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A scoping review of research methodologies used on studies of gender and sexuality within mathematics education

Uma revisão de escopo das metodologias de pesquisa utilizadas em estudos de gênero e sexualidade na educação matemática

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ABSTRACT

This scoping review examines the methodologies used in empirical studies on gender and sexuality within mathematics education, focusing on research published between 2020 and 2024. By analyzing articles from major databases, including ProQuest, Web of Science, EBSCO, Google Scholar, and Scopus, this review identified a range of qualitative, quantitative, and mixed-method approaches. The study highlights the shift towards post-structuralist perspectives, reflecting a growing interest in exploring gender and sexuality as fluid and socially constructed phenomena. This review aims to enhance understanding of methodological trends in the field and advocates for methodological advances that reflect this shift towards post-structuralist studies in mathematics education.

KEYWORDS: Gender and sexuality. Research metodologies. Mathematics education.

RESUMO

Esta revisão de escopo examina as metodologias utilizadas em estudos empíricos sobre gênero e sexualidade na educação matemática, com foco em pesquisas publicadas entre 2020 e 2024. Analisando artigos de grandes bases de dados, incluindo ProQuest, Web of Science, EBSCO, Google Scholar e Scopus, esta revisão identifica uma gama de abordagens qualitativas, quantitativas e de métodos mistos. O estudo destaca a transição para perspectivas pós-estruturalistas, refletindo um crescente interesse em explorar gênero e sexualidade como fenômenos fluidos e socialmente

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construídos. Esta revisão visa aprimorar a compreensão das tendências metodológicas na área e incentiva avanços metodológicos que reflitam essa mudança para estudos pós-estruturalistas na educação matemática.

PALAVRAS-CHAVE: Gênero e sexualidade. Metodologias de pesquisa. Educação matemática.

Introduction

The study of gender and sexuality in mathematics education is longstanding but remains unresolved (Becker; Hall, 2024; Lubienski; Ataide Pinheiro, 2020; Neto; Ataide Pinheiro, 2021).[3] Over the decades, gender has been extensively studied, yielding numerous findings related to gender and mathematics. From past literature reviews and other types of inquiry, it is evident that much early research focused on achievement and participation in mathematics relative to individuals' gender (see Becker; Hall, 2024; Fennema, 1974; Fennema; Sherman, 1976; Hyde; Fennema; Lamon, 1990; Leyva, 2017; Lindberg; Hyde; Petersen; Linn, 2010). Despite the growing body of literature exploring gender, mathematics, and achievement, recent meta-analyses have shown no statistically significant gender differences in mathematical achievement (Lindberg; Hyde; Petersen; Linn, 2010). However, some researchers continue to alert us to the importance of gender in mathematics achievement, arguing that achievement in mathematics still varies according to students' gender (Lubienski; Ganley, 2017). Regarding the ongoing debates on mathematics achievement and gender research, we and others argue that research comparing gender and mathematics achievement must be conducted in ways that do not perpetuate stereotypes that will contribute to more gender differences between men and women in mathematics (Ataide Pinheiro, 2021; Goldberg; Darwin; Esquibel; Noble *et al.*, 2023; Gutiérrez, 2008; Piatek-Jimenez; Braz Dias, 2021).

More recently, there has been a shift in mathematics education research towards advocating for more inclusive approaches to addressing issues of gender and sexuality (Ataide Pinheiro, 2023; Becker; Hall, 2024; Cox; Ataide Pinheiro, 2024). This shift is partly a response to the positivist production of knowledge about gender in mathematics education research. This means mathematics educators began to interrogate issues of gender using the "posts" (e.g., post-structuralism,

[3] We would like to extend our sincere thanks to the anonymous reviewer for their invaluable and encouraging feedback, which has greatly contributed to strengthening our manuscript. We are also deeply grateful to Rebecca Renirie, mathematics area librarian at [First Author's Institution] for her insightful assistance with navigating databases; we look forward to engaging her expertise earlier in the process for future reviews, especially in improving search terms and research procedures.

postmodernism, postcolonialism, etc.) to create new knowledge in the field of mathematics education. However, many of these new inquiries, despite their attempts to make sense of different epistemologies, ontologies, and methodologies, fell short in aligning the assumptions of epistemology and ontology with their methodological approach and produced what St. Pierre (2014) simply defined as humanist qualitative methodology. This methodology uses concepts of positivism, such as research questions, research design, data collection, data analysis, etc., but is misaligned with epistemological and ontological assumptions of the “posts.”

Additionally, as researchers in mathematics education engage with these "new ways of inquiry," there has been a growing call for investigations that go beyond the traditional gender binary (boys vs. girls) (Hall; Norén, 2021) and explore sexuality, an area that has been largely overlooked in mathematics education research (see Ataide Pinheiro, 2022; Dubbs, 2016; Kersey; Voigt, 2021). One of the most recent literature reviews on the topic of gender and sexuality in mathematics education, a publication by Becker and Hall (2024), revealed current trends in research on gender from 2020 through 2022. Noticeably, they found that gender remains a significant focus in research in mathematics education due to persistent inequalities in achievement, attitudes, representation, and lived experiences of individuals regarding mathematics. Their work calls for research that reflects methodological and theoretical advancements in the field of mathematics education for diverse genders and sexualities. They also noted a shift in how researchers have begun to conceptualize gender as a fluid, non-binary construct while recognizing the dearth of research on sexuality in mathematics education, calling for more work that addresses this dearth (also see Voigt, 2020; Voigt; Reinholz, 2020). Furthermore, Becker and Hall highlighted that research on gender and sexuality has mostly concentrated on higher education, with less attention given to K-12 students. This might stem from the obstacles in bringing these topics into K-12 educational settings in conservative states across the globe, where discussions on gender and sexuality with minors continue to face opposition. Answering a decade-old call to shift research focus from sex differences to a more theorized examination of gender (see Damarin; Erchick, 2010; Esmonde, 2011), Becker and Hall found that recent studies increasingly approach gender through a post-structural lens, viewing it as fluid and socially constructed. This critique emerges from decades of research on the achievement gap in mathematics education.

Recognizing this evolving landscape of research on gender and sexuality in mathematics education and addressing the recent call by Becker and Hall (2024), this study, a scoping literature review, aims to provide an overview of the methodologies used in recent (2020 to 2024) studies of gender and sexuality within mathematics education. By examining the methodologies employed in research on gender and sexuality in mathematics education, this review seeks to illustrate how different approaches have contributed to the field's understanding of gender and sexuality in the context of mathematics education. While previous literature reviews have enhanced our understanding of the field by discussing whether the achievement gap between genders is still relevant (Lubienski; Ganley, 2017), reporting on current trends in gender and sexuality mathematics education research (Becker; Hall, 2024; Leyva, 2017), or discussing the current theories used in gender and sexuality research (Przybyla-Kuchek; Jackson; Piatek-Jimenez; Hall *et al.*, 2022), none have specifically focused on the methodologies used in gender and sexuality research. Importantly, there is a notable absence of literature reviews focusing on the methodologies used in gender and sexuality research in mathematics education. This review aims to fill this gap by discussing the diverse methodologies employed in mathematics education research on gender and sexuality. By doing so, we aim to enhance the field's knowledge and understanding of the various methodological approaches that have shaped research on gender and sexuality in mathematics education.

Theoretical Framework

Scoping reviews, like systematic reviews, have gained prominence as a method for addressing methodological and practical concerns across a wide range of disciplines, including clinical, medical, and educational contexts (Zawacki-Richter; Kerres; Bedenlier; Bond et al., 2020). While systematic reviews have been utilized since the 1970s, scoping reviews are a more recent development, often serving as precursors to systematic reviews. Their primary purpose is to explore the breadth of existing research on a given topic, identifying gaps and establishing an initial framework for future, more detailed investigations.

