in Brazil between 1985 and 2019 that include the topic of ethnomathematics. Passos and Vieira (2021) present the main researchers/advisors and the distribution of the works by state of origin in the country, dividing them into decades (1985-1995; 1996-2005; 2006-2015; 2016-2019). However, unlike our proposal, they do not organize them in thematic groups and do not discuss the cultural contexts studied in the works.

In addition to the two studies presented, some dissertations and theses developed in Brazil have also carried out bibliographical research focusing on Brazilian academic work with ethnomathematics (Almeida, 2020; Bampi, 2003; Conrado, 2005; Dall'Agnol, 2019; Sudré Júnior, 2021; Meira, 2021; Dias Neto, 2021; Passos, 2017; Peres, 2019; Santana, 2022; Santos, 2015; Soares, 2008; Vilela, 2007). Nevertheless, they all differ from the proposal of dividing them into thematic groups, as presented in the study in question, and from the methodology of cataloguing, organizing and discussing the results.

---

[5] The period from 2005 to 2023 was used, as the many works prior to 2005 are difficult to access and most of them cannot be downloaded for free.

Methodology

This bibliographic study is referred to as a systematic review. According to Kitchenham (2004, p. 1), "a systematic literature review is a means of identifying, appraising and interpreting all available research relevant to a particular research question, topic area or phenomenon of interest". Through a systematic review, it is possible to "categorize the information, identify theoretical and methodological aspects, gaps, similarities, and differences between studies, make it possible to (re)articulate the existing knowledge on the subject, and make it possible to take new paths of what is to be known" (Motta & Kalinke, 2021, p.147). From this perspective, "(...) there are some steps that the researcher must understand and follow in order for the review work to be done well, with a view to minimizing the problems that may hinder or even misrepresent the final report" (Brizola & Fantin, 2017, p.29).

This research was based on the guide proposed by Mendes and Pereira (2020), formulated for systematic reviews in the field of mathematics education and teaching. The guide consists of five steps: I - Objective and question; II - Search for studies; III - Selection of studies; IV - Analysis of productions; V - Presentation of the systematic review. Guidance was also sought from Munzlinger et al. (2012).

Stages I and II will form the study protocol (SP), which, according to Munzlinger et al. (2012, p. 7), "is necessary to formalize the research, as it guides the conduct of the bibliographic search systematically and also [sic] makes the review reproducible by other researchers." Stages III and IV consist of carrying out the protocol. Stage V consists of writing "a report that will be a synthesis of the bibliography studied" (Conforto et al., 2011, p. 10).

Protocol Construction

Donato and Donato (2019, p. 228) point out that "the protocol is an essential component of the systematic review process, helping to ensure consistency, transparency, and integrity". For Okoli (2019, p. 15), "in practice, the protocol consists of an outline organized according to the steps to be followed for the review". The protocol specifies the research questions, the objective, and the elements and steps to be taken to develop the systematic review.

The guiding questions are: What is the panorama of Brazilian academic research in ethnomathematics carried out between 2005 and 2023? What is the number of theses and dissertations? Who are the main supervisors? Which universities are involved, and in which states are they located? To answer the questions raised, the aim was to map Brazilian academic research in Ethnomathematics from 2005 to 2023, as well as to identify some of its constituent

elements: type of research (whether thesis or dissertation), supervisor, HEI involved, and the state in which it is located.

The search database used was the Catalogue of Theses and Dissertations of the Coordination for the Improvement of Higher Education Personnel (Capes), as it contains information on theses and dissertations defended in Brazil since 1987. The data are reported weekly by the country's postgraduate programs (Brasil, n.d.).

To identify beforehand what would be cataloged in the studies, a primary research was carried out in a database besides the Capes catalog of theses and dissertations. The database chosen was the Digital Library of Theses and Dissertations (DLTD), which, like the one mentioned above, has a collection of academic theses defended in Brazil. When conducting a systematic review, primary studies are essential as a "preliminary stage of the review, playing a fundamental role as a source of information in the process of maturing the topic and helping to contextualize the problem, as well as defining the objectives and research questions" (Munzlinger et al., 2012, p. 5).

In the primary study, the keyword "ethnomathematics" was used in the advanced search and in the all fields option. A total of 310 results were found. The sample of theses and dissertations was defined by systematic sampling[6], with the first paper[7] defined by lottery (the lottery was drawn from the first 11 results). In this conjecture, the number drawn was 10; therefore, the analysis of the studies began with the study number 10 (it is important to note that the DLTD results are numbered in ascending order up to the maximum number of results found) and the interval of 10 was followed until a total of 30 works were analyzed.

After analyzing the papers in the primary study, the theses and dissertations were divided and organized into five thematic categories: **Teacher Training**, which consists of works that refer to or address teacher training; **Curriculum**, which refers to theses and dissertations focused on the teaching and learning process, curriculum or models directed towards mathematics education; **Ethnomathematics[8]**, which is equivalent to investigations that describe or present parts or an ethnomathematics different from school mathematics; **review and/or mapping,** which are works of systematic review, literature review, state of the

---

[6] According to Tiboni (2010, p. 18), this method "is a procedure for random sampling, used when the elements of the population are already ordered. (...) Using the systematic sampling method, we define the selection interval for extracting the elements of the population that will make up the sample".

[7] "In systemic sampling, the position of the first element of the sample is obtained by drawing lots, and it must belong to the (...) initial elements of the list" (Tiboni, 2010, p. 18).

[8] We chose to write it in lower case to differentiate it from the concept of Ethnomathematics. Thus, ethnomathematics refers to the group (G3) created as a category for cataloging the research panorama.

art or mapping; and theoretical studies, which are studies that only present theoretical notes and reflections aimed at Ethnomathematics or that are configured as historiographical research.

The categories created in the primary study were defined as thematic groups, as shown in Table 1, to catalog the panorama of Ethnomathematics research in the theses and dissertations in the CAPES catalog - the focus of this study.

Table 1.

Thematic groups

Group	Theme
G1	Teacher training
G2	Curriculum
G3	ethnomathematics
G4	Review and/or mapping
G5	Theoretical studies

It is well known that, according to Knijnik (2006, p. 20), "splitting is always a problematic operation: it allows some aspects to be emphasized while making it impossible to better understand others. However, in order to better catalog and organize the data, we have chosen to divide the groups listed above. It should be noted that a thesis or dissertation may belong to one or more groups.

Another element that formed part of the cataloging of the works on ethnomathematics, and which was also tested in the primary study, was the cultural approach in which the research was developed or to which it was directed (only cultural approaches different from the school environment were considered).

In addition to the above, we identified the elements that make up each academic research at the stricto sensu level: the type of research (thesis or dissertation); the supervisor; the university to which the work is linked; and the state in which the university is located.

