EMP Educação Matemática Pesquisa
ISSN 1983-3156
Qualis A1

http://dx.doi.org/10.23925/1983-3156.2025v27i5p304-329

Mathematics in in-person pedagogy courses in Minas Gerais

Matemáticas en cursos presenciales