> [S]coping reviews typically present a general perspective to clarify concepts and features not yet investigated in-depth for a certain topic or field. In contrast, systematic reviews evaluate the quality of the existing literature to respond to one or more specific and precise research questions. (Gutierrez-Bucheli; Reid; Kidman, 2022, p. 652-653)

Scoping reviews are particularly useful when the research topic is complex or has not yet been extensively studied, allowing researchers to map the existing literature and clarify key concepts. Unlike systematic reviews, which aim to evaluate the quality of the evidence and provide definitive answers to specific research questions, scoping reviews are more exploratory. They often do not require a critical appraisal of the evidence, focusing instead on describing the types and characteristics of available research.

> [S]coping reviews do not commonly require a critical appraisal (e.g., risk of bias assessment) of evidence because they do not seek to give insight into practice and policy decisions based on evidence-based research—aspects more typical of a systematic review. (Gutierrez-Bucheli; Reid; Kidman, 2022, p. 657)

While Becker and Hall (2024) took steps to ensure the publications they reviewed were of the highest academic quality, we aimed at being comprehensive in our review, including a broad range of sources such as conference papers and theses/dissertations, without restricting our selection based on the ranking of the journals in which the articles were published. The reason for this was not merely to avoid the critical appraisal stage of the review and expedite the process; rather, since we were not conducting an evidence synthesis but investigating the methodologies used, we wanted to gather as many different methodologies as possible. Additionally, limiting our search to top journals could bias the results, as these journals often tend to favor more traditional methodologies.

Note that “[a]lthough conducted for different purposes compared to systematic reviews, scoping reviews still require rigorous and transparent methods in their conduct to ensure that the results are trustworthy” (Munn; Peters; Stern; Tufanaru et al., 2018, p. 6). Gutierrez-Bucheli, Reid, and Kidman (2022) advocate a process for conducting a scoping review that typically involves six key stages: 1) design, purpose, and scope; 2) relevant literature and evidence search; 3) evidence selection; 4) data extraction; 5) summary and report; and 6) consultation and review. Although these stages may sound sequential, each one is iterative, allowing researchers to refine their approach and ensure alignment between the research question and the chosen methodology. The authors write that the stages “have channels for feedback and feedforward” (Gutierrez-Bucheli; Reid; Kidman, 2022, p. 655). For example, consultation and review are not confined to the final stage but are integrated throughout the process. This parallel approach helps ensure consistency between research objectives and

methodological decisions by incorporating diverse perspectives and mitigating groupthink.

During our scoping review, we adopted an iterative approach at each stage, performing multiple searches across different databases and adapting our methods to accommodate the unique features of each. Feedback from an article reviewer prompted us to revise how we summarized and reported our findings. To accurately track the number of articles reviewed at each stage, rather than only the final number of publications retrieved, as we did in the first version of this article, we repeated the process and expanded the search to ensure thorough documentation throughout. Additionally, the results obtained from certain databases sometimes raised questions about their coverage, leading us to consult with a librarian. Based on her feedback, we made decisions that were not part of our initial plan. These questions and insights could not have been anticipated before our hands-on interaction with the databases during the initial search process. In one consultation, the librarian suggested using an additional database, expanding our search, checking for duplicates, and documenting all steps and procedures.

Since our article focuses on a scoping review of methodologies used in a specific area of research, we will now, in this theoretical framework section, discuss recent scholarship that points out a methodological issue that has been occurring in education and the social sciences, particularly in studies that claim to employ post-structural theories as their theoretical framework.

Much of the way we come to understand methodology aligns with the discussions presented by Elizabeth St. Pierre and Patti Lather (Lather, 1993; 2005; 2008; 2013; 2014; 2016; 2017; St. Pierre, 2012; 2013; 2016; 2017; 2019). Therefore, we understand methodology as theoretically informed ways to interact with textual and material apparatuses. Through the concept of post-qualitative methodology, St. Pierre and Lather critique the adoption of positivist research concepts within qualitative methodologies, including the systematization of research questions, research design, data collection, data analysis, coding, theme creation, and findings. St. Pierre refers to this positivist-influenced approach as humanist qualitative methodology. She observes that the systematization of qualitative methodology with positivist concepts has led to a separation between epistemology and ontology in the methodologies.

Under the lens of humanist qualitative methodology, research has become guided by principles, tenets, algorithms, and step-by-step processes designed to assist researchers in analyzing their data. While this approach has made research more

accessible and systematic, leading to an explosion of guidebooks and textbooks since the 1980s, it has also reduced the initial radical break qualitative research made from positivism. What began as a revolutionary departure from positivist quantitative methodologies has, over time, been codified into a series of recipe-like procedures, diminishing the transformative potential of qualitative inquiry.

In contrast, post-qualitative methodology resists such codification. It does not offer step-by-step manuals, instead requiring students to deeply engage with theory. For instance, a student interested in conducting a Foucauldian study should directly engage with Foucault's concepts of archaeology or genealogy, rather than relying on standardized methods like interviews. Post-qualitative research demands a more nuanced and theoretically informed approach, encouraging scholars to navigate their inquiries without the crutch of prescriptive guidelines.

This critique is particularly aimed at graduate students and researchers who claim to engage with the work of theorists, often from French backgrounds, who are widely recognized in the United States and increasingly globally as post-structuralists. These include figures such as Foucault, Derrida, Deleuze, and Guattari, among others. Researchers who intend to use the theories of these thinkers should avoid relying on traditional (or humanist) qualitative methodologies, or so goes St. Pierre's critique. If they do, they risk misaligning their theoretical stances with their methodological approaches. For example, a student interested in conducting a Foucauldian study should directly engage with Foucault's concepts of archaeology or genealogy, rather than relying on standardized methods like interviews. To conduct Derridean deconstruction, students must thoroughly read and understand Derrida's work on deconstruction. There is no straightforward, prescribed path that outlines how to do it. Post-qualitative research demands a more nuanced and theoretically informed approach, encouraging scholars to navigate their inquiries without the crutch of prescriptive guidelines, ensuring that their methods are truly aligned with their theoretical foundations.

Lather and St. Pierre (2013) also critique the foundational assumptions of humanist qualitative research, particularly its reliance on the binary logics of subject/object, human/non-human, and the privileging of the human subject as the center of inquiry. The authors challenge the notion of a stable, knowable self and call into question the traditional. In post-structuralist terms, the "crisis of representation" does not signify the end of representation itself, but rather the end of the notion of pure, unmediated presence (Lather, 1993). If this is assumed as a theoretical framework, it

is quite contradictory to use interviews as a method of data collection. Mazzei and Jackson (2012) critically examine the conventional treatment of voice in qualitative research. The authors argue against the simplistic and mechanistic approaches that attempt to present participant voices as authentic, stable, and self-reflective. They challenge the notion that voices in qualitative research can “speak for themselves” or be fully captured through traditional methods such as transcription and coding (Mazzei; Jackson, 2012). The crisis also involved a critique of the way language is used in research. Post-structuralists have argued that language is not a medium that reflects or describes reality, but rather it shapes and constructs the reality it seeks to describe. This has led to a questioning of whether traditional academic writing could ever fully and accurately represent complex social realities.

Similarly to Lather and St. Pierre, Pascale (2010) criticizes the tendency of traditional social science to overlook these philosophical foundations, resulting in a “cookbook approach” to research that lacks critical engagement with the underlying assumptions about reality and knowledge. Pascale argues that to deepen our understanding of methodology, it is crucial to consider the broader philosophical foundations that underpin various research approaches. In her explanation of post-structuralist views, gender and sexuality transcend socially constructed identities; they are socially constructed subjectivities. The most recent theories of subjectivity view subjects not as individuals but as discursive categories that represent collective social relations.