The works were organized in Excel. A spreadsheet was created for each thematic group (G1, G2, G3, G4 and G5), and also for the intersections between the first three groups, as shown in Figure 1.
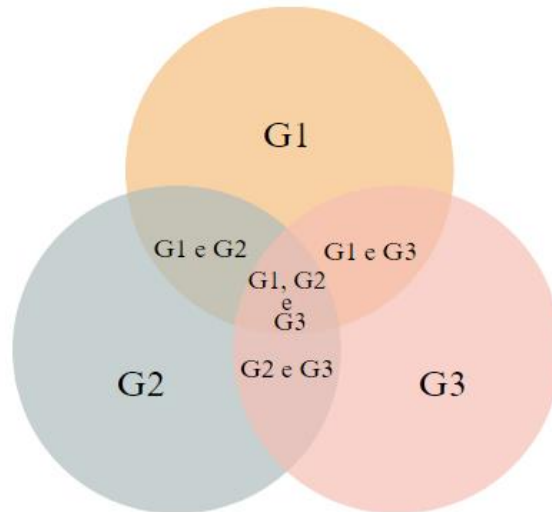
Figure 1.

Intersection diagram of the first three groups

In order to select the studies, inclusion and exclusion criteria were used to better manage the survey (Mendes & Pereira, 2020). The inclusion criteria were research that directly or indirectly involved the Ethnomathematics Program. The exclusion criteria were: full text not found for download and those in which the study's panorama could not be identified.

Only the search term "Ethnomathematics" was used in the search field of the Capes catalog to select the studies. The selection was made using the year filter, starting with research from 2005 to 2023. Table 2 shows a summary of the search protocol.

Table 2.

Protocol summary

Search base	CAPES Catalog of Theses and Dissertations
Period	2005 - 2023
Search term	Ethnomathematics
Inclusion Criteria	Research directly or indirectly involving the Ethnomathematics Program.
Exclusion Criteria	Full text not available for download; Works in which it was not possible to identify the panorama of the study.

Another important factor in the selection and analysis of studies is the strategies used to select and extract the data. These stages were carried out by reading the title, abstract, keywords,

objectives, research questions and some methodological and analytical notes. No papers were read in their entirety.

Papers that were not fully accessible through the Capes catalog were searched in the DLTD, Google Scholar or the HEI repository.

Application of the protocol

The application of the protocol consists of the stages of selection and analysis of studies. In this phase, the data were selected, read, and extracted. According to Munzlinger et al. (2012, p. 13), "this is the most arduous and also the most important task. This procedure must be carried out by strictly following all the selection criteria defined in the EP, and during the reading, the answers to the research questions must be sought".

The theses and dissertations were selected and analyzed in a single stage by applying the inclusion and exclusion criteria and reading the studies. Initially, using the search term "ethnomathematics", a total of 693 studies were found. By excluding the period 2005-2023 from the year filter, the number of retrieved studies was 629. After applying the inclusion and exclusion criteria and reading the papers, the total number of selected studies was 501. Figure 2 shows the number of studies by year of publication.
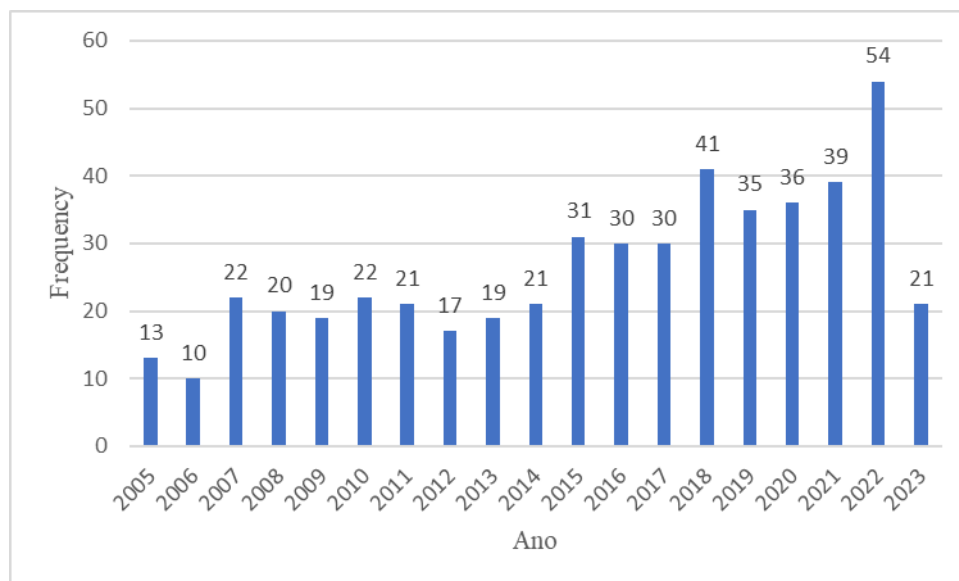

Figure 2.

Number of Brazilian academic studies on Ethnomathematics defended between

2005 and 2023

The years with the lowest and highest number of defenses, respectively, are 2006 and 2022, with a total range of 44 studies. From 2007 to 2014, there is greater homogeneity in the

number of defenses compared to the period 2015-2022, with a coefficient of variation of 0.080 in the first period and 0.202 in the second. However, despite the more heterogeneous dispersion in the number of defenses, the period from 2015 to 2022 shows an increase in defenses compared to previous years.

Regarding the number of studies identified by inclusion and exclusion criteria, Table 3 shows the number of studies cataloged under each criterion adopted.

Table 3.

Number of studies by inclusion and exclusion criteria

Search base	Criteria adopted		Number of studies
CAPES catalog of theses and dissertations	Inclusion	Researches that directly or indirectly involve the Ethnomathematics Program.	550
	Exclusion	Full text not available for download.	47
		Works in which it was not possible to identify the panorama of the study.	2

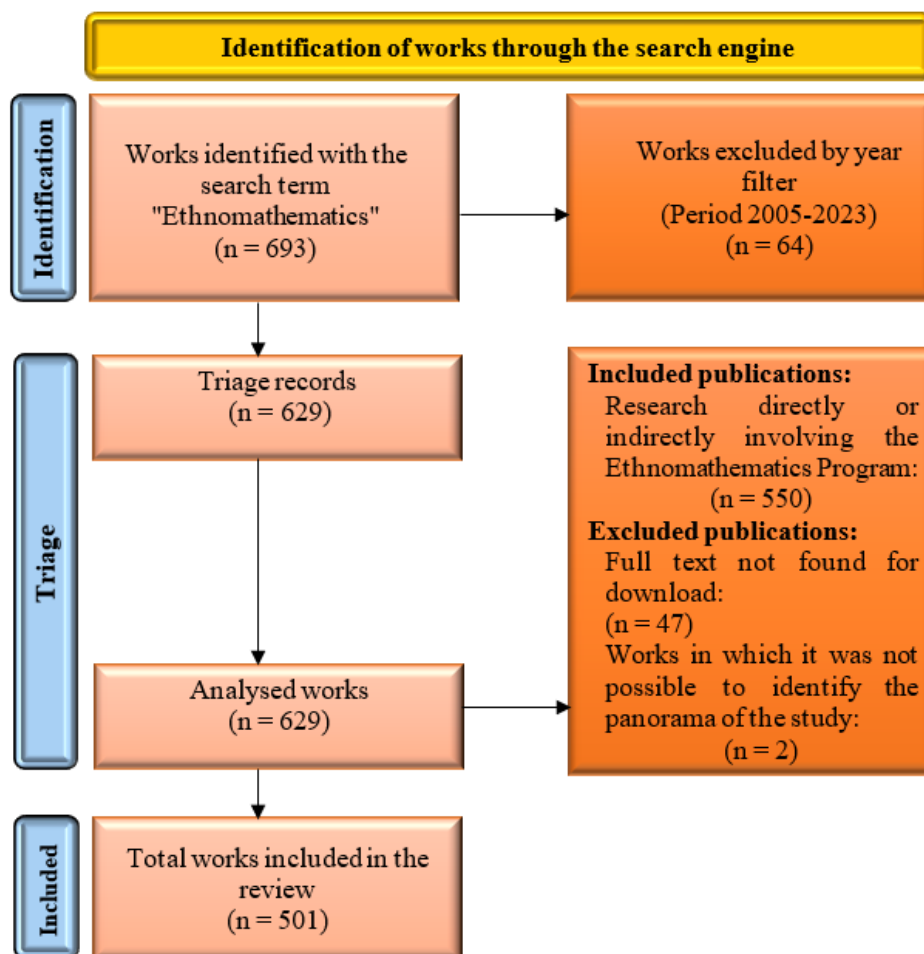Figure 3 summarizes the steps taken in this systematic review.

