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Trabajo encomendado del GT19 de ANPEd (2002-2023): modelos, temáticas y contribuciones para la educación matemática

Travail commandé du GT19 de l'ANPEd (2002-2023): modèles, thématiques et contributions à l'éducation mathématique

Trabalho encomendado do GT19 da ANPEd (2002-2023): modelos, temáticas e contribuições para a educação matemática

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Abstract

This article is part of the dossier commemorating the 25 years of history of GT19 – Mathematics Education of ANPEd. The aim is to describe, analyze, and discuss the models of proposal for the commissioned works of GT19 – Mathematics Education, the themes addressed, responsible researchers, the consolidation of the field of Mathematics Education at the national level, and the dialogue with international productions of works produced between 2002 and 2023. Throughout these two decades, GT19 has established itself as a fundamental space for discussion and advancement of investigations in the area. During this period, we had debates about research in Mathematics Education, teacher training and professional development, curriculum, public policies, and Mathematics teaching, as well as Mathematics Education at different stages of Basic Education. Thus, this study aims to not only map the main thematic trends that permeated the commissioned works but also to reflect on challenges and perspectives for the future of Mathematics Education in Brazil.

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Keywords: Mathematics education, Teacher education, Research field, Different levels of education.

Resumen

Este artículo integra el dosier en celebración de los 25 años de historia del GT19 – Educación Matemática de la ANPEd. El objetivo es describir, analizar y discutir los modelos de proposición de los trabajos encomendados del GT19 – Educación Matemática, los temas abordados, los investigadores responsables, la consolidación del campo de la Educación Matemática a nivel nacional y el diálogo con las producciones internacionales de los trabajos producidos entre 2002 y 2023. A lo largo de estas dos décadas, el GT19 se ha consolidado como un espacio fundamental para la discusión y avance de las investigaciones en el área. En este período, hemos tenido debates sobre investigaciones en Educación Matemática, formación de profesores y desarrollo profesional, currículo, políticas públicas y enseñanza de Matemática, además de la Educación Matemática en diferentes etapas de la Educación Básica. Así, este estudio pretende no solo mapear las principales tendencias temáticas que han permeado los trabajos encomendados, sino también reflexionar sobre desafíos y perspectivas para el futuro de la Educación Matemática en Brasil.

Palabras-clave: Educación Matemática, Formación de profesores, Campo de investigación, Diferentes niveles de enseñanza.

Résumé

Cet article fait partie du dossier commémoratif des 25 ans d'histoire du GT19 – Éducation Mathématique de l'ANPEd. L'objectif est de décrire, d'analyser et de discuter les modèles de proposition des travaux commandés du GT19 – Éducation Mathématique, les thématiques abordées, les chercheurs responsables, la consolidation du champ de l'Éducation Mathématique au niveau national et le dialogue avec les productions internationales des travaux réalisés entre 2002 et 2023. Au cours de ces deux décennies, le GT19 s'est affirmé comme un espace essentiel pour la discussion et l'avancement des recherches dans ce domaine. Pendant cette période, nous avons eu des débats sur la recherche en Éducation Mathématique, la formation des enseignants et le développement professionnel, le curriculum, les politiques publiques et l'enseignement des Mathématiques, ainsi que l'Éducation Mathématique à différents niveaux de l'Éducation de base. Ainsi, cette étude vise non seulement à cartographier les principales tendances thématiques qui ont marqué les travaux commandés, mais également à réfléchir sur les défis et les perspectives pour l'avenir de l'éducation mathématique au Brésil.

Mots-clés : Éducation mathématique, Formation des enseignants, Domaine de recherche, Différents niveaux d'enseignement.

Resumo

Este artigo integra o dossiê em comemoração aos 25 anos de história do GT19 – Educação Matemática da ANPEd. O objetivo é descrever, analisar e discutir os modelos de proposição dos trabalhos encomendados do GT19 – Educação Matemática, as temáticas abordadas, os pesquisadores responsáveis, a consolidação do campo da Educação Matemática em âmbito nacional e o diálogo com as produções internacionais dos trabalhos produzidos entre 2002 e 2023. Ao longo dessas duas décadas, o GT19 tem sido um espaço fundamental para a discussão e o avanço das investigações na área. Nesse período, ocorreram debates sobre pesquisas em Educação Matemática, formação de professores e desenvolvimento profissional, currículo, políticas públicas e ensino de Matemática, além da Educação Matemática em diferentes etapas da Educação Básica. Assim, este estudo pretende não apenas mapear as principais tendências temáticas que permearam os trabalhos encomendados, mas também refletir sobre desafios e perspectivas para o futuro da Educação Matemática no Brasil.

Palavras-chave: Educação matemática, Formação de professores, Campo de pesquisa, Diferentes níveis de ensino.

Commissioned work of WG19 of ANPEd (2002-2023): models, themes, and contributions to Mathematics Education

One important form of participation during the National Meetings of the National Association of Graduate Studies and Research in Education (Associação Nacional de Pós-Graduação e Pesquisa em Educação - ANPEd) is the Commissioned Work (CW) session in the Working Groups (WGs). This session invites researchers to write texts on topics and theoretical-methodological references that are of interest to the ANPEd WGs for discussion. The objective of the CW session is threefold: to foster debate by bringing different perspectives to the table and deepening discussions on relevant topics in the field of education; to integrate researchers and promote the exchange of ideas between experts and other participants at the event; and to update the field by presenting trends, challenges, and theoretical and methodological perspectives.

Each working group can propose a commissioned work, or groups of working groups can collaborate to address a topic of interest to multiple groups. Understanding the topics and interests of a working group (WG) at each meeting enables us to identify research production trends, as well as the theoretical and methodological choices within a field of study. For example, in WG19—Mathematics Education, we can understand and (re)signify this collective movement in the field of mathematics education, even though WG participants may vary at each national meeting. Conversely, some researchers remain active for extended periods, consistently attending meetings.

The work commissioned by WG 19 involved different organizational models for defining themes and selecting guest researchers. This variability accompanies the consolidation of research and practices in mathematics education and its relationship with education, the main focus of ANPEd. Thus, this article aims to analyze the models employed by WG 19 — Mathematics Education — to explore the themes addressed, the researchers involved, the consolidation of the Mathematics Education field at the national level, and the dialogue with international contributions. Additionally, we aim to reflect on the dialogue with researchers from other working groups (WGs) and the democratization of spaces for groups and researchers who produce knowledge based on democratically defined themes.