> Poststructuralists and postmodernists draw from Althusser to conceptualize subjects as the expression of social processes—the embodiment and reification of social structures. For example, terms such as “black” or “heterosexual” are understood as subject locations that are the products of culture and power. Subject positions, in this sense, are historical and discursive categories of identification. [...] For example, no one is born with a racial identification; culture “hails” individuals as belonging to a particular racial category or subject location that becomes part of a personal identity. Subjectivities are dominant cultural markers of “difference” that shape individual identity through the tension and interplay between the symbolic and the imaginary. (Pascale, 2010, pp. 31-32)

This implies that research that treats identities as fixed categories by which people delineate who one is (in the case of gender, aspects such as appearance, speech, attire, body formations, etc.; and in the case of sexuality, categories concerning romantic and sexual attraction) should not really claim to be using a postructuralist theoretical foundation.

In our collaboration, we approach the concepts of gender and sexuality from distinct theoretical perspectives. While the second author adheres to a post-structuralist view, the first author does not fully embrace the linguistic focus of post-structuralism, believing that it can neglect the material, embodied aspects of human existence. She tends to a espousing of European sexual differences theory, which emphasizes the importance of the body, biology, and the material conditions in the construction of gender and sex differences, while still acknowledging that these are not fixed or essentialist categories, but are continually reconfigured in relation to power, technology, and culture (Braidotti, 2017).

We acknowledge the importance of examining the alignment between epistemologies and research methodologies, particularly in studies that claim to use post-structuralist theories, as highlighted by Lather and St. Pierre. This alignment is especially relevant in the context of gender studies, where post-structuralist frameworks are increasingly common. However, our current research was designed to answer the specific question “What are the methodologies used in empirical studies about gender and sexuality conducted within the mathematics education research community?” While we recognize that a deeper analysis of the alignment between theory and methodology could further nuance our findings, this was not our original objective. Given the constraints of time and the scope of our study, we will not pursue this line of inquiry in the present manuscript. Nonetheless, we agree that this is an important area for future research.

In the next section, we discuss how we conducted this scoping literature review and summarize the results.

Search Process and Methodology

To conduct a comprehensive review of research methodologies used in studies of gender and sexuality within mathematics education, we employed a systematic search strategy across five major academic databases: ProQuest, Web of Science, EBSCO, Google Scholar, and Scopus.

Database Selection

Gutierrez-Bucheli, Reid, and Kidman (2022) emphasize that consulting with a research librarian to identify the most relevant databases in the field is a crucial step in conducting a scoping review, noting that this step is often overlooked. In our case, we did consult with a research librarian, who explained that when selecting databases for academic research, it is essential to consider the specific needs of your study and

the strengths of each platform. ProQuest and EBSCO are both robust platforms that offer access to multiple databases, making them excellent choices for a comprehensive search. ProQuest, with its Education Database, ERIC, and ProQuest One Education, provides a wide range of educational resources and is particularly useful for those focused on education research. EBSCO's Education Source is also highly regarded for its extensive collection of education-related articles and often yields relevant results. In terms of multidisciplinary databases, Scopus and Web of Science are both strong options, but they have different strengths. Scopus is known for its extensive coverage of sciences, social sciences, and humanities, and often includes a broader range of journals, which can be beneficial for interdisciplinary research. Web of Science, while highly respected for its rigorous selection process and citation analysis tools, is slightly more limited in its humanities and social sciences coverage. Ultimately, using a combination of these databases can provide a more thorough and nuanced understanding of the research landscape.

We ultimately utilized ProQuest, EBSCO, Web of Science, Scopus, and Google Scholar for our search. Given the differences in functionalities and search capabilities of each database, our approach had to be tailored accordingly, requiring adjustment and consideration at each stage. This will be explained in more detail in this section.

Inclusion and Exclusion Criteria

For this scoping review, we established a set of inclusion and exclusion criteria to ensure that the selected studies were relevant to our research focus on gender and sexuality within mathematics education.

Inclusion:

Publication date: We included only articles published from 2020 to 2024.

Relevance to mathematics education: Articles needed to explicitly focus on mathematics education. We also included studies that discussed STEM as a broader category, provided they did not specifically focus on one of the sciences, technology, or engineering. This decision was made because we are aware of mathematics educators who use the STEM acronym in their research. This criterion ensured that our review remained centered on studies directly relevant to our field.

Focus on gender and sexuality: Studies were required to address issues related to gender and sexuality. This included research on broader topics of gender and sexuality, studies focused on lesbian, gay, and bisexual (LGB) populations, and those discussing discrimination faced by these groups.

Language: Initially, we included articles written in English, French, Spanish, and Portuguese to reflect the languages spoken by the researchers. After initial searches, we found it unusual that there were not many articles in languages other than English, so we decided to expand our search to include articles in any language, knowing that we could always use available software to translate the few articles in different languages.

Type of publication: We included journal articles, book chapters, theses or dissertations, and conference proceedings to provide a broad overview of the research landscape. However, unfortunately for this publication we will analyze only journal articles, due to time constraints.

Exclusion:

Non-relevant subject areas: We excluded articles that did not specifically pertain to mathematics education, such as those focusing on general education or other unrelated disciplines. Articles that focused explicitly on one of the sciences (e.g., biology, physics, or chemistry), technology, or engineering were also excluded.

Gender as a comparative variable: We excluded studies that treated gender solely as a comparative variable, such as those examining “gender differences” or the “gender gap.” We decided not to include studies that used gender solely as a comparative variable because this approach can reinforce existing stereotypes and does not critically examine the social construction of gender. According to Fonseca, Caldeira, and Souza (2022), such studies often fall into a “citational chain” that reiterates assumptions about inherent differences between men and women in mathematical practices. This approach overlooks the importance of exploring how educational practices contribute to the production and reinforcement of gender differences.

Irrelevant research focus: Articles were excluded if their primary focus was not on gender and sexuality within mathematics education. For example, studies that only mentioned gender or sexuality without a substantial focus on these topics in the context of mathematics education were not considered.

Literature reviews: We excluded literature reviews to focus on studies that contribute original research findings. This criterion ensured that our review concentrated on research methodologies.

Search Terms

We utilized Boolean search phrases across four databases—ProQuest, EBSCO, Web of Science, and Scopus—using three primary search strings labeled as A, B, and C:

Search A: math* AND education AND (gender OR sexual*)

Search B: math* AND education AND (LGB* OR queer)

Search C: math* AND education AND (transph* OR homoph)

In ProQuest, the term “noft” was used to specify that the search should include results from any field except for the full text, ensuring a focus on titles, abstracts, and keywords. In EBSCO, this was achieved by specifying the search should be done in “all fields.” Google Scholar does not allow for field-specific searches beyond the title or full text (the “noft” term was not applicable).

The asterisks (*) allowed us to capture various word forms, such as “mathematics,” “mathematical,” “mathematician,” and so forth.

We recognize that it would have been possible to combine searches A, B, and C into a single Boolean search term across the databases. However, we opted to conduct these searches separately for a few reasons. First, by treating each search as distinct, we aimed to gain insights into the specific focus of the literature—whether it centered on broader issues of gender and sexuality, LGB populations, or the discrimination these populations face. This approach allowed us to assess the distribution and emphasis within the existing body of research more effectively. Additionally, math* and education were consistent across all searches, serving as the foundation for our exploration.

When it came to Google Scholar, we chose to combine the search terms into one Boolean expression. This decision was made to streamline the process within the platform’s more limited search capabilities. Combining the terms in Google Scholar ensured that we could still capture relevant studies across all three focal areas without overly complicating the search process. Despite this limitation, the combined search still yielded a substantial number of relevant results, making Google Scholar an invaluable resource in our review process.

Reviewing Titles and Abstracts

From this point forward in the text, when we say “after reviewing titles and abstracts,” we are referring to the following process: First, we read the titles of the articles. If a title clearly indicated that the research focus was different from what we

intended to include, or if it contained one of our exclusion criteria—such as using gender as a variable to study a different phenomenon, like math achievement—the article was excluded. If the title suggested relevance, we proceeded to read the abstract, applying our inclusion and exclusion criteria once more. If there was any uncertainty about the article's relevance after reading the abstract, we would browse through the publication itself. Based on this thorough review process, we made the final decision on whether to include the publication in our scoping review.