Figure 3.

Flowchart of the selection of papers - adapted from PRISMA 2020 (Page et al., 2021)

Finally, the analysis of the productions which, according to Mendes and Pereira (2020, p. 224), "consists of extracting the data relevant to the research objective" took place during the reading and selection of the studies. The data was organized and stored in Excel spreadsheets.

Presentation of the systematic review

This is where the data cataloged in the analysis of the studies is presented to answer the question posed at the outset and generate some reflections and considerations. It is a phase in which graphs, tables, reports, and final documentation are produced with the data collected during the systematic review (Munzlinger et al., 2012).

As a starting point, which is considered fundamental for opening discussions, we start with the number of theses and dissertations. Figure 4 shows the number of defenses per year at each stricto sensu postgraduate level.
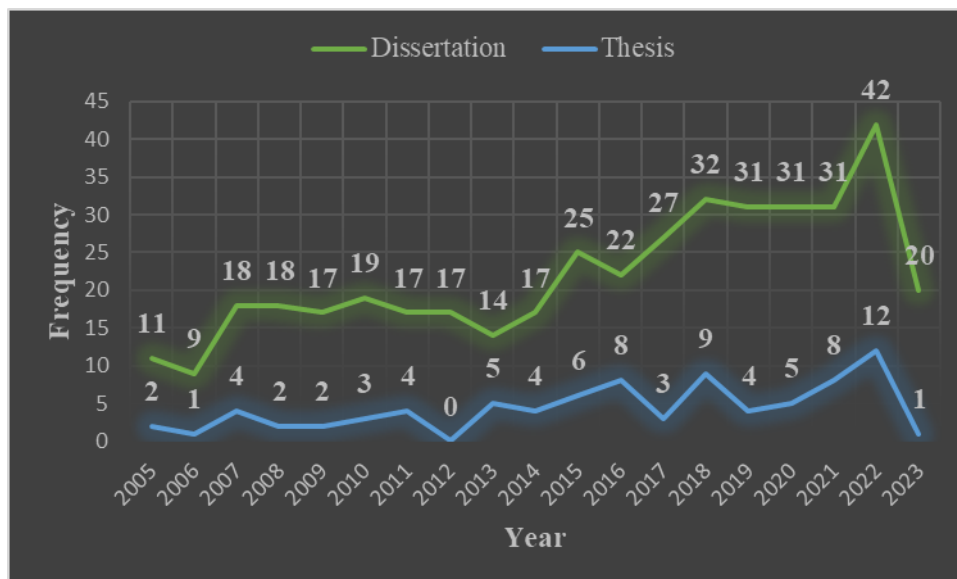
Figure 4.

Number of Brazilian theses and dissertations on Ethnomathematics defended between 2005 and 2023

Given the data presented above, it can be seen that the number of dissertations defended (418 dissertations) was higher than the number of theses (83 theses). This difference was also identified in all the years analyzed. Thus, it is possible to infer that, during this period in Brazil, there were more dissertations than theses in the field of Ethnomathematics Program research, and the difference was quite significant in all the years studied.

These results may be linked to the number of master's and doctoral programs in Brazil. According to Capes, there are 4601 master's degrees[9] and 2532 doctorates[10] distributed among postgraduate programs (Brazil, 2021). This equates to a difference of 2,069 courses, with master's degrees outnumbering doctorates.

Regarding academic productions by state, Figure 5 shows what this panorama has been like according to the location of the HEI to which the research is linked.

---

[9] The sum was based on the total number of postgraduate programs that include: master's/doctorate, master's, professional master's and professional master's/doctorate.
[10] The sum was based on the total number of postgraduate programs that include: master's/doctorate, doctorate, professional master's/doctorate and professional doctorate.
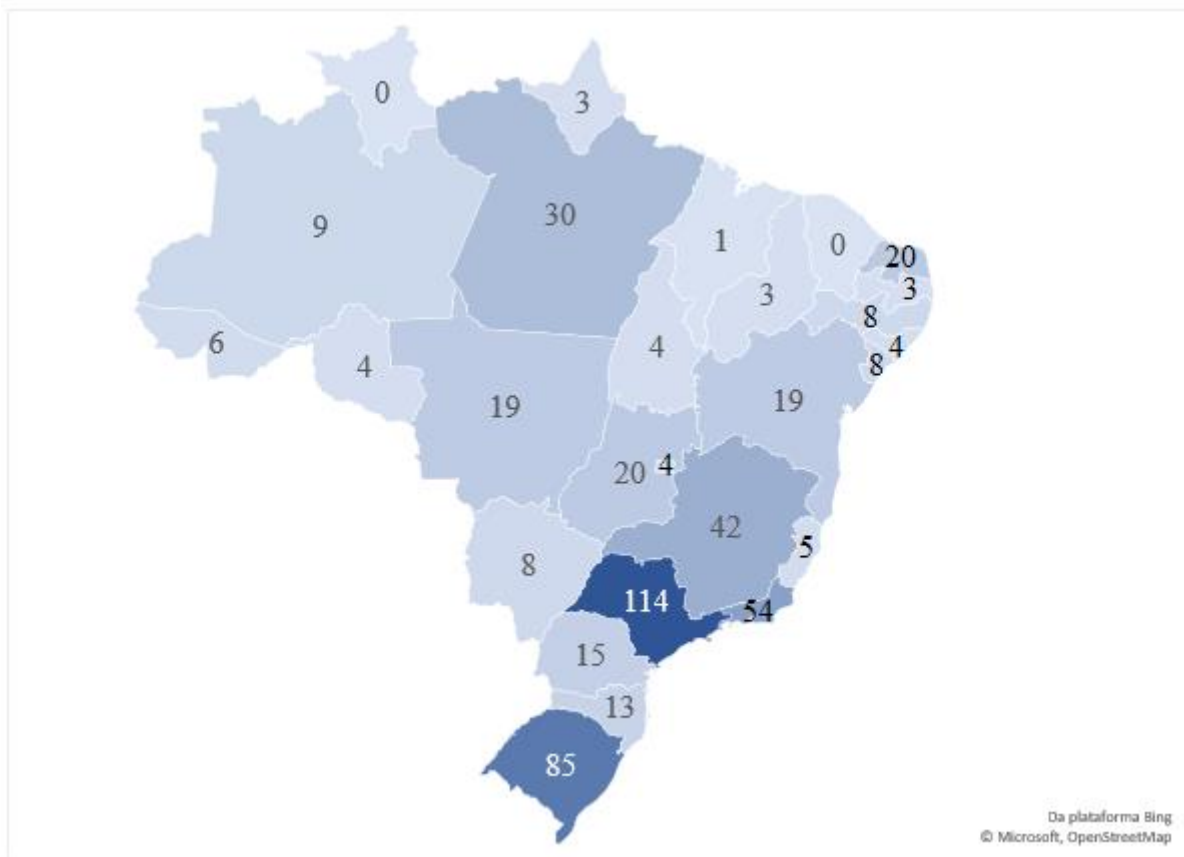
Figure 5.