Models for organizing the work commissioned by WG19

The first works commissioned by WG19 addressed topics of interest to the Mathematics Education community, featuring prominent national and international researchers in the field. Based on these topics, the WG coordination invited renowned researchers with relevant

academic production on the topic to prepare and present a text during the ANPEd National Meeting.

The first commissioned work to map the WG's production was prepared by Professor Dario Fiorentini from the State University of Campinas (Unicamp) in 2002. In 2005, WG19 researchers collaborated to produce a commissioned work that expanded upon Fiorentini's mapping. This study focused on qualitative and quantitative research methods as well as those based on the French didactic perspective, which was a prevalent theoretical reference in the WG's early work. This predominance was largely due to the leading role played by researchers from the Pontifical Catholic University of São Paulo (PUC-SP) in establishing and consolidating WG19 at ANPEd.

Starting in 2007, the commissioned work took on a different format. Professor Antonio Vicente Marafioti Garnica from Universidade Estadual Paulista "Júlio de Mesquita Filho" (UNESP) was invited to discuss texts produced by guest researchers addressing a theme defined by the WG at the previous meeting.

> To discuss the topic "Public Policies and Mathematics Education," the coordinators of the Mathematics Education Working Group of ANPEd opted for a different approach than those previously implemented by the group. They invited four professionals to write texts on specific topics, such as curriculum organization and development, research and teacher training practices, textbooks, and assessment. These texts would then be compiled into a single text with a focus on systematization and referral of issues. (Garnica, 2007, p. 1).

Thus, Garnica was tasked with summarizing the discussions held by four guest researchers. The commissioned work consisted of presenting this summary text. This format was repeated in 2008 with Professor Cristiano Alberto Muniz from the Universidade de Brasília (UnB) collaborating on the discussion of the text entitled "Public Policies and the Initial and Continuing Training of Mathematics Teachers." Public policies were addressed in the work commissioned for the two meetings. As it was a relevant topic within the context of educational policies in mathematics education, it needed to be discussed and expanded upon within the working group (WG).

In 2009, the working format was established in WG19. Topics of interest to participants were defined at each meeting. The process included inviting researchers to produce and submit base texts within the scope of the chosen topic. These texts were disseminated widely by email. A coordinating researcher, either a WG member or an external member, established a dialogue with the submitted texts, prepared the commissioned work, and coordinated the debate with the WG19 coordination team on the day of the CW presentation at the ANPEd National Meeting.

The base texts were sent to WG19 ad hoc evaluators, who, along with the coordination team, evaluated which ones would be discussed in the commissioned work. Most authors of base texts voluntarily attended the meeting to participate in the debate. During this period, we participated in broader discussions within the ANPEd Scientific Committee. As mathematics educators, we aimed to expand the dialogue between the themes and outputs of WG19 and other ANPEd working groups. Thus, subsequent meeting facilitators were not necessarily from the field of mathematics education. This occurred in 2009 with Professor Elizeu Clementino de Souza from the Universidade do Estado da Bahia (UNEB) and in 2013 with Professor Guilherme Val Toledo from Unicamp.

This model for producing and presenting commissioned works has remained in place since 2011. At each meeting, the definition of a specific theme mobilizes the Mathematics Education research community, who contribute texts organized and systematized by a guest researcher with recognized expertise in the topic. This format has proven fundamental to consolidating discussions on research in the field, highlighting priority themes, and monitoring the development of research in mathematics education in Brazil.

However, some participants in the WG are transient, attending only some meetings and knowing little about the group's consolidated productions and discussions. A group already exists that constitutes the history of the WG and recognizes how this commissioned work format has enabled the production of relevant, comprehensive research on topics of interest to mathematics education researchers.

Since 2012, we have tried to publish the texts submitted by researchers and the commissioned work produced by guest researchers in journals, dossiers, and books. This type of production has been essential in highlighting significant contributions to the field and identifying niches and research groups that excel in various research areas. Producing commissioned texts is not always simple since the researcher responsible for the synthesis must explore the diverse theoretical, methodological, and epistemological perspectives that the field of mathematics education has developed recently. On the other hand, these texts are important systematizations of research results and play a significant role in training new researchers.

Next, we will present the bibliographic research methodology adopted for this study, as well as an analysis of the themes that have emerged over the years.

Methodology

To achieve the proposed objective, we conducted a systematic literature review, a type of bibliographic research that allows us to synthesize bibliographic productions for a specific

purpose (Barbosa, 2018). Our analysis focused on commissioned works (CW) produced between 2002 and 2023. Table 1 presents a chart with the year, ANPEd national meeting number, authors, and title of the CW.

Table 1.