ProQuest Search Results

Search A yielded 741 results. By filtering for articles with "mathematics education" in the subject field, the number was reduced to 104. Further exclusion of articles containing "gender differences" in any field brought the count to 69. After reviewing titles and abstracts, 7 articles were deemed relevant. Search B resulted in 8 articles, with only 1 making it to the final list after title and abstract review. Search C returned 3 articles, none of which were relevant after review.

Web of Science Search Results

Search A initially produced 50 titles. By refining the subject field to "Education: Educational Research" and "Education: Scientific Disciplines" (as "Mathematics Education" was not an available option), the list was narrowed to 4 titles, none of which were relevant. Search B and Search C each yielded 1 result, both of which were excluded for irrelevance.

Ebsco Search Results

Search A initially returned 9,815 results. By filtering for "mathematics education" in the subject field, this number was reduced to 105. Further exclusion of articles mentioning "gender differences" reduced the count to 80. After reviewing titles and abstracts, 15 articles were selected for inclusion in the final list. Search B resulted in 16 articles, with 2 articles making it to the final list after title and abstract review. Search C initially returned 27 results. After adjusting the search term from "homoph*" to "homophob*" to exclude irrelevant articles about hemophilia, 9 articles remained. None were deemed relevant after title and abstract review.

Scopus Search Results

Search A initially produced 4,454 documents. Since "mathematics education" and "education" were not available as subject areas, a different approach was taken. Keywords like "gender differences" and "gender gap" were excluded, retaining the term

“sex differences” due to its relevance to the European sex difference theory. This filtering reduced the number to 4,128 documents. By further limiting the subject area to “mathematics,” 393 documents were found. After reviewing titles and abstracts, 15 documents remained. Note that many were still about gender gap and gender differences in achievement in mathematics. Search B returned 16 documents. After reviewing titles and abstracts, 6 relevant documents remained. Search C initially found 11 documents, but none were deemed relevant after reviewing titles and applying exclusion criteria.

Google Scholar Search Results

The initial search using the terms “mathematics education” AND (gender OR sexuality OR lgb* OR transph* OR homoph*) yielded 290 results. After reviewing titles and abstracts, 17 articles were retained.

A subsequent search in Portuguese using the terms “educação matemática” AND (gênero OR sexualidade OR lgb* OR transfob* OR homofob*) produced 183 results. After reviewing titles and abstracts, 28 articles were selected as relevant.

Final Refinement and Article Selection

A total of 1,084 titles and abstracts were reviewed according to the process described, resulting in 91 publications being selected for review (Table 1).

Table 1: Number of publications reviewed

Database	Search	Number of Publications that Underwent Title and Abstract Review	Number of Publications Selected for Review
Proquest	Search A	69	7
	Search B	8	1
	Search C	3	0
Web of Science	Search A	4	0
	Search B	1	0
	Search C	1	0
EBSCO	Search A	80	15
	Search B	16	2
	Search C	9	0
Scopus	Search A	393	15
	Search B	16	6
	Search C	11	0
Google Scholar	English	290	17
	Portuguese	183	28

Total	1084	91

Source: Authors' data

Management and Organization of Results

The review of titles and abstracts was conducted directly within the databases. If an article met our criteria and was to be included, we clicked the select box next to it. After completing the selection process for each search, we asked the database to export the list of selected articles to EndNote, using the EndNote import file (.enw) or RIS formatted file (.ris) format, depending on what was available. Once the files were exported, we uploaded the bibliographic citations of 91 articles to EndNote, organizing them into specific groups based on the search in which they were found (e.g., ProQuest A, Scopus B). We then created another group in EndNote called "Scoping Review Final" and copied all 91 entries into it. Finally, we used EndNote's Find Duplicates tool to identify and remove duplicate entries. Among the 91 publications initially selected, 13 were book chapters, 9 were published in conference proceedings, 11 were theses or dissertations, and the remaining 58 were journal articles. The 58 journal articles were uploaded to NVivo 14, which was used to manage coding the sections on metholodogy of the publications.

Although this is a scoping review and we aim to be inclusive of theses, book chapters, and conference papers, for this initial presentation of findings, we will focus on creating a preliminary typology based solely on the journal articles. Due to time constraints and the need to address feedback from the reviewers who evaluated an earlier version of this study, we conducted new searches to ensure we accurately tracked all steps of the search process, including the number of articles and abstracts reviewed. Concentrating on journal articles allows us to efficiently develop an initial framework, which can later be calibrated and used again for the totality of publications selected by our search and criteria.

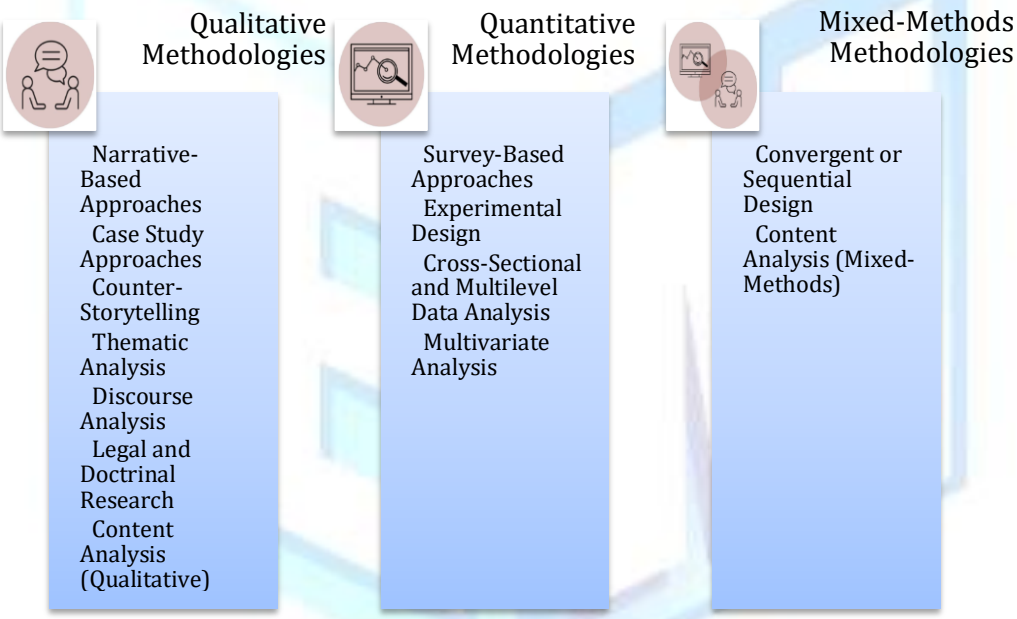
Process of Organization of Findings

We began by importing 33 articles from an earlier version of this study into NVivo 14. Each article was read in full, and we manually coded them within the software for analytical approach, methods and methodology, objectives, research questions, and theoretical stance. This process led to the creation of an initial typology of methodologies, attempting to connect them to their respective objectives, research questions, and theoretical frameworks. However, not all articles clearly articulated their theoretical stance. Note that the capabilities of NVivo and its AI features were not

particularly helpful for this task, so the typology was primarily developed manually. As we categorized the methodologies, we sought to identify commonalities and differences between the studies.

In the post-review phase of this article, we revisited the typology with the assistance of ChatGPT. We fed the typology to the AI and uploaded each of the remaining 26 articles, one by one, for the AI to iterate the process of classification. At each iteration, we kept record of why the study was classified into an existing type or why a new type was created. After the initial 26 iterations, we examined the classification and noticed some overlap. In other words, the types we had were not mutually exclusive as is typical in a typology, which ensures clear categorization. We fixed this by removing overlapping categories and re-iterating the classification process for the articles that had been classified under them. This collaborative process enabled the creation of an acceptable typology as a way to organize and present the methodological approaches used in the journal articles we reviewed (Figure 1).

Figure 1: Types and subtypes of methodologies



Source: Authors' analysis.

In the next section we provide a brief description of the methodology subtypes, with a citation of the studies that we classified under each.