Number of Brazilian academic productions on Ethnomathematics by state (2005-2023)

The five states with the highest number of productions, in descending order, are: São Paulo, Rio Grande do Sul, Rio de Janeiro, Minas Gerais and Pará. It can be seen that the Southeast has the highest concentration of academic research in Ethnomathematics, with a production of about 42.91% of the total investigations[11], and more than 53.02% of this research is linked to higher education institutions in São Paulo. Of the 26 Brazilian states, research in ethno-mathematics can be seen in 24 of them and in the Federal District. Only Ceará and Roraima do not have any work in this area.

The data in Figure 5 show an expansion of ethnomathematics research in all Brazilian regions, with the South and Southeast standing out. These results could be related to the fact that in these regions there is a higher concentration of universities working in this area of research. According to the data collected, 36.63% of the HEIs are located in the Southeast and 24.75% in the South.

---

[11] Whenever we refer to the total number of investigations, we are taking into account the 501 studies catalogued during the selection of research.

In terms of HEIs, 101 institutions were found. Figure 6 shows the graph of Brazilian HEIs with more than four theses and/or dissertations defended between 2005 and 2023.
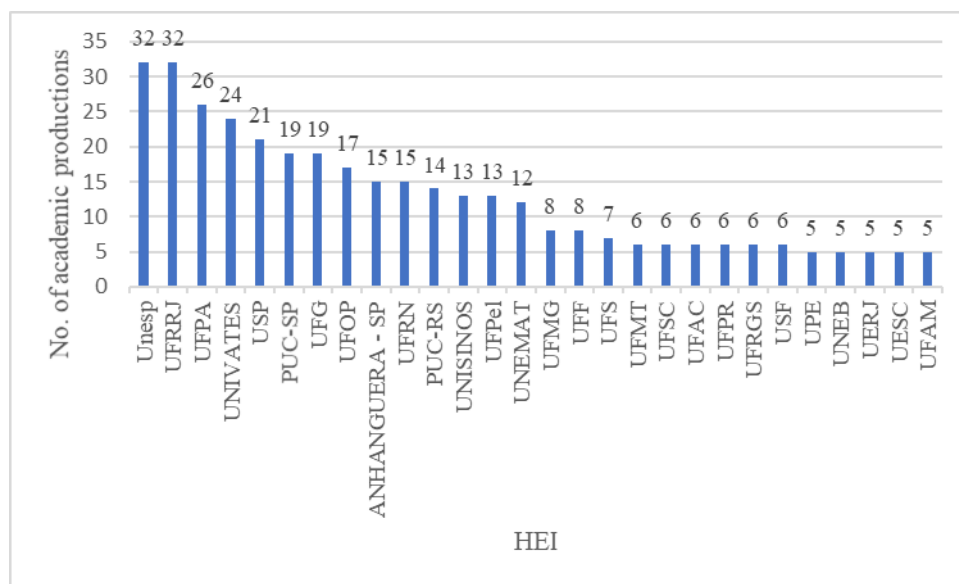

Figure 6.

Brazilian HEIs with the highest academic production in Ethnomathematics (2005-2023)

The Universidade Estadual Paulista (Unesp), the Universidade Federal Rural do Rio de Janeiro (UFRRJ), the Universidade Federal do Pará (UFPA), the Universidade do Vale do Taquari (UNIVATES) and the Universidade de São Paulo (USP) stand out at the national level in terms of the number of academic studies on ethnomathematics defended in Brazil, with more than 20 defenses each. Together, these five institutions account for the equivalent of 26.95% of the research. Once again, the Southeast region stands out, with 10 HEIs among those with the highest production, five of which are located in the State of São Paulo. By region, the Universidade Federal do Pará (UFPA) has the highest production in the North (5.19%), the Universidade Federal do Rio Grande do Norte (UFRN) in the Northeast (2. 99%), Universidade Estadual Paulista (Unesp) and Universidade Federal Rural do Rio de Janeiro (UFRRJ) in the Southeast (6.39%), Universidade do Vale do Taquari (UNIVATES) in the South (4.79%) and Universidade Federal de Goiás (UFG) in the Midwest (3.79%).

The North, Northeast, and Midwest regions do not have various HEIs among those with the highest production, with a concentration of work in a few institutions. A different context occurs in the South and Southeast, where even though there are institutions with numerous papers, it is possible to see a greater variety of institutions among those shown in Figure 6.