List of work commissioned by WG19 from 2002 to 2023

WORK COMMISSIONED BY WG19 – MATHEMATICAL EDUCATION BY ANPEd

YEAR	ANPEd NATIONAL MEETING	AUTHOR(S)	TITLE
2002	25.th	Dario Fiorentini	Mapeamento e balanço dos trabalhos do WG-19 (Educação Matemática) no período de 1998 a 2001
2003	26.th	Antonio Miguel, Antonio Vicente Marafioti Garnica, Sonia Barbosa Camargo Igliori e Ubiratan D'Ambrósio	A Educação Matemática: uma área de conhecimento em consolidação. O papel da constituição de um grupo de trabalho dessa área na ANPEd
2004	27. th	João Pedro da Ponte	Investigar a nossa própria prática: uma estratégia de formação e de construção do conhecimento profissional
2005	28. th	Adair Mendes Nacarato, Ana Cristina Ferreira, Celi Espasandin Lopes, Dario Fiorentini e Regina Célia Grando[3]	Modalidades de pesquisas em Educação Matemática: um mapeamento de estudos qualitativos do WG-19 da ANPEd
2006	29. th	Juan Diaz Godino	Presente y futuro de la investigación en didáctica de las matemáticas
2007	30. th	Antonio Vicente Marafioti Garnica	Educação Matemática e políticas públicas: currículos, avaliação, livros didáticos e formação de professores
2008	31.th	Cristiano Alberto Muniz	Políticas públicas e formação inicial e continuada de professores que ensinam Matemática
2009	32.th	Elizeu Clementino de Souza	Pesquisa Narrativa, (Auto)biografias e História Oral: ensino, pesquisa e formação em Educação Matemática
2010	33.th	Rosana de Oliveira	Educação Matemática e Infância: diferentes possibilidades de exploração
2011	34. th	Celi Espasandin Lopes	Os desafios e as perspectivas para a Educação Matemática no Ensino Médio
2012	35. th	Plínio Cavalcanti Moreira e Ana Cristina Ferreira	O lugar da Matemática na Licenciatura em Matemática
2013	36. th	Guilherme do Val Toledo Prado	Ensaio entre Imagens e Conceitos da Educação Matemática para Currículos, Práticas e Formação Docente dos e nos Anos Iniciais do Ensino Fundamental
2015	37. th	Andréia Maria Pereira de Oliveira	Desenvolvimento profissional de professores que ensinam matemática: colaboração e materiais curriculares no âmbito do Programa Observatório da Educação (OBEDUC)

[3] The title of the 2005 TE was Mathematics Education: Quantitative and Qualitative Analyses, under the responsibility of a group of researchers: Adair Mendes Nacarato (USF); Ana Cristina Ferreira (UFOP); Celi Aparecida Espasandin Lopes (UNICSUL); Dario Fiorentini (UNICAMP); Regina Célia Grando (USF), Cileda Coutinho (PUC-SP), Saddo Ag Almouloud (PUC-SP), Clayde Regina Mendes (PUCCAMP); Miriam Cardoso Utsumi (CUML). The texts by Cileda Coutinho (PUC-SP), Saddo Ag Almouloud (PUC-SP), Clayde Regina Mendes (PUCCAMP), and Miriam Cardoso Utsumi (CUML) are not available on the ANPEd website.

2017[4]	38. th	Jonei Cerqueira Barbosa	Abordagens teóricas e metodológicas na Educação Matemática: aproximações e distanciamentos
2019	39. th	Victor Augusto Giraldo e Filipe Santos Fernandes	Formação de professores que ensinam matemática em contextos de regulação e perdas de direitos: possibilidades e formas de resistência
2021	40. th	Márcia Cristina de Costa Trindade Cyrino e Regina Célia Grando	(Des)construções curriculares para a formação inicial de professores que ensinam matemática: desafios e cenários de possibilidades para (re)existir
2023[5]	41. th	Vinício de Macedo Santos	Formação de professores de matemática e educação básica: justiça social e equidade no processo de reconstrução da democracia brasileira

Efforts were made to locate the texts since several articles were "lost" due to changes made to the ANPEd official website. This required searching through contacts with authors and former WG coordinators. This has hindered the production of the WG's own report and obstructed systematic review research using the WG's mathematics education texts. The papers were read in full to determine the objectives of the discussion and the results of the analysis of the authors' proposed conclusions.

The works were organized into three discussion categories: 1. Teacher Training (eight works);

2. Mathematics Education as a Field of Research (six works); and

3. Mathematics Education at Different Levels of Education (three works).

Discussion of the CW of WG19 for the period from 2002 to 2023

Axis 1: Training of professors

The eight studies comprising Axis 1 focus on teacher training and take three approaches: continuing training (Ponte, 2004; Souza, 2009), initial training (Moreira & Ferreira, 2012; Cyrino & Grando, 2021), and the relationship between initial and continuing training (Muniz, 2008; Oliveira, 2015; Giraldo & Fernandes, 2019; Santos, 2023).

The studies investigating continuing training focus on professors to better understand their teaching work and restructure training practices to contribute to student learning and quality teaching (André, 2010). Collaboration stands out as a key aspect in training processes that produce research based on teachers' own practices, as well as in recent research dimensions

[4] Work presented in 2017 and published in 2018.
[5] Work presented in 2023 and published in 2024.

with teachers. These dimensions highlight autobiographical narrative research, oral history, and self-writing (Josso, 2004; Passeggi, 2020; Nacarato, 2023).

> The biographical approach, as well as the use of autobiographical narratives and oral history research, is a methodological option for teacher training. This approach initially enables research into the training process. Additionally, it allows for the use of autobiographical narratives to understand the feelings and representations of social actors in their training and self-training processes (Souza, 2009, p. 10). (Souza, 2009, p. 10).

These works support the professor's perspective as a producer of knowledge about their practice, as well as an intellectual subject of reflection and investigation about their professional trajectory, identity, and development. "It seems reasonable to propose that professionals investigate their practice as a genre of research with its own defining characteristics" (Ponte, 2004, p. 18).

Thus, by reflecting on their practice, professors can understand the problems arising in their professional fields and institutions. "The discourse of research on practice is not, therefore, merely a discourse on the practices of others; it is also, and above all, a discourse on ourselves and our practice" (Ponte, 2004, p. 21). The author adds that collaboration is one of the most important elements of research on practice but points out some ethical issues in researching one's own practice.

> One problem researchers face when studying their practice is the distance between themselves and their subject. This distance can exist in terms of space, time, and culture. In my opinion, there are three ways to create this distance: (1) resort to theory, (2) take advantage of your experience in a group, and (3) engage in debate outside the group (Ponte, 2004, p. 18). (Ponte, 2004, p. 18).

In autobiographical narrative research, the professor is a "storyteller" who produces elements in their autobiographical or biographical narratives, both oral and written, that enable us to learn about their life, ways of thinking, feelings, actions, emotions, anxieties, challenges, and professional, personal, and human development.

> What do these texts have in common? First, the identification of how researchers propose training work based on oral narratives and written proposals... ways of working focused on oral and written communication, from a collaborative perspective, through the theoretical and practical analysis of the processes that constitute teaching identity and the knowledge of mathematics professors. It is evident that the way in which professors narrate and share their life-training stories, through the apprehension of memories and recollections of their schooling trajectory, training devices, classroom episodes, work with training memoirs, shared narratives, and exploratory-investigative practices, are configured as adjectives of concepts that researchers adopt

> to undertake singularities in the processes of researching life and professional learning in the context of teaching mathematics education. (Souza, 2009, p. 9)

The commissioned works discuss continuing training processes that center on the professor as the protagonist. These processes consider the professor's unique characteristics, life trajectories, and professionalization. These aspects enable the horizontality established in collaborative training processes between mathematics teachers and trainers. Progress in researching continuing training for professors in collaborative contexts using narratives as a theoretical and methodological reference allows us to consider how research on practice is linked to autobiographical narrative research, as Nacarato (2023) points out.