Findings

A. Qualitative Methodologies

Narrative-Based Approaches: Methods that involve storytelling or narrative inquiry to explore individual experiences and perspectives, particularly of marginalized

groups (Alderton, 2020; Ataide Pinheiro, 2021; De Lima, 2021; Ibourk; Hughes; Mathis, 2022).

Case Study Approaches: In-depth, contextualized studies of specific cases to draw broader conclusions about educational practices and theories (Barbosa; Giraldo; Da Costa Neto, 2021; Jaremus, 2021; Joseph, 2021; Leyva; Quea; Weber; Battey et al., 2021; Soares; Cury; Dos Santos; Sangiogo, 2023).

Counter-Storytelling: A critical qualitative approach that gives voice to marginalized groups through storytelling, challenging dominant narratives (Leyva, 2021; Leyva; McNeill; Balmer; Marshall et al., 2022).

Thematic Analysis: Identifying patterns or themes within qualitative data to understand complex social phenomena (Gjøvik; Kaspersen; Farsani, 2022; Hall; Robinson, 2020; Jaremus; Gore; Prieto-Rodriguez; Fray, 2020; Voigt, 2022).

Discourse Analysis: Studies that explore how language is used in texts and interactions to construct social realities, focusing on power dynamics and identities (Batista Guse; Dos Reis Detoni, 2023; De Oliveira; Assunção; De Andrade, 2023; Lafay, 2022; Neto; Borges; Alves, 2021; Przybyla-Kuchek, 2021; Silva, 2023; Xenofontos, 2024).

Legal and Doctrinal Research: Research that examines existing laws, legal documents, and policies to understand their impact on specific communities, often focusing on rights and justice (Sharma, 2021).

Content Analysis (Qualitative): Systematic examination of text, images, or media to identify themes, patterns, and meanings, focusing on qualitative interpretation without quantification (Bento; Soares; Dos Santos Pastoriza; Sangiogo, 2023).

Reanalysis through Narrative and Post-Structural Lenses: Combination of different studies by revisiting and reinterpreting existing qualitative data using narrative analysis and post-structural frameworks (Jaremus; Pomeroy; Luoma, 2024; Kersey; Voigt, 2021).

B. Quantitative Methodologies

Survey-Based Approaches: Methods involving structured questionnaires to collect data on attitudes, beliefs, and behaviors within specific populations (Copur-Gencturk; Thacker; Quinn, 2021; Guse; Waise; Da Conceição Esquincalha, 2020; Jao; Hall; Di Placido, 2024; Teague Tsopgny; Maingari; Mbede, 2020; Waise; Da Conceição Esquincalha, 2024).

Experimental Design: Research that manipulates variables to determine causal relationships and assess the effects of interventions (Chang; Luo; Walton;

Aguilar et al., 2019; Gonzalez; Odic; Schmader; Block et al., 2021; Klapproth; Holger Von Der, 2024; Lee; Lee; Song; Kim et al., 2022).

Cross-Sectional and Multilevel Data Analysis: Analysis of data collected at a single point in time to identify correlations and patterns. A statistical approach that examines data structured at more than one level (e.g., students within schools) to understand the influence of different factors (Lao, 2023; Wolff, 2021).

Multivariate Analysis: Research that employs statistical techniques such as MANOVA (multivariate analysis of variance) and chi-square tests to analyze relationships between sexual identity and various educational experiences and outcomes (Lindner; Makarova; Bernhard; Brovelli, 2022; Voigt, 2022).

C. Mixed-Methods Methodologies

Convergent or Sequential Design: Research designs that use both qualitative and quantitative methods to address research questions from multiple perspectives, either simultaneously (convergent) or in sequence (sequential) (Saki; Sager; Walkington, 2023).

Content Analysis (Mixed-Methods): A combination of qualitative and quantitative techniques used to analyze the content of texts, images, or media. This includes both identifying themes qualitatively and quantifying the frequency or correlation of these themes (Guichot-Reina; De La Torre-Sierra, 2023; Lafay, 2022; Van De Rozenberg; Groeneveld; Van Veen; Van Der Pol et al., 2023).

Discussion and Conclusion

This scoping review provides an overview of the methodologies used in studies on gender and sexuality within mathematics education from 2020 to 2024. Our findings show a range of methodological approaches, reflecting the evolving nature of this research area. The frequent use of qualitative methods, such as narrative-based and case study approaches, indicates a focus on understanding the experiences of individuals and the contexts in which they operate. This shows a commitment to exploring the complexities of educational phenomena and the varied experiences of learners and educators.

The use of qualitative methods aligns with the field’s interest in post-structural perspectives, which view gender and sexuality as fluid and socially constructed. These approaches often challenge traditional binaries and examine the intersections of various identities, aiming to understand how gender and sexuality appear in educational contexts. This trend is seen in the use of narrative and discourse analyses,

which allow researchers to explore how language and stories shape and reflect social realities.

Additionally, we found comparatively fewer studies focused on sexuality within mathematics education than studies focused on gender, despite calls for more inclusive approaches. This is just an observation and is not directly linked to our objective of addressing methodologies. However, it is important to note that content and methodologies are often intertwined, and some methods may be more appropriate for certain topics. Although our primary goal was to map methodologies, we encountered challenges in creating a typology that completely disregarded the content of the studies. Recognizing the link between content and method can provide valuable insights for future research, helping researchers choose the most appropriate methodological approaches for their specific topics.

We were surprised by the small number of articles in languages other than English, especially since we know that such articles exist in the field. Initially, we considered translating our search terms into other languages to capture a broader range of studies. In fact, we implemented this approach in an earlier version of this paper. However, after consulting with our librarian, she explained that the databases primarily use English search terms because the vast majority of titles, abstracts, and keywords are in English, and that using non-English search terms wasn't a viable strategy. In other words, apparently although there are some articles with full text in other languages, these are not effectively retrieved using non-English search terms due to the indexing practices of the databases. Google Scholar, on the other hand, proved useful to find articles in different languages using non-English search terms. For this version of the article, we used only English and Portuguese search terms due to time constraints. However, it would be valuable to conduct future searches using terms in other languages to broaden our understanding and learn from a wider range of studies and methodologies. This isn't about inclusivity as a virtue, but rather about breaking away from the limitations of our own knowledge. Often, English-only audiences wait for books and articles to be translated into English to become aware of developments in the field, as was the case when the U.S. discovered "French theory" and the works of Foucault, Derrida, Deleuze, and Guattari long after they were published. By accessing studies that already incorporate these theories, we could stay more current with the latest advancements.

Among the studies that intend to use post-structural theories, there appears to be a range of methodological approaches, but none that warranted the category "post-

quantitative" in our typology. Some of those studies still rely on traditional qualitative methods, such as interviews and thematic analysis, which may not fully align with the theoretical principles of post-structuralism—with the possible exception of Jaremus and collaborators' reanalysis of previous studies (Jaremus; Pomeroy; Luoma, 2024) and some of the studies under the category of discourse analysis (Neto; Borges; Alves, 2021; Przybyla-Kuchek, 2021; Silva, 2023). While Przybyla-Kuchek's study utilizes a nuanced approach to coding through both denotative and connotative layers, there is a potential for overcoding if the text is overly segmented or excessively interpreted through a lens of finding every possible discourse. To align with the critiques of traditional qualitative methodologies highlighted by Pascale, Lather, and St. Pierre (while acknowledging that this may not be the sole aim of this and other scholars), the study should strive for a balance that honors the fluidity and multiplicity of meanings within the data. It should avoid the pitfalls of overcoding by allowing the text to retain its richness and complexity, rather than being overly dissected into codes. Additionally, it is important to recognize that journal submission requirements can influence this balance, as methodologies based on "thinking with theory" (Brown, 2024; Jackson; Mazzei, 2011; St. Pierre; Jackson, 2014)—a term used by Jackson and Mazzei (2011) to emphasize the interconnectedness of theory and data, highlighting how theory and data constitute or make one another—often result in a prompt to authors by reviewers to systematically describe their approaches.