244 different supervisors were identified. The graph in Figure 7 shows those with more than five supervisors of papers defended in Brazil.
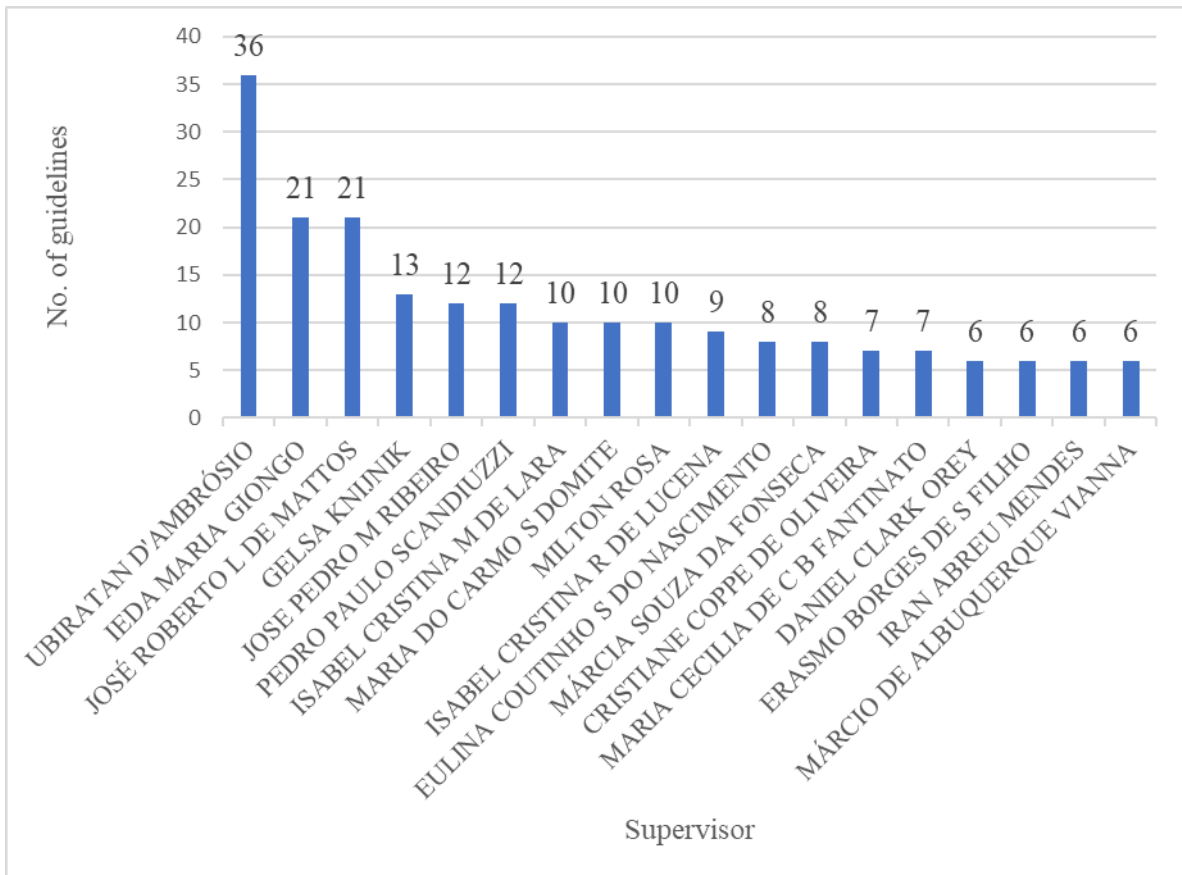
Figure 7.

The supervisors with the most academic work in Ethnomathematics in Brazil (2005-2023)

The six supervisors with the highest number of orientations in Ethnomathematics in Brazil are Ubiratan D'Ambrósio, with 7.19% of the total number of orientations, followed by Ieda Maria Giongo and José Roberto Linhares de Mattos, with 4.19%, Gelsa Knijnik, with 2.60%, and José Pedro Machado Ribeiro and Pedro Paulo Scandiuzzi, with 2.40%. Professor D'Ambrósio has a significant difference in terms of supervision compared to the other supervisors.

Considering the number of supervisors (244) and the total number of papers (501), the average number of supervisions per supervisor is about 2.05 papers. This shows a diversity of supervisors in academic research in the Ethnomathematics program. Of the 244 supervisors, only 18 are among the most productive with more than five supervisions, which shows that more than 92.62% have between five and one supervisions. It is also important to highlight the number of supervisions of Professor Ubiratan D'Ambrósio, who, even a few years after coining the term Ethnomathematics, is still the most prominent supervisor of this research program in Brazil.

Regarding the panorama of academic research in ethnomathematics by thematic group of cataloging, we found 72 works focused on Teacher Education (G1), 345 for the curriculum (G2), 298 for ethnomathematics (G3), 21 for review and/or mapping (G4) and 21 for Theoretical Studies (G5). Some studies include more than one group[12] . The Venn diagram, expressed in Figure 8, shows the number of studies according to the classification and intersection between groups G1, G2 and G3.
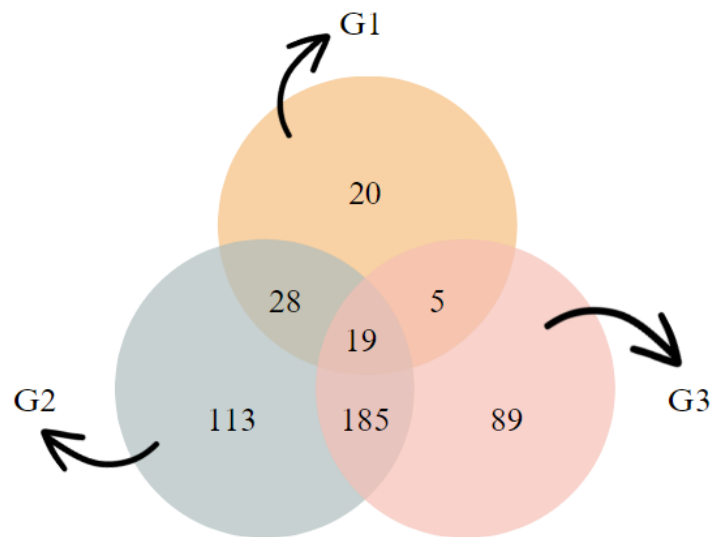

Figure 8.

Number of Brazilian academic papers in ethnomathematics according to the classification and intersection between the thematic groups G1, G2 and G3

It is noted that 20 studies address only teacher training, 28 only teacher training and curriculum, 5 only address teacher training and ethnomathematics, 113 exclusively the curriculum, 185 only the curriculum and ethnomathematics, 89 only ethnomathematics and 19 teacher training, curriculum and ethnomathematics. The highest frequency is given among research involving curriculum and ethnomathematics (185+19), with the equivalent of 40.72% of the total investigations.

The data show us that Brazilian academic research in ethnomathematics works more on issues related to the teaching and learning process, curriculum or models directed to mathematics education (G2), as well as describing or presenting parts or an ethnomathematics (G3). Teacher education (G1), in comparison with the others, is still little investigated in this field of research, with only 14.37% of the total investigations contemplating this aspect.

---

[12] The work of G4 and G5 did not belong to more than one thematic group.