> We have also defended the ethical and responsible commitment of narrative researchers. Hence my belief that narrative research requires the researcher to immerse themselves in the context of the investigation and that it proves to be a coherent device for researching the practice itself, given that the researcher will take their work context as the subject of study. Acting as a trainer, they have intentionality and take responsibility for their actions together with the students in training. They transform themselves and the context in which they operate. For this reason, narrative research promotes (self-)training. (p. 21)

Collaboration between school professors, trainers, and/or researchers occurs in environments that encourage the development of shared pedagogical practices and reflective processes regarding their life histories, professional trajectories, and professional development in self-training processes. This dimension was identified as the main one in these works.

In the area of initial training, studies have been conducted by Moreira and Ferreira (2012) and Cyrino and Grando (2021). Moreira and Ferreira (2012) addressed the training of mathematics teachers and the role of mathematical training for these professionals. Cyrino and Grando (2021), on the other hand, examined the impacts and tensions resulting from a particular regulation for the initial teacher training — Resolution CNE/CP No. 02/2019 — and identified potential forms of resistance within the training field. The authors discussed the impacts and tensions in the epistemological, curricular, and professionalization fields, as well as the possibilities of (re)existence and creative insubordination constructed by the authors of the submitted texts.

Moreira and Ferreira (2012) based their arguments on an analysis of the texts submitted for the commissioned work. They situated teachers' mathematical knowledge and the role of mathematics in initial training within two categories. For this purpose, the authors employed Shulman's (1986, 1987) concept of pedagogical content knowledge as a "watershed."

> On the one hand, we could place those studies that seek to understand the mathematical knowledge relevant to the profession in terms of the specificities given by school teaching practice in mathematics and not predominantly by the academic discipline itself. ... In a second strand, we could place those works that start from a vision closer to the 3+1 tradition, in which “Content Knowledge” is predominantly valued in teaching practice in primary school and in defining the place of mathematics in teacher training, conceiving it as a fundamental “hard core” and the legitimate fulcrum of this training. In this case, the work that would complement the training of professors in the undergraduate program (accepting the insufficiency of this core considered fundamental) is referred to instances outside mathematical training, with special attention to the “teaching methods” of the discipline. (Moreira & Ferreira, 2012, pp. 14-15)

Moreira and Ferreira (2012) classified the submitted texts as related to the first strand in an attempt to discuss and provide examples of how to "think about the mathematics of professors and their role in the initial training of these professionals based on school teaching practices," with an emphasis on "issues involving learning, teaching, and the meaning of mathematical knowledge in school education today" (p. 18).

More specifically, Cyrino and Grando (2021) analyzed the impacts of the National Curriculum Guidelines for the Initial Training of Teachers for Basic Education and the National Common Base for the Initial Training of Teachers in Basic Education (Base Nacional Comum - BNC – Training, 2019). Several entities, including ANPEd and the National Association for the Training of Education Professionals (Associação Nacional pela Formação dos Profissionais da Educação - ANFOPE), considered these guidelines reductionist and problematic from the perspective of initial teacher training. The authors pointed to this debate and the tensions in CW.

> Teacher training has long been an arena of ideological and political conflict in Brazil. Over the past two decades, the various resolutions that define the National Curriculum Guidelines (DCN) for the initial training of Basic Education professors, published by the National Education Council (CNE), have explicitly stated different conceptions of teacher training. These conceptions cut across curricular and pedagogical projects, reflecting disputes present in civil society and the state. Recently, attacks on education have increased, and these attacks are carried out in the name of "quality education." These attacks blame educators for the current state of education and seek to reform the curriculum. (Cyrino & Grando, 2021, p. 2).

The analyses in the document covered the fields of epistemology, curriculum, and professionalization.

> This analysis revealed that, in the epistemological field, professors are considered consumers and implementers of knowledge produced by other educational agents. There has been an attempt to standardize the curricula of teacher training courses in

> basic education, with an emphasis on skills-based pedagogy. This has resulted in a break with the theory-practice unity and a fragmentation of teaching knowledge, as well as a break with the organic perspective between initial and continuing training. In the field of professionalization, professors are individually accountable for their training and professional development. (Cyrino & Grando, 2021, p. 1).

The set of base texts analyzed revealed ways of resisting or even (re)existing. This concept is similar to what Albán Achinte (2009) describes as "*La re-existência apunta a descentrar las lógicas estabelecidas para buscar en las profundidades de las culturas las claves de formas organizativas, de producción, alimentarias, rituales y estéticas que permitan dignificar la vida y re-inventarla para permanecer transformándose"* (p. 455). Cyrino and Grando (2021) noted that the concept of (re)existence is similar to creative insubordination in mathematics education. This is achieved through resistance practices that are creatively developed and implemented in the initial training of mathematics teachers. To this end, they referred to the texts to support and conclude their argument.

> As a way of resisting and (re)existing, a curricular (de)construction is defended, from the perspective of creative insubordination, in the search for creative and collaborative paths, loopholes, shortcuts, and tactics that value the professionalization of professors and a mathematical education in favor of social justice. (Cyrino & Grando, 2021, p. 1)

Once again, the collaborative dimension was experienced as an important aspect of processes of resistance or (re)existence to guidelines that do not correspond to research results in the field of initial training.

Beyond collaboration, both texts highlight the importance of professional teaching identity. Both texts discuss initial teacher training as a space and time for the development of teachers' professional identities, which is a key concept for understanding the training process. Moreira and Ferreira (2012) emphasized the necessity of rethinking the training of mathematics teachers, particularly their mathematical training, based on the demands of the profession and the recognition of a professional identity for mathematics teachers (p. 11). Similarly,

> Becoming a professor involves adopting new perspectives about oneself and others as producers of knowledge and as individuals responsible for their learning. The motivation to work, perceptions of their tasks, the role of mathematics and mathematics education, future prospects as professors, and responsibilities are fundamental to forming the professional identity of mathematics professors. (Cyrino & Grando, 2021, p. 20).