Future research should build on these developments by exploring new methods that can better capture the complexities of gender and sexuality in mathematics education. By addressing methodological challenges and the politics of publishing, researchers can contribute to a more detailed understanding of these topics and promote a more inclusive educational environment for all learners.

References

ALDERTON, Julie. Kelly's story: transformative identity work in primary mathematics teacher education. **Gender & Education**, Oxfordshire, UK, v. 32, n. 2, p. 145-160, 2020.

ATAIDE PINHEIRO, Weverton. **At the intersections**: queer high school students' experiences with the teaching of mathematics for social justice. 2022. Tese (doutorado em educação matemática) - Indiana University, Bloomington, IN, USA, 2022

ATAIDE PINHEIRO, Weverton. Dismantling the 'all-boys club', a narrative of contradictions women experience in Ph.D. mathematics programs : A freirean approach. **International Electronic Journal of Mathematics Education**, London, UK, v.16, n. 3, em0652, 2021.

ATAIDE PINHEIRO, Weverton. Gender and sexuality in mathematics education: Queer high school students' experiences in the united states. **Boletim GEPEM**, Rio de Janeiro, RJ, Brazil, v. 83, p. 78-121, 2023.

BARBOSA, Gabriela; GIRALDO, Victor; DA COSTA NETO, Cleber Dias. Etnomatemática e pedagogia decolonial na licenciatura em matemática: uma experiência com estudantes lgbtqi+. **Revista de Educação da Universidade Federal do Vale do São Francisco**, Petrolina, PE, Brazil, v. 11, n. 24, p. 393-425, 2021.

BATISTA GUSE, Hygor; DOS REIS DETONI, Hugo. A normalizing mathematics (education): forum analysis of an extension course about gender studies and mathematics education. **Educação Matemática Pesquisa**, São Paulo, SP, Brazil, v. 25, n. 4, p. 47-70, 2023.

BECKER, Joanne Rossi; HALL, Jennifer. Research on gender and mathematics: Exploring new and future directions. **ZDM–Mathematics Education**, Heidelberg, Germany, v. 56, n. 1, p. 141-151, 2024.

BENTO, Andressa Soares; SOARES, Alessandro Cury; DOS SANTOS PASTORIZA, Bruno; SANGIOGO, Fábio André. Do silêncio à discussão sobre gênero em um espaço de formação continuada de docentes de ciências e matemática. **Investigações em Ensino de Ciências**, Porto Alegre, RS, Brazil, v. 28, n. 1, p. 190-212, 2023.

BRAIDOTTI, Rosi. Sexual difference theory.*In:* JAGGAR, Alison M.; YOUNG, Iris Marion. ***A companion to feminist philosophy***. Oxford, UK: Blackwell Publishing, 2017. p. 298-306.

BROWN, Christopher P. Conducting case study research to address the continued crises: a process of learning to employ decolonial perspectives to produce a flourishing academic lifeworld. **Qualitative inquiry**, Thousand Oaks, CA, USA, v. 30, n. 1, p. 71-81, 2024.

CHANG, Felix; LUO, Mufan; WALTON, Gregory; AGUILAR, Lauren *et al.* Stereotype threat in virtual learning environments: effects of avatar gender and sexist behavior on women's math learning outcomes. **CyberPsychology, Behavior & Social Networking**, New York, NY, USA, v. 22, n. 10, p. 634-640, 2019.

COPUR-GENCTURK, Yasemin; THACKER, Ian; QUINN, David. K-8 teachers' overall and gender-specific beliefs about mathematical aptitude. **International Journal of Science and Mathematics Education**, Taipei, Taiwan, v. 19, p. 1251-1269, 2021.

COX, Jennifer; ATAIDE PINHEIRO, Weverton. Advancing equitable and responsible research involving gender and sexuality within mathematics education. **The Educational Forum**, London, UK, v. 88, n. 3, p. 1-26, 2024.

DAMARIN, Suzanne; ERCHICK, Diana B. Toward clarifying the meanings of gender in mathematics education research. **Journal for Research in Mathematics Education**, Reston, VA, USA, v. 41, n. 4, p. 310-323, 2010.

DE LIMA, Luciano Feliciano. (Dis)invisibilization: reflections about sexual diversity in the formation of mathematics teachers. **Zetetike**, Campinas, SP, Brazil, v. 29, p. 1-21 - e021029, 2021.

DE OLIVEIRA, Júlio César Gomes; ASSUNÇÃO, Ricardo Gomes; DE ANDRADE, Akira Ribeiro. Caso(s) de família: o dia em que a análise combinatória se descobriu heteronormativa. **Boletim GEPEM**, Rio de Janeiro, RJ, Brazil, n. 83, p. 155-176, 2023.

DUBBS, Christopher. **A queer turn in mathematics education research: Centering the experience of marginalized queer students.** *In*: WOOD, M. B.; Turner, E. E.; Civil, M.; Eli, J. A. (orgs.). **Proceedings of the 38th Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education***.* Tucson, AZ, USA: The University of Arizona. p. 1041-1048.

ESMONDE, Indigo. Snips and snails and puppy dogs'tails: genderism and mathematics education. **For the Learning of Mathematics**, New Westminster, British Columbia, Canada, v. 31, n. 2, p. 27-31, 2011.

FENNEMA, Elizabeth. Mathematics learning and the sexes: a review. **Journal for Research in Mathematics Education**, Reston, VA, USA, v. 5, n. 3, p. 126-139, 1974.

FENNEMA, Elizabeth; SHERMAN, Julia A. Fennema-sherman mathematics attitudes scales: **i**nstruments designed to measure attitudes toward the learning of mathematics by females and males. **Journal for Research in Mathematics Education**, Reston, VA, USA, v. 7, n. 5, p. 324-326, 1976.

FONSECA, Maria da Conceição Ferreira Reis; CALDEIRA, Maria Carolina da Silva; DE SOUZA, Maria Celeste Reis Fernandes. Gênero e matemática: cadeias discursivas e produção da diferença nos artigos acadêmicos publicados no brasil entre 2009 e 2019. **Bolema: Boletim de Educação Matemática**, Rio Claro, SP, Brazil, v. 36, n. 72, p. 19-46, 2022.

GJØVIK, Øistein; KASPERSEN, Eivind; FARSANI, Danyal. Stereotypical images of male and female mathematics teachers. **Research in Mathematics Education**, UK, v. 25, n. 2, p. 1-16, 2022.

GOLDBERG, Elizabeth R; DARWIN, Taylor Kirkpatrick; ESQUIBEL, Jesus S; NOBLE, Samanthia; MULLINS ALLEN, Miranda; ATAIDE PINHEIRO, Weverton. Contemporary debates on equity in stem education**:** takeaways from a doctoral seminar in equity in stem education. **Journal of Research in Science, Mathematics and Technology Education**, Famagusta, North Cyprus, v. 6, p. 69-89, 2023.

GONZALEZ, Antonya Marie; ODIC, Darko; SCHMADER, Toni; BLOCK, Katharina; Baron, Andrew Scott. The effect of gender stereotypes on young girls' intuitive number sense. **PLoS One**, São Francisco, CA, USA, v. 16, n. 10, Oct 2021 2021.

GUICHOT-REINA, Virginia; DE LA TORRE-SIERRA, Ana María**.** The representation of gender stereotypes in spanish mathematics textbooks for elementary education. **Sexuality & Culture**, Heidelberg, Germany, v. 27, p. 1481–1503, 2023.

GUSE, Hygor Batista; WAISE, Tadeu Silveira; DA CONCEIÇÃO ESQUINCALHA, Agnaldo. O que pensam licenciandos(as) em matemática sobre sua formação para lidar com a diversidade sexual e de gênero em sala de aula? **Revista Baiana de Educação Matemática**, Juazeiro, Bahia, Brazil, v. 1, p. 01-25, e202012, 2020.

GUTIÉRREZ, Rochelle. A “gap-gazing” fetish in mathematics education? Problematizing research on the achievement gap. **Journal for Research in Mathematics Education**, Reston, VA, USA, v. 39, n. 4, p. 357–364, 2008.