Linked to these results, Figure 9 shows the graph, by year, of the number of papers defended in Brazil by cataloging group (G1, G2 and G3).
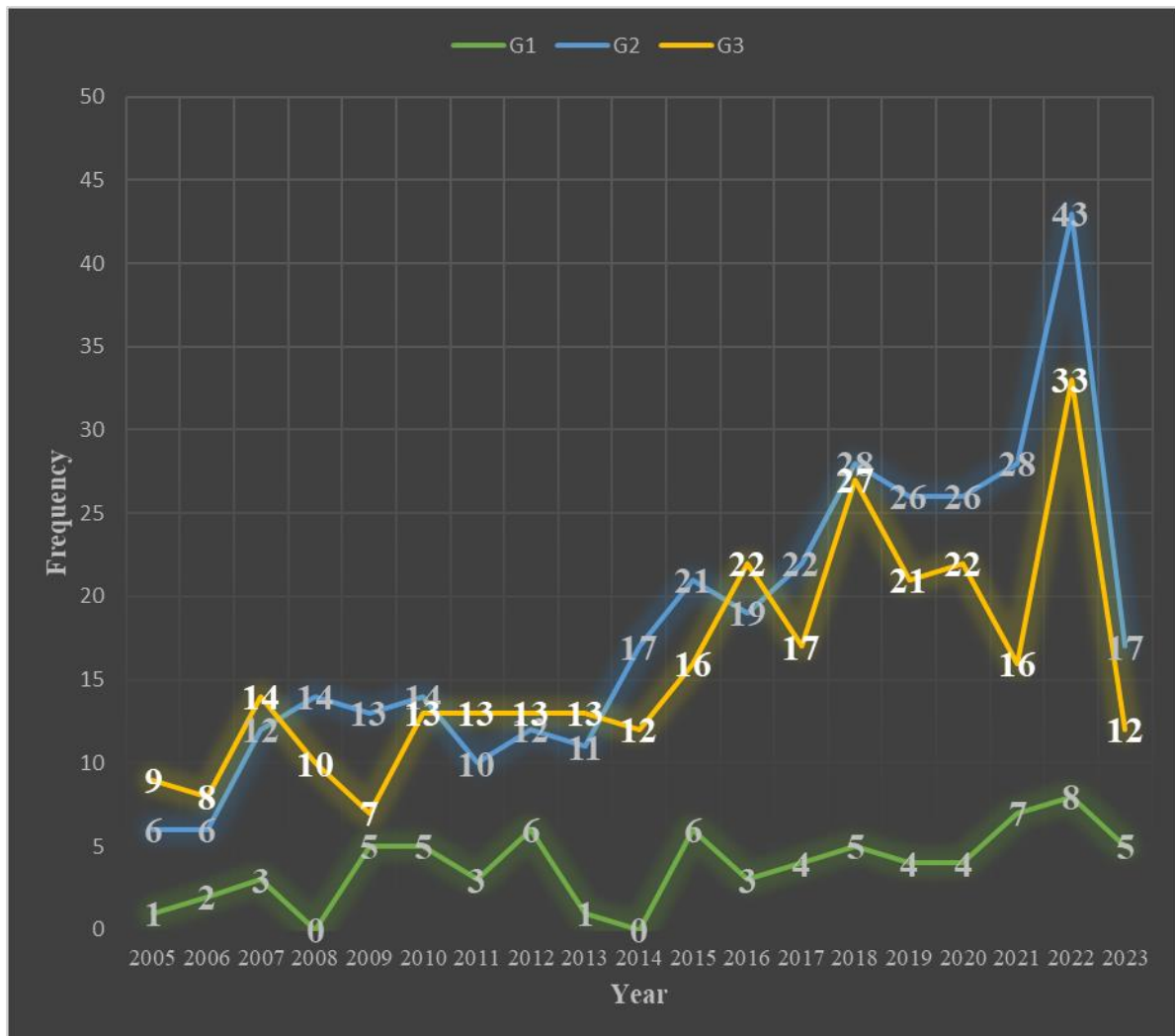

Figure 9.

Number of Brazilian academic researches in ethnomathematics of thematic groups G1, G2 and G3 (2005-2023)

In all years, the number of works focused on G2 and G3 was higher than that of G1. The number of researches involving G2 and G3 are analogous until 2018; from then on, G3 shows a decrease until 2021, reaching, in that year, a difference of 12 productions in relation to G2. It is observed that 2022 was the year with the highest number of productions in the three thematic groups.

The coefficients of variation of G1, G2 and G3 are, in this order: 0.584, 0.491 and 0.416. This shows us that the variation of productions focused on G1 is more heterogeneous than those that approach G2 and G3. Therefore, even though it was a period in which the number of

productions directed to teacher training was lower, it is also possible to observe a certain instability in the variation of research in this aspect.

Finally, regarding the cultural group, 105 different approaches[13] were identified . Given the quantitative, for better organization and considering that some approaches have common characteristics, such data were structured in specific groups, known as cultural context. Table 4 presents the systematization of cultural contexts according to the linked cultural approaches, as well as the number of studies that covered each cultural context[14] .

An important point to highlight concerns the fact that in only 366 investigations, it was possible to identify a cultural approach. Of the total studies analyzed, in 90 investigations there was no delimitation of a cultural group, and in 45 of them it was not possible to identify the cultural approach (the study did not directly present a cultural approach, or it was not possible to verify it because the work was not read in full).

Table 4.

Brazilian research in ethnomathematics by cultural context (2005-2023)

Cultural background	Cultural approach	No. of works
Indigenous	Indigenous	86
Peasant	Landowners; rural community; rural producers; farmers; rural settlement; landless; rural community; viticulture; Milkmen; rural land regularization; horticulturists; rice producers; tobacco producers; sugarcane producers; coffee producers; yerba mate producers; onion producers; cocoa producers; sisal workers; peasants; Cassava Growers; flour producers; açaí producers and cross breeders.	83
Black	Blacks; Africans; Umbanda religion; Babalorixás; Quilombos; Afro-Brazilians; Capoeiristas.	51
Civil construction	Masons; civil construction; cemetery wall builders; cistern Builders; architecture.	18
Ribeirinho	Ribeirinhos.	16
handicraft	Artisans; marquetry artisans; rabeta artisans; miriti artisans; lace makers; Clay artisans; ceramic artisans.	16
Fishing	Fishermen; shrimp fishermen; canoeists.	13
Disability	Visually impaired; hearing impaired; inclusive education.	11
Digital Culture	Users of digital information technologies.	7
Other countries	Arab; Amákhuma People; Immigrants; Timor-Leste; Haitians.	7

---

[13] As pointed out in the protocol, only cultural approaches that differ from the school environment were cataloged.
[14] Some investigations involve more than one cultural context.

Cultural background	Cultural approach	No. of works
Urban community	Residents of the suburb; members of a neighborhood.	6
Settlers	Germans; Jesuits.	6
Carpentry	Carpenters; naval carpenters; construction Carpenters.	6
Weaving	Weavers; net weavers.	5
Fair	fairground vendors	5
Clothing manufacturing	Garment workers; denim garment workers; seamstresses; bombacha producers.	5
Artwork	Paintings; Sculptors.	4
Sport	Chess players; sport climbers; wheelchair Sportsman dance.	3
Industry	Red ceramic industry; refrigeration industry; dairy industry.	3
Solidarity-based economic ventures	Solidarity economic enterprises.	3
Cook	Cook; Assistant Cook; cookery.	3
Samba school	Carnival; samba school.	2
Driver	Trucker; app driver.	2
Criminal Recovery Center	Prisoners; convicts in socio-educational regime.	2
Gold mining	Prospectors.	1
Automotive paint	Automotive painter.	1
Environmental Police	Environmental Police.	1
Soap making	Soap producers.	1
Electrician	Electrician.	1
Floriculture	Florist.	1
Beauty salon	Hair stylist.	1
Bus collector	Bus collector.	1
Housework	Domestic workers.	1
Women's culture	Women.	1
Gypsy	Gypsies.	1
Adolescence	Teenagers.	1
Street trade	Street traders.	1
Occupational Safety	Occupational Safety Technician.	1
Logger	Loggers	1
Public relations	Public relations	1
Singer	Singers	1

Given the data in Table 4, the most addressed cultural contexts were: indigenous, peasant, black, construction, Riverside, crafts, fishing, and disability. The Indigenous and the peasant were treated, in that order, in approximately 17.17% and 16.57% of the investigations, respectively. The peasant cultural context was the one with the greatest cultural diversity, with 23 cultural approaches.