Regarding the training processes that comprise the initial and continuing education of mathematics teachers, four texts were produced based on commissioned works. Muniz (2008) and Oliveira (2015) discussed public policies for teacher training and their implications for

training processes, including the reformulation of initial and continuing training curricula and research on specific programs, such as the Continuing Teacher Training Program (Pró-Letramento) and the Education Observatory (Obeduc). Giraldo and Fernandes (2019) and Santos (2024) presented texts denouncing the colonizing impacts of teacher training discourses in mathematics, as well as forms of resistance and announcement from a decolonial perspective of teaching and resistance organizations, such as scientific societies.

Muniz's (2008) text discussed the theme "Public Policies for the Training of Teachers Who Teach Mathematics." After analyzing the base texts, Muniz concluded by identifying two dimensions that determine public training policies.

> One dimension is constituted by legislation, written documents, guidelines, opinions, and resolutions. Another dimension is constituted by personal and political determinations and initiatives, which are sometimes eminently partisan, and are developed within the school, particularly in the classroom. Public policies reflect a complex, intertwined relationship between the two dimensions, ranging from legislation to professors' subtle pedagogical acts in the classroom. Conversely, one must consider how professors construct their praxis, which reframes and resizes laws in their practical, concrete, everyday applications. To understand how public policies aimed at training mathematics teachers are constituted, one must consider the interplay of these two perspectives. (p. 22).

To articulate these two perspectives, Muniz (2008) discussed the space gained by the Brazilian Society of Mathematics Education (SBEM) within the National Education Council (CNE). This allowed SBEM to bring together the results of academic research on teacher training practices and academic researchers involved in evaluation policies, such as the National Textbook Program (PNLD) and the Basic Education Evaluation System (SAEB). However, this space has been lost over the years, primarily due to the inclusion of the third sector, including large business groups such as Itaú Social, the Lemann Foundation, the Ayrton Senna Institute, and the Reúna Institute. Unfortunately, SBEM is currently far removed from the Ministry of Education's (MEC) decisions and actions. Mathematics educators participate through individual actions. With its extensive expertise in producing and disseminating research in mathematics education over its 38 years of existence, SBEM is no longer a reference or partner of the MEC.

According to Muniz (2008), developing public policies for teacher training requires valuing research as a formative aspect for both future and current teachers.

> Public policies favoring a greater presence of mathematics educators in mathematics departments and education faculties must be developed. This would allow for better coordination between the training of mathematics teachers and scientific research. Interaction and research in mathematics education would play an important role in training from the beginning. Such policies would require legislation mandating an

> increasing number of positions for mathematics educators in both the Department of Mathematics and the Faculty of Education, as well as greater coordination between the two through research and extension activities. (p. 24).

The scope of research as an initial or continuing training process was the main focus of Obeduc, a teacher training program. The commissioned work, entitled "Professional Development of Teachers Who Teach Mathematics: Collaboration and Curriculum Materials within the Scope of the Education Observatory Program (Obeduc)," was systematized by Oliveira (2015) and focused on Obeduc. Obeduc was linked to the Directorate for the Training of Basic Education Teachers (DEB), an agency of the Coordination for the Improvement of Higher Education Personnel (Capes), under the "Training Associated with Research" initiative. This initiative involved undergraduate and graduate students, basic education teachers, and researchers in studies and research. To analyze the nine submitted texts, Oliveira focused on professional development, collaboration, and educational materials.

He analyzed the pedagogical practices that promote professional development among Obeduc participants. To this end, Oliveira drew on two concepts from Bernstein (2000) to address the principles of communication in pedagogical practice: classification and framing. "The first concept refers to the content of communication in the pedagogical relationship, characterized by what to say. Framing, on the other hand, refers to the form of communication in pedagogical practice, or how one speaks (Bernstein, 2000)" (Oliveira, 2015, p. 13). Thus, the author concluded:

> Teaching practices that promote professional development enable future teachers and professors to participate in various activities. These activities include producing written narratives about lessons, developing tasks that explore specific approaches or mathematical content, and supporting changes to school teaching practices. They also include helping produce educational curriculum materials, developing strategies for managing them in class, and coping with teaching work routines. Regarding future researchers, these practices provide contact with the reality of schools and teaching practices. (Oliveira, 2015, pp. 14–15).

At the end of the text, the author lamented that although the program produced effective proposals for the initial and/or continuing training of professors, its continuity was compromised from the perspective of professional development. This issue is evident in this program and others, such as Pró-Letramento and the National Pact for Literacy at the Right Age (PNAIC), which ended despite their positive outcomes.

In the summary of the article, Oliveira (2015) also indicated new possible avenues of investigation for pedagogical practices that promote professional development, encouraging the creation of other programs from this perspective.

> The presented articles introduced new elements that enabled the analysis of the pedagogical practices established by groups involved in OBEDUC projects. These projects enhance the professional development of mathematics professors by presenting unique content and forms of communication. These articles lead us to consider this a modality of teacher training that poses new challenges for the community of mathematics educators. These challenges concern understanding the pedagogical relationships between members of these groups, the texts and forms of expression that characterize their pedagogical representations, and the dynamics of their organization. These aspects open new avenues for research and demand public policy programs that support or promote different modalities of teacher training (p. 15). (p. 15).

Giraldo and Fernandes (2019) presented a theoretical essay based on the analysis of 11 texts submitted for discussion on the training of professors who teach mathematics. To this end, they adopted what they called a decolonial option in order to

> Discuss the traces and effects of coloniality that manifest in the training of mathematics professors, highlighting the power relations, regulations, and resistance movements involved in the spaces and times that comprise different training processes. We propose three axes to guide this discussion. Based on our interpretation of decoloniality, these axes cut across these relationships, enabling the construction of paths of resistance. The axes are: teaching collectives as spaces of resistance, methodologies in dialogue with knowledge, and mathematics as political-epistemic disobedience. (Giraldo & Fernandes, 2019, p. 1).