GUTIERREZ-BUCHELI, Laura; REID, Alan; KIDMAN, Gillian. Scoping reviews: Their development and application in environmental and sustainability education research. **Environmental Education Research**, Abingdon, UK, v. 28, n. 5, p. 645-673, 2022/05/04 2022.

HALL, Jennifer; NORÉN, Eva. Innovations in “gender issues” research in mathematics education. **Mathematics Education Research Journal**, Melbourne, Australia, v. 33, n. 4, p. 787-791, 2021.

HALL, Jennifer; ROBINSON, Travis. Death by a thousand papercuts: Gender issues in university mathematics. **Redress**, Brisbane, Queensland, Australia, v. 29, n. 2, p. 39-44, 2020.

HYDE, Janet S.; FENNEMA, Elizabeth; LAMON, Susan J. Gender differences in mathematics performance: A meta-analysis. *Psychological bulletin*, Washington, DC, USA, v. 107, n. 2, p. 139-155, 1990.

IBOURK, Amal; HUGHES, Roxanne; MATHIS, Clausell. “It is what it is”: Using storied-identity and intersectionality lenses to understand the trajectory of a young black woman's science and math identities. **Journal of Research in Science Teaching**, Hoboken, NJ, USA, v. 59, n. 7, p. 1099-1133, 2022.

JACKSON, Alecia Youngblood; MAZZEI, Lisa. **Thinking with theory in qualitative research**: viewing data across multiple perspectives. London, UK: Routledge, 2011.

JAO, Limin; HALL, Jennifer; DI PLACIDO, Cinzia. “If you’re a dude, you’re a chick, whatever the hell in between, you need to know about maths”: The Australian and Canadian general public’s views of gender and mathematics. **Mathematics Education Research Journal**, Melbourne, Australia, v. 36, p. 339-365, 2024.

JAREMUS, Felicia. When girls do masculinity like boys do: Establishing gender heteroglossia in school mathematics participation. **Mathematics Education Research Journal**, Melbourne, Australia, v. 33, n. 4, p. 713-731, 2021.

JAREMUS, Felicia; GORE, Jennifer; PRIETO-RODRIGUEZ, Elena; FRAY, Leanne. Girls are still being ‘counted out’: Teacher expectations of high-level mathematics students. **Educational Studies in Mathematics**, Heidelberg, Germany, v. 105, p. 219-236, 2020.

JAREMUS, Felicia; POMEROY, David; LUOMA, Tiina. Boys on the margins of mathematics in Finland, Australia, and New Zealand: Rethinking gendered binaries. **International Journal of Educational Research**, Amsterdam, Netherlands, v. 123, 102274, 2024.

JOSEPH, Nicole M. Black feminist mathematics pedagogies (blackfmp): A curricular confrontation to gendered antiblackness in the US mathematics education system. **Curriculum Inquiry**, Toronto, Ontario, Canada, v. 51, n. 1, p. 75-97, 2021.

KERSEY, Elizabeth; VOIGT, Matthew. Finding community and overcoming barriers: experiences of queer and transgender postsecondary students in mathematics and other STEM fields. **Mathematics Education Research Journal**, Melbourne, Australia, v. 33, n. 4, p. 733-756, 2021.

KLAPPROTH, Florian; HOLGER VON DER, Lippe. A gender bias in curriculum-based measurement across content domains: Insights from a german study. **Education Sciences**, Basel, Switzerland, v. 14, n. 1, p. 76, 2024 2024.

LAFAY, Anne. Représentations de genre dans un manuel scolaire de mathématiques de première année du primaire au Québec. **Canadian Journal of Education**, Ottawa, Ontario, Canada, v. 45, n. 3, p. 769-786, 2022

LAO, Yehui. The more male classmates, the worse: How male peers harm academic performance of a student. **International Journal of Educational Development**, Amsterdam, Netherlands, v. 103, 102880, 2023.

LATHER, Patti. (Post)feminist methodology - getting lost, or a scientificity we can bear to learn from. **International Review of Qualitative Research**, London, UK, v. 1, n. 1, p. 55-64.

LATHER, Patti. Fertile obsession: Validity after poststructuralism. **Sociological Quarterly**, Bellevue, NE, USA, v. 34, n. 4, p. 673-693, Nov 1993. Review.

LATHER, Patti. Top ten+ list: (re)thinking ontology in (post)qualitative research. **Cultural Studies ↔ Critical Methodologies**, Thousand Oaks, CA, USA, v. 16, n. 2, p. 125-131, 2016.

LATHER, Patricia. **(Post)critical methodologies**: the science possible after the critiques : The selected works of Patti Lather. New York, NY, USA: Routledge, 2017.

LATHER, Patti. Scientism and scientificity in the rage for accountability: a feminist deconstruction. *In:* Proceedings of the First International Congress of Qualitative Inquiry. Available at: https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=ec59c2221eb3a0e5e2beab940652166254153fd7. Accessed in: 08/08/2024.

LATHER, Patti. “To give good science”: Doing qualitative research in the afterward. **Education policy analysis archives**, Tempe, AZ, USA, v. 22, n. 10, p. 1-14, 2014.

LATHER, Patti. Methodology-21: What do we do in the afterward? **International Journal of Qualitative Studies in Education**, London, UK, v. 26, n. 6, p. 634-645, 2013.

LATHER, Patti; ST. PIERRE, Elizabeth A. Post-qualitative research. **International Journal of Qualitative Studies in Education**, London, UK, v. 26, n. 6, p. 629-633, 2013.

LEE, Hyun Ji; LEE, Jeesoo; SONG, Juyeon; KIM, Sungwha *et al.* Promoting children's math motivation by changing parents' gender stereotypes and expectations for math. **Journal of Educational Psychology**, Washington, DC, USA, v. 114, n. 7, p. 1567–1588, 2022.

LEYVA, Luis A. Black women’s counter-stories of resilience and within-group tensions in the white, patriarchal space of mathematics education. **Journal for Research in Mathematics Education**, Reston, VA, USA, v. 52, n. 2, p. 117-151, 2021.

LEYVA, Luis A. Unpacking the male superiority myth and masculinization of mathematics at the intersections: A review of research on gender in mathematics

education. **Journal for Research in Mathematics Education**, Reston, VA, USA, v. 48, n. 4, p. 397-433, 2017.

LEYVA, Luis A; MCNEILL, R Taylor; BALMER, B R; MARSHALL, Brittany L *et al.* Black queer students' counter-stories of invisibility in undergraduate stem as a white, cisheteropatriarchal space. **American Educational Research Journal**, Washington, DC, USA, v. 59, n. 5, p. 863-904, 2022.

LEYVA, Luis A; QUEA, Ruby; WEBER, Keith; BATTEY, Dan *et al.* Detailing racialized and gendered mechanisms of undergraduate precalculus and calculus classroom instruction. **Cognition and instruction**, London, UK, v. 39, n. 1, p. 1-34, 2021.

LINDBERG, Sara M; HYDE, Janet Shibley; PETERSEN, Jennifer L; LINN, Marcia C. New trends in gender and mathematics performance: A meta-analysis. **Psychological bulletin**, Washington, DC, USA, v. 136, n. 6, p. 1123, 2010.

LINDNER, Jana; MAKAROVA, Elena; BERNHARD, Deborah; BROVELLI, Dorothee. Toward gender equality in education—teachers' beliefs about gender and math. **Education Sciences**, Basel, Switzerland, v. 12, n. 6, p. 373, 2022.

LUBIENSKI, Sarah; GANLEY, Colleen M. Research on gender and mathematics. *In*: CAI, Jinfa (org.). **Compendium for research in mathematics education**. Reston, VA: National Council of Teachers of Mathematics, 2017. p. 649–666.

LUBIENSKI, Sarah; ATAIDE PINHEIRO, Weverton. Gender and mathematics: What can other disciplines tell us? What is our role? **Journal of Urban Mathematics Education**, College Station, TX, USA, v. 13, n. 1, p. 1-14, 2020.