Even in the face of the organization of cultural approaches in specific groups (41 cultural contexts), it is still possible to see a plurality of cultural knowledge involved in academic research in ethnomathematics in Brazil. This shows us that the master's and doctoral investigations, in this line of research, cover a diversity of cultures, both Brazilian and from

other countries. However, there is a concentration of studies related to peasant and indigenous cultures.

About the cultural contexts of the theses and dissertations of thematic group G3 in Figure 8, which describe or present parts or an ethnomathematics different from school mathematics, it is observed that the works of this group include 96 of the 105 cultural approaches expressed in Table 4. The graph in Figure 10 shows the cultural approaches that appear most in the works of G3.
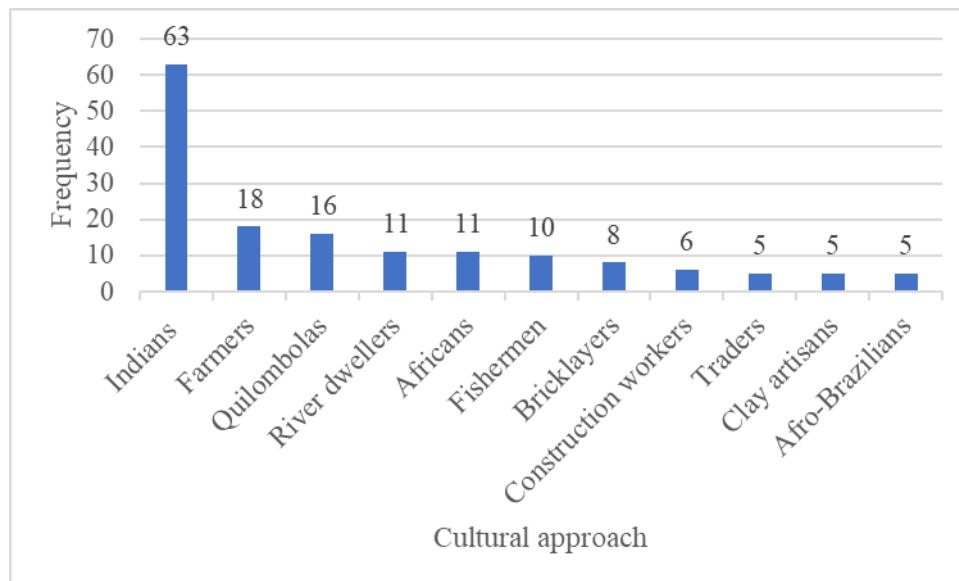

Figure 10.

The cultural approaches that appear the most in G3

In particular, the most treated approaches are: indigenous, present in 21.14% of the group's investigations, followed by farmers, in 6.04%, quilombos, in 5.37%, Africans and Riverside dwellers, in 3.69% and fishermen, in 3.36%. This indicates that the ethnomathematical knowledge and actions most studied in Brazilian academic works, involving the ethnomathematics program, were those originating from the constituent peoples of these cultural scenarios. This case may be linked to the fact that these peoples go back to the origin of the Brazilian peoples and/or that they contemplate the most traditional productive diversities of Brazil.

Final considerations

The study in question, through a systematic review, sought to create a mapping of the panorama of Brazilian academic research in ethnomathematics, in the period 2005 and 2023,

and identify some constituent elements: type of research (whether thesis or dissertation), advisor, linked Hei and the state in which the HEI is inserted.

Given the data presented, in the period from 2005 to 2023, there was a growth in academic research in ethnomathematics in Brazil, with the number of dissertations higher than theses. There was also an expansion of HEI in all Brazilian regions, with investigations focused on this aspect of Mathematics Education. Regarding the number of advisors, 244 advisors were identified among the 501 papers defended in HEIs of 24 states and the Federal District.

Research is more focused on the teaching and learning process, curriculum, models directed to mathematics education and to describe or present parts or an ethnomathematics, and teacher training is still little investigated. In addition to the studies with the aforementioned approaches, reviews and/or mapping and theoretical and historical approaches were also identified.

Regarding the cultural approach, research indicates diverse cultural contexts; however, studies have a greater incidence in peasant and indigenous culture. The research in ethnomathematics defended in the aforementioned period has the main characteristic of contemplating the curriculum and / or the description of ethnomathematics, with knowledge from the peasant and Indigenous context as the most investigated. These are studies that, for the most part, seek answers about the processes of teaching and learning mathematics in schools inserted in rural and indigenous areas. However, in a more restricted intensity, they present an investigative diversity in other perspectives and cultural contexts.

With this article, we do not intend to exhaust what has been discussed in the academic Productions in ethnomathematics developed in Brazil, we only seek to outline reflections on the investigative itinerary of this research program of social and political dimensions of Mathematics Education. We know that we are drawing succinct notes, from the thoughts and looks of specific subjects, among various existing possibilities. That other visions may contribute to the program, especially those of those who venture to read the texts in full. However, we hope, with such a study, to bring significant contributions to the ethnomathematics Research Program.

References

Almeida, K. F. (2020). *Etnomatemática na educação de jovens e adultos: um olhar sobre a produção científica no Brasil* [Dissertação de mestrado em Educação em Ciências e Matemática, Universidade Federal de Goiás]. http://repositorio.bc.ufg.br/tede/handle/tede/11012.

Andrade, P. M. F., & SILVA, A. A. (2020). dimensões da etnomatemática na poética do sujeito camponês: análise do VIII festival de poesias escola paulo freire. *ReDiPE: Revista Diálogos e Perspectivas em Educação*, *2*(1), 251-266. https://periodicos.unifesspa.edu.br/index.php/ReDiPE/article/view/1250.

Bampi, L. R. (2003). *Governo Etnomatemático: tecnologias do multiculturalismo* [Tese de doutorado em Educação, Universidade Federal do Rio Grande do Sul]. http://hdl.handle.net/10183/2672.

Brasil. [n.d.]. Catálogo de Teses e Dissertações. *Histórico e evolução*. Ministério de Educação. Brasília: MEC/CAPES.

Brasil. (2021). Sistema de Informações Georreferenciadas – CAPES. *GEOCAPES*. Ministério de Educação. Brasília: MEC/CAPES.

Brizola, J., & Fantin, N. (2017). Revisão da Literatura e Revisão sistemática da Literatura. *Revista de Educação do Vale do Arinos-RELVA*, *3*(2), 23-39. https://doi.org/10.30681/relva.v3i2.1738.

Clareto, S. M., & Miarka, R. (2020). Etnomatemática em Cenas: nas sulinas fronteiras de uma américa, de que ?matemáticas? somos capazes? *RLE (PASTO)*, 13, 9-28. https://www.redalyc.org/journal/2740/274065861002/html/.

Conforto, E. C., Amaral, D. C., & Silva, S. D. (2011). Roteiro para revisão bibliográfica sistemática: aplicação no desenvolvimento de produtos e gerenciamento de projetos. In *Anais do 8º Congresso Brasileiro de Gestão e Desenvolvimento de Produtos*, Porto Alegre, RS.