The authors constructed a narrative that questions the institutionalized and naturalized modes of the university as a space for training professors. This narrative defends and reinforces the cultural, social, political, territorial, racial, gender, and sexual superiority and standards of Euro-U.S.-centric modernity. "To the extent that it creates, legitimizes, and reproduces knowledge that conforms to coloniality" (p. 10). They denounced the control of teaching work through discussions on the coloniality of being and knowledge based on Walsh (2008) and pointed out that:

> Professors may not be fully aware of the politics of their work or how it contributes to the broader project of coloniality by imposing hegemonic epistemologies. De Paula and Cyrino (2019) discuss the concept of professional identity among mathematics teachers based on an inventory from 2006 to 2016. ... The authors highlight the recognition of socio-political-cultural influences on the professional identity formation of mathematics teachers as an emerging element from these studies. They also highlight the understanding that contexts of regulation and loss of rights are harmful to these movements. We interpret these movements as processes of coloniality of being that operate in an articulated manner with the coloniality of knowledge. (Giraldo & Fernandes, 2019, p. 14).

The authors explained that the texts on which the article was based advocated for the development of professional identities among teachers as "pathways for training, activism, and resistance" (p. 10). Once again, the collective dimension illuminated the collaborative processes involved in the formation of teachers' professional identities. In this sense, the authors advocated for "converting teaching into collective, politically engaged action" (p. 15).

Their theoretical construct raised questions aimed at denaturalizing truths in teacher training and highlighted the specificity of mathematics as hegemonic knowledge. Mathematics defines hierarchies and power relations in relation to other disciplines and questions the place of the bachelor's degree compared to the professional nature of the teaching degree. Thus, the authors pointed out:

> A path of resistance emerges on two fronts. The first combats the coloniality of power — the hierarchization of bodies that characterizes mathematics as a "capacity derived from the isolated inspiration of 'geniuses' with innate talent" (Matos & Quintaneiro, 2019, p. 571). The second front combats the coloniality of life and nature, "the dichotomy imposed between nature and society and the rupture it promotes between the biophysical, human, and supernatural (spiritual) worlds" (Walsh, 2012, p. 68). This coloniality places mathematics at the service of maintaining dualisms such as nature/culture, mind/body, and abstract/concrete. Therefore, it is necessary to demand "a problematized exposition of mathematics that highlights the multiple historical, social, and cultural processes of mathematical knowledge production that have determined the way mathematics is established today" (Matos & Quintaneiro, 2019, p. 571). (Giraldo & Fernandes, 2019, p. 26).

The text by Santos (2024) sparked recent reflections in teacher training research by listing and analyzing eight foundational texts that highlight "insurgent training practices forged against the grain of current educational policy." Santos emphasized the major challenges facing the teaching profession within a theoretical and political framework. He portrayed what research on teacher training has already established and denounced the current context.

> There has never been more discussion about the importance of education for social and democratic development and the role of teachers in this process. Yet, teachers (and their trainers) have never been more neglected and excluded. Since the establishment of the LDB/96, depending on the government (especially the government imposed by the legal/parliamentary coup of 2016), the logic of centralization has been present in decision-making processes, the formulation of public policies, teacher training, and curriculum development. This logic occurs without the more direct participation of professors, their institutions, trainers, their training centers, and academic and scientific associations. (p. 9).

For Santos (2024), the set of basic texts for discussion mainly indicates the “emergence of insurgent training practices,” which arise despite hegemonic neoliberal policies that control the training and performance of professors, as well as public training policies.

> The crossings, erasures, and prohibitions promoted by curriculum production and teacher training policies create anomalies, coercion, and interference, which harm teaching practice and ethos. ... The teaching ethos is constructed from two perspectives: the singularity, difference, and subjectivity of each individual, and the identity, profile, and professional personality of groups of future teachers, teachers, and their trainers. (p. 14).

Santos (2024) concluded the text by pointing out the challenge of a "capillary spread," meaning these insurgent practices should be institutionalized through a project of the Brazilian Society of Mathematics Education (SBEM), which unites us. This project involves internal and external actions aimed at education agencies of federal entities (p. 16). (p. 16).

Axis 2: Mathematics education as a field of research

In the six commissioned works that make up Axis 2, Mathematics Education as a Field of Research, we have the following focuses: the consolidation of ANPEd's WG-19, research modalities, theoretical and methodological approaches, and Mathematics Education and public policies. Fernandes and Valente (2019) argued that

> As a field of research, mathematical education is organized around mathematics teaching and the professional knowledge of mathematics teachers, as well as its implications for building a democratic society. This field seems to place the professional training of teachers, particularly mathematics teachers, at the center of the debate, coining the term "mathematical educator" (p. 9).

The first five CWs focused on discussing the constitution of mathematics education as a research field and demonstrated the consolidation of a working group to present and discuss research carried out in this field. The focus was on the themes of the WG's initial work, the diversity of research modalities, and the theoretical and methodological approach of French didactics, which was prevalent in the WG's initial theoretical foundation. Additionally, the focus was on the interfaces with public policies. The sixth CW addressed the WG's recent interest in learning about the theoretical and methodological approaches adopted by research groups in the mathematics education community.

Miguel et al. (2003) presented a text consisting of four independent topics. These topics addressed the establishment of mathematics education as a field of research, as well as the implementation of efforts to consolidate it from a historical perspective. D'Ambrósio discussed

the emergence and organization of mathematics education research in an international context, pointing out the similarities between this trajectory and the Brazilian experience. Igliori discussed the motivations and challenges that led to the formation of a working group dedicated to mathematics education at ANPEd and included testimonials from Brazilian researchers who supported the group's creation. Using conceptual bases, Miguel revisited the discussion of the disciplinarization of mathematics education, a topic already studied by D'Ambrosio. Miguel pointed out themes such as the relationships between education and mathematics education, mathematics and mathematics education, and the relevance of creating the working group at ANPEd. Finally, Garnica discussed the state of research in mathematics education and the obstacles to it, analyzing studies on teacher training. Thus, the field of mathematics education emerged from the convergences and divergences of these discourses.