MAZZEI, Lisa A; JACKSON, Alecia Y. Complicating voice in a refusal to "let participants speak for themselves". **Qualitative Inquiry**, Thousand Oaks, CA, USA, v. 18, n. 9, p. 745-751, 2012.

MUNN, Zachary; PETERS, Micah D. J.; STERN, Cindy; TUFANARU, Catalin *et al.* Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. **BMC Medical Research Methodology**, London, UK, v. 18, n. 1, p. 143, 2018.

NETO, Vanessa; PINHEIRO ATAIDE, Weverton. The problematic issue of gender in mathematics textbooks: A comparative analysis between Brazil and the USA. **RIDEMA: Revista de Investigação e Divulgação em Educação Matemática**, Juiz de Fora, MG, Brazil, v. 5, n. 1, p. 1-20, 2021.

NETO, Vanessa; BORGES, Luiza; ALVES, Thays. Redes produtivas de saber/poder: Gênero e matemática sobre análise de estudantes. **RIPEM: Revista Internacional de Pesquisa em Educação Matemática**, Brasília, DF, Brazil, v. 11, n. 3, p. 173-188, 2021.

PASCALE, Celine-Marie. **Cartographies of knowledge:** exploring qualitative epistemologies. Thousand Oaks, CA, USA: Sage Publications, 2010.

PIATEK-JIMENEZ, Katrina ; BRAZ DIAS, Ana Lúcia. Gender equity in mathematics? *In*: PERALTA, Deise Aparecida; PACHECO, José Augusto (orgs). **Currículo e avaliação externa**: entre políticas internacionais e práticas nacionais. Vila Nova de Famalicão, Portugal: Edições Húmus, 2021. p. 125-147.

PRZYBYLA-KUCHEK, Julia. The possibilities of feminist poststructural discourse analysis as an approach to gender research in the mathematics classroom. **Mathematics Education Research Journal**, Melbourne, Australia, v. 33, n. 4, p. 689-711, 2021.

PRZYBYLA-KUCHEK, Julia; JACKSON, Brent; PIATEK-JIMENEZ, Katrina; HALL, Jennifer Hall, BRAZ DIAS, Ana Lúcia; ATAIDE PINHEIRO, Weverton. Gender and sexuality working group: applying theory to data. In: Annual Conference of the North American Chapter of the International Group for the Psychology of Mathematics Education, 44, 2022, Nashville, TN, USA. p. 2185-2187. Available at: http://www.pmena.org/pmenaproceedings/PMENA%2044%202022%20Proceedings.pdf. Accessed in: 08/08/2024.

SAKI, Milton; SAGER, Marc T.; WALKINGTON, Candace. Understanding racially minoritized girls' perceptions of their stem identities, abilities, and sense of belonging in a summer camp. **Education Sciences**, Basel, Switzerland, v. 13, n. 12, p. 1183, 2023 2023.

SHARMA, Shilpa. Challenges faced by the lgbtq community- a comparative study between india and australia. **Turkish Journal of Computer and Mathematics Education**, Trabzon, Turkey, v. 12, n. 4, p. 1105-1109, 2021

SILVA, Marcio Antonio. Os ventos do norte não movem os moinhos? Racismo epistêmico a matemática é branca, masculina e europeia. **Educação Matemática Pesquisa**, São Paulo, SP, Brazil, v. 25, n. 2, p. 238-257, 2023.

SOARES, Andressa; CURY, Alessandro; DOS SANTOS, Bruno; SANGIOGO, Fábio André. Diversidade em pauta em uma intervenção didática na formação de professores de ciências e matemática. **REnCiMa. Revista de Ensino de Ciéncias e Matemática**, São Paulo, SP, Brazil, v. 14, n. 1, p. 1-23, 2023.

ST. PIERRE, Elizabeth Adams. A brief and personal history of post qualitative research toward "post inquiry". **Journal of Curriculum Theorizing**, Dayton, OH,USA, v. 30, n. 2, p. 2-19, 2014.

ST. PIERRE, Elizabeth Adams. Another postmodern report on knowledge: Positivism and its others. **International Journal of Leadership in Education**, London, UK, v. 15, n. 4, p. 483-503, 2012.

ST. PIERRE, Elizabeth Adams. Post qualitative inquiry, the refusal of method, and the risk of the new. **Qualitative Inquiry**, Thousand Oaks, CA, USA, v. 27, n. 1, p. 3-9, 2019.

ST. PIERRE, Elizabeth Adams. The posts continue: becoming. **International Journal of Qualitative Studies in Education**, London, UK, v. 26, n. 6, p. 646-657, 2013.

ST. PIERRE, Elizabeth Adams. Untraining educational researchers. **Research in Education**, London, UK, v. 96, n. 1, p. 6-11, 2016.

ST.PIERRE, Elizabeth Adams. Haecceity: Laying out a plane for post qualitative inquiry. **Qualitative Inquiry**, Thousand Oaks, CA, USA, v. 23, n. 9, p. 686-698, 2017.

ST. PIERRE, Elizabeth A.; JACKSON, Alecia Y. Qualitative data analysis after coding. **Qualitative Inquiry**, Thousand Oaks, CA, USA, v. 20, n. 6, p. 715– 719, 2014.

TEAGUE TSOPGNY, Armel Valdin; MAINGARI, Daouda; MBEDE, Raymond. L'influence des enseignant·e·s de mathématiques dans l'orientation des filles vers ce domaine. **Nouveaux Cahiers de la Recherche en Éducation**, Sherbrooke, Quebec, Canada, v. 22, n. 3, p. 68-88, 2020.

VAN DE ROZENBERG, Tessa M.; GROENEVELD, Marleen G.; VAN VEEN, Daudi P.; VAN DER POL, Lotte D. *et al.* Hidden in plain sight: Gender bias and heteronormativity in Dutch textbooks. **Educational Studies**, New York, NY, USA, v. 9, n. 3, p. 299-317, 2023.

VOIGT, Matthew. A quantitative exploration of queer-spectrum students' experiences in introductory undergraduate mathematics courses. **PLoS One**, São Francisco, CA, USA, v. 17, n. 10, Oct 2022

VOIGT, Matthew. **Queer-spectrum student experiences and resources in undergraduate mathematics.** 2020. Tese (doutorado) - University of California San Diego, San Diego, CA, USA, 2020.

VOIGT, Matthew; REINHOLZ, Daniel L. Calculating queer acceptance and visibility: A literature synthesis on queer identity in mathematics. *OSF Preprints*, p. 1-42, 2020. Available at: https://osf.io/preprints/osf/pumqe. Accessed in: 08/08/2024.

WAISE, Tadeu Silveira; DA CONCEIÇÃO ESQUINCALHA, Agnaldo. As aulas de matemática podem fomentar o reconhecimento de alunes LGBTI+? **Revista Temporis [ação]**, Goiânia, GO, Brazil, v. 24, n. 01, p. 22-22, 2024.

WOLFF, Fabian. How classmates' gender stereotypes affect students' math self-concepts: A multilevel analysis. **Frontiers in Psychology**, Lausanne, Switzerland, v. 12, p. 1-12, artigo 599199, 2021. Available at: https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2021.599199/full. Accessed in: 08/08/2024.

XENOFONTOS, Constantinos. Gender representations in school mathematics: A study of primary textbooks in the Republic of Cyprus. **International Journal of Mathematical Education in Science and Technology**, London, UK. p. 1-21, 2024. Available at: https://www.tandfonline.com/doi/epdf/10.1080/0020739X.2024.2337945?needAccess=true. Accessed in: 08/08/2024,

ZAWACKI-RICHTER, Olaf; KERRES, Michael; BEDENLIER, Svenja; BOND, Melissa; BUNTINS, Katja. (orgs.) **Systematic reviews in educational research:** methodology, perspectives and application. Wiesbaden, Germany: Springer VS, 2020.

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