Conrado, A. L. (2005). *A pesquisa brasileira em Etnomatemática: desenvolvimento, perspectivas, desafios* [Dissertação de mestrado em Educação, Universidade de São Paulo]. https://doi.org/10.11606/D.48.2005.tde-27032012-125006.

D'Ambrosio, B. S. (2006). Etnomatemática e educação. In G. Knijnik, F. Wanderer, & C. J. Oliveira. *Etnomatemática, currículo e formação de professores* (pp. 39-52). EDUNISC.

D'Ambrosio, U. (2019). *Etnomatemática*: elo entre as tradições e a modernidade. Autêntica Editora.

Dall´Agnol, L. (2019). *Um estado da arte das pesquisas acadêmicas brasileiras sobre Etnomatemática e formação de professores de matemática (de 2006 a 2016)* [Tese de doutorado em Educação Matemática, Pontifícia Universidade Católica de São Paulo]. file:///C:/Users/Alison/Downloads/Luzit%C3%A2nia%20Dall_agnol.pdf.

Dias Neto, J. de R. L. (2021). *Um olhar em relação à produção de pesquisas em educação do campo que tematizam o uso da Etnomatemática* [Dissertação de mestrado em Ensino em Ciências e Saúde, Universidade Federal do Tocantins]. http://hdl.handle.net/11612/3699.

Donato, H., & Donato, M. (2019). Etapas na Condução de uma Revisão Sistemática. *Acta Medica Portuguesa*, *32*(3), 227-235. https://doi.org/10.20344/amp.11923.

Isolani, L. G. (2015). *Dimensões da Etnomatemática aplicados no processo de ensino de eletricidade no curso profissionalizante* [Dissertação de mestrado profissional em ensino de ciências naturais e matemática, Universidade Regional de Blumenau].

Kitchenham, B. (2004). Procedures for performing systematic reviews. *Keele, UK, Keele University*, 33, 1-23.

Knijnik, G. (2002). Itinerários da Etnomatemática: questões e desafios sobre o cultural, o social e o político na educação matemática. *Educação Matemática em Revista*, *36*, 161-176.

Knijnik, G. (2006). Itinerários da Etnomatemática: questões e desafios sobre o cultural, o social e o político na educação matemática. In G. Knijnik, F. Wanderer, & C., J. Oliveira. *Etnomatemática, currículo e formação de professores* (pp. 19-38). EDUNISC.

Knijnik, G., Wanderer, F., Giongo, I., M., & Duarte, C., G. (2019). *Etnomatemática em movimento.* Autêntica Editora.

Halmenschlager, V. L. da S. (2001). *Etonomatemática: uma experiência educacional*. Selo Negro.

Meira, C. de J. (2021). *As concepções de cultura nas teses de Etnomatemática: uma presença ausente* [Tese de doutorado em educação, Universidade Federal Fluminense]. http://app.uff.br/riuff/handle/1/25247.

Mendes, L. O. R., & Pereira, A. L. (2020). Revisão sistemática na área de Ensino e Educação Matemática: análise do processo e proposição de etapas. *Educ. Matem. Pesq.,* *22*(3), 196-228. https://doi.org/10.23925/1983-3156.2020v22i3p196-228.

Motta, M. S., & Kalinke, M. A. (2021). Em busca de compreensões sobre os objetos de aprendizagem na educação matemática por meio de uma revisão sistemática de literatura. *Educ. Matem. Pesq.,* *23*(1), 140-170. https://doi.org/10.23925/1983-3156.2021v23i1p140-170.

Munzlinger, E., Narcizo, F. B., & Queiroz, J. E. R. de. (2012). Sistematização de revisões bibliográficas em pesquisas da área de IHC. In P. T. A. Junior, & S. D. J. F. Barbosa. *Simpósio Brasileiro sobre Fatores Humanos em Sistemas Computacionais*. (pp. 01-20). Sociedade Brasileira de Computação – SBC.

Okoli, C. (2019). Guia para realizar uma Revisão Sistemática de Literatura. *EAD em Foco*, 9(1), 01-40. https://doi.org/10.18264/eadf.v9i1.748.

Passos, C. M. (2017). *Condições de produção e legitimação da Etnomatemática* [Tese de doutorado em Educação, Universidade Federal de São Carlos]. https://repositorio.ufscar.br/handle/ufscar/9447?show=full.

Passos, C. M., & Vieira, M. J. (2021). Itinerários Etnomatemáticos: 35 Anos de Pesquisas em um Movimento Temático pelas Diferentes Regiões do Brasil. Jounal of Mathematic and Culture, 15(1), 169-187. https://journalofmathematicsandculture.files.wordpress.com/2021/06/151-article-9.pdf.

Page, M. J., Mckenzie, J. E., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D., et al. 2021. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*, *372*(71), 1-9. http://doi.org/10.1136/bmj.n71.

Peres, P. V. (2019). *As inter-relações dos pensares matemáticos e financeiros na educação, como um desafio transdisciplinar* [Dissertação de mestrado em Educação Matemática, Universidade Anhanguera de São Paulo]. http://repositorio.pgsskroton.com/bitstream/123456789/32014/1/Patricia_Verzinhasse_Peres_organized.pdf.

Santana, D. dos R. (2022). *Análise da evasão escolar na EJA e uma proposição ao ensino de matemática visando a permanência dos estudantes* [Dissertação de mestrado Profissional em Educação Básica, Universidade Estadual do Norte do Paraná].

Santos, R. V. (2015). *Produções brasileiras sobre Etnomatemática no século XXI: uma análise das implicações da concepção de etno e cultura* [Dissertação de mestrado em educação em ciências e matemática, Pontifícia Universidade Católica do Rio Grande do Sul]. https://tede2.pucrs.br/tede2/handle/tede/6421.

Silva, M. C. R. da, & Giongo, I. M. 2021. Professores que atuam em escolas indígenas, práticas pedagógicas e o campo da etnomatemática: algumas possíveis reflexões. *Educ. Matem. Pesq.*, *23*(2), 189-217. http://dx.doi.org/10.23925/1983-3156.2021v23i2p189-217.

Soares, D. A. (2008). *Educação matemática crítica: contribuições para o debate teórico e seus reflexos nos trabalhos acadêmicos* [Dissertação de mestrado em Educação Matemática, Pontifícia Universidade Católica de São Paulo]. https://repositorio.pucsp.br/jspui/handle/handle/11352.

Sudré Júnior. R. L. P. (2021). *Uma análise de estudos envolvendo Etnomatemática no Ensino de Jovens e Adultos* [Dissertação de mestrado Profissional em Matem ática em Rede Nacional, Universidade Federal Rural do Rio de Janeiro].

Tiboni, C. G. R. (2010). *Estatística Básica: Para os cursos de administração, ciências contábeis, tecnologia e de gestão*. Atlas.

Vilela, D. S. (2007). *Matemáticas nos usos e jogos de linguagem: ampliando concepções na educação matemática* [Tese de doutorado em Educação, Universidade Estadual de Campo]. https://doi.org/10.47749/T/UNICAMP.2007.403754.