The texts by Fiorentini (2002) and Nacarato et al. (2005) mapped related works that were approved for presentation at the Working Group (WG). The first study defined the scope of the mapping by focusing on specific thematic areas and directing the analysis to teacher training between 1998 and 2001. The results of the twelve studies analyzed revealed an absence of research on the initial training of mathematics teachers and on public policies and programs for teacher training. Additionally, changes in the curriculum and assessment of teacher training necessitated research to inform educators' and researchers' reflections on mathematics education. Thus, Fiorentini presented the relationship between education and mathematics education.

> It is precisely the coexistence of mathematics education with other areas of education that keeps it dynamic and creative, continually revitalizing itself. Mathematics education depends on education, yet it is also autonomous. However, mathematics education seeks its identity within a field that strives to be open to the multiple dimensions of educational practice while maintaining its research questions (p. 14). (p. 14).

The second mapping examined methodological issues in qualitative research conducted between 1998 and 2004. The results of the analysis of 80 studies indicated various methodological perspectives, as well as the predominance of naturalistic or field studies and historical and bibliographic studies. There were few theoretical essays, and exploratory and diagnostic research decreased over time. There was also a clear shortage of studies on the history of mathematics education, mathematical modeling, ethnomathematics, and the philosophy of mathematics. Nacarato, Ferreira, Lopes, Fiorentini, and Grando highlighted some theoretical and methodological issues in these studies.

> There is a lack of a theoretical or conceptual framework for the object of study. There is also inconsistency between the theoretical assumptions announced in the work and the analytical and interpretive treatment of the analyzed material. There is theoretical and methodological inconsistency between the object to be investigated and the instruments used to collect and analyze the information. The results obtained in the research are general, expressing a lack of analysis and synthesis for the researcher(s). Another issue is the researcher's difficulty synthesizing a thesis or dissertation into a coherent and consistent article, both theoretically and methodologically. Additionally, we found that the abstracts lacked essential research information. (p. 16).

The theme of the 2005 CW was mathematics education. Quantitative and Qualitative Analyses. Quantitative research related to French Didactics was systematized by Cileda Coutinho and Saddo Ag Almouloud (both from PUC-SP), while Clayde Regina Mendes and Miriam Cardoso Utsumi (both from PUC-Campinas) systematized quantitative approach research. The two texts related to these mappings could not be found on the ANPEd website.

Godino (2006) discussed the characteristics that define mathematics didactics as a field of scientific and technological research and its current stage of development on the international stage. Godino presented the means of disseminating knowledge, predominant research themes, institutions promoting the training of researchers and research projects, and the impact of research in mathematics education on teaching and learning. Finally, Godino evaluated the current consolidation of mathematics didactics and its future prospects.

Garnica (2007) wrote a commissioned paper that systematizes and raises questions about four specific topics related to mathematics education and public policy: textbooks, curriculum, teacher training, and assessment. The themes were developed by four different authors: João Bosco Pitombeira de Carvalho, Célia Maria Carolino Pires, Dario Fiorentini, and Maria Isabel Ramalho Ortigão. The author pointed out a discrepancy among the considerations discussed: the individual participation of researchers specializing in the development of public policies related to the topics versus the lack of collective systematization for the academic community in the field. Garnica (2007) emphasized that

> There are different conceptions of assessment, the curriculum, mathematics, textbooks, quality, teacher training, science, and language. Therefore, no public policy can be assessed "as a whole" or managed by a single researcher or small group of researchers. Without consistent, collectively discussed guidelines, these researchers end up "representing" the field on the committees responsible for these policies (p. 23). (p. 23).

The author highlights a current problem: mathematics educators are co-opted by public policies to provide advisory services, such as teacher training programs and the development of national guidelines, curricula, and other documents. These educators then take on an individualized role, ignoring collective discussions produced within the SBEM and its working

groups, as well as other research groups in the field. While the diversity of ideas certainly contributes to our field, there are groups of researchers who focus on specific topics that are sometimes overlooked by individuals invited to participate in public policies. This undermines democratic and academic debate within scientific societies, which sometimes weakens the SBEM's work with the Ministry of Education (MEC).

In Barbosa's (2017) study, research groups discussed their theoretical and methodological approaches. The author analyzed twelve papers, guided by the following question: "What theoretical and methodological approaches are raised from the corpus, and what are their similarities and differences?" (p. 3). Barbosa addressed four main theoretical approaches in mathematics education: teacher thinking, technological mediation, and contextual and post-contextual approaches. He also discussed six methodological approaches frequently used in mathematics education research: naturalistic research, theoretical modeling, cooperative investigation, narrative research, historical analysis, and bibliographic study. Regarding similarities and differences, Barbosa emphasized that "there is no direct relationship between the two instances. The same methodological approach can be used in different ways, so its particularization depends on the theoretical approach adopted in each research study" (p. 12).

Axis 3: Mathematics education at different levels of education

The three commissioned works that comprise Axis 3, "Mathematics Education at Different Levels of Education," include texts by Oliveira (2010), Lopes (2011), and Prado (2013). Within the WG, there was curiosity and concern about whether the levels of schooling—early childhood education, early years of elementary school, and high school—were receiving adequate attention in mathematics education research, which justified the proposal of these themes in the WG. The interest in investigating these levels further, as well as encouraging researchers — including WG participants and mathematics educators — to critically reflect on the subject, motivated the selection of these themes for the commissioned papers at the 2010, 2011, and 2013 meetings.

Based on the six base texts submitted, Oliveira (2010) discussed mathematics education in early childhood education and the early years of elementary school. Regarding the first theme, the research focused on continuing education and analyzed the participation of female

professors in a group discussing mathematics education in childhood. It also explored statistical concepts with children and conducted a systematic review of international literature on babies' initial quantitative skills and the development of the concept of number. Regarding the second theme, investigations addressed the difficulties elementary school professors face when teaching multiplication and division; the use of mathematical concepts in reading and writing processes through games; and communicating mathematical ideas through problem-solving with students of different ages.

Oliveira (2010) pointed out the following similarities among the analyzed texts: the participants in the empirical studies included professors and children of various ages; the research emphasized reading and writing as pivotal elements in diverse educational settings; and the investigations primarily focused on the communication of mathematical concepts and collaborative work within groups comprised of professors, as well as interactions among students and between students and professors. Finally, Oliveira (2010) emphasized that, despite the demand for texts related to mathematics education in early childhood education, only three texts addressed this theme. This may indicate the need for investment in new research in this area" (p. 20).

Lopes (2011) addressed the topic of mathematics education in secondary education based on two foundational texts. The first study focused on regular secondary mathematics education, analyzing official documents and professors' perceptions. The second study focused on vocational education, providing a historical context for a federal institute in southern Minas Gerais and discussing the challenges of this educational approach. Lopes questioned the teaching and learning of mathematics at this stage of basic education in terms of content and teaching approaches. He asked the following questions: "What mathematical knowledge is necessary for people in today's society?" (p. 5), and "What is the role of mathematics in the education of high school students?" (p. 6), and "[...] which mathematical concepts are essential for high school students?" (p. 10). He also emphasized that

> Mathematics teaching must be interesting and integrated with current issues. To achieve this challenge, it is necessary to investigate the processes of mathematical knowledge acquisition in secondary education, helping to rethink the mathematics curriculum for this course and, even more, to build the identity of this level of education. (p. 7)

In addition, he emphasized the specificity of mathematics teaching for technical and vocational courses and concluded with a call to action:

> Therefore, it is time-critical that new scientific publications discuss teaching practices in secondary school mathematics and analyze the relevance of a flexible curriculum that breaks with the traditional, overly formalized mathematical content that does not contribute to students' scientific development or prepare them for the workforce. (pp. 14–15).

In a narrative text, Prado (2013) discussed the relationship between images and concepts in the teaching of mathematics in the early years. He proposed reflections on the curriculum, pedagogical practices, and teacher training. The author identified, observed, and analyzed regularities in the titles, abstracts, and eight base texts. The studies examined mathematics education in the early years by analyzing student-teacher interactions, teachers' work and pedagogical roles, the mathematical knowledge underlying their practices, and the influence of the relationship between school and university on this teaching. The author provided the following summary:

> This journey through the spiral titles reveals a shift in emphasis from mathematics teaching centered on professors and specific content to guiding research and the academic knowledge produced. — some relationship, sometimes not so direct — with the subject of mathematical learning and students in the early years of elementary school (p. 4).

The texts addressed different dimensions of mathematics teaching at this stage of basic education by linking theory, training, and teaching practice. 1) the construction of the concept of number from a Piagetian perspective, 2) the role of play and games in child development based on Vygotsky and mathematics education authors, 3) the link between arithmetic and algebra highlighting the need for teacher training, and 4) Stochastics (combinatorics, probability, and statistics) as a foundation for critical thinking with inspiring practice reports. Other topics include language and communication in teaching, emphasizing school-university dialogue; the contribution of historical studies to teacher training; problem-solving as an approach to transforming everyday challenges into learning opportunities; and combinatorics as a space for reflection on pedagogical practice.

Final considerations

Analyzing the texts of the works commissioned by ANPEd's WG19 on Mathematics Education reveals the consolidation of a democratic model of commissioned work. This model brings together the research and perspectives of various Mathematics Education researchers. These researchers contribute either their own research developed within groups or their thoughts on the themes proposed at each meeting. Although the themes are similar, we observe an evolution in the discussions, which is representative of the advancement and consolidation of research in mathematics education in Brazil.

When analyzing the set of texts that bring together discussions on research and the training processes of mathematics professors, we highlight the consolidation of these professors' knowledge, practices, subjectivities, and conceptions, which are defined by an idiosyncratic yet political, hegemonic discourse. Euro-US-centric discourse, as well as the potential for transdisciplinary and decolonial deconstruction of the training curriculum. This potential is expressed through research with professors (collaboration), research on professors (resistance), and the formation of a professional teaching identity from the perspective of professional development. Collaboration is a pivotal aspect of this teacher empowerment and professional training.

The analysis of commissioned works shows that mathematics education has established itself as a field of research marked by theoretical and methodological plurality. The establishment of WG19 — Mathematics Education at ANPEd — was essential for organizing academic discussions, validating the field as interdisciplinary, disseminating research, and critiquing educational policies, reflecting the evolving nature of the field. WG-19 was a decisive milestone in the organization of Brazilian mathematics education, and its legacy requires continuity and further development. The field must remain committed to critical, diverse, inclusive, and transformative mathematics education that combines scientific rigor with social relevance. As the analyzed research reiterates, the field's future depends on its capacity for theoretical and methodological renewal to respond to complex contemporary educational

challenges. As Igliori wrote in Miguel et al. (2004), "May WG19 have a long life, and may it be the venue for fruitful theoretical debates—the only path to scientific research" (p. 75).

The discussions enabled by the texts from different levels of education point to important challenges and directions for mathematics education in early childhood education, in the early years of elementary school, and in high school, highlighting the need to: develop research that brings universities and schools closer together, problematize teaching through different approaches, strengthen teacher training (initial and continuing), explore new methodologies that integrate mathematics, language, and real contexts, and produce specific knowledge for each level of education, considering its particularities. The reflections arising from the discussions provide insights for the transformation of pedagogical practices in the classroom, articulating theory, research, training, and pedagogical action in different educational contexts. Although not addressed in 2012, the topic was discussed in 2010, 2011, and 2013, indicating a frequent concern of WG19 with the teaching and learning of mathematics at different levels of education.

It is important to highlight that the theme of the next work commissioned for the 42nd National Meeting of ANPEd 2025 – “Crossings of whiteness and the anti-racist struggle in mathematics education research” – was not covered in any of the three axes discussed in this article. The call for the production of the base texts reinforces the commitment and position of the community of mathematics educators:

> If, as researchers in the field of Mathematics Education, we wish to build the long-awaited Anti-Racist Education in all its dimensions, we must make ourselves available to investigate, theoretically and methodologically, the concepts that have made and continue to make whiteness a problem for us to understand that only engagement in the construction of Anti-Racist Mathematics Education will bring benefits to all of us, especially to the new generations. (p. 2)

This highlights the very movement of the WG's themes, which follow the interests of the field of research in Mathematics Education in the discussion on diversity, inclusion, sensitive issues, and resistance in favor of social justice and the reduction of inequalities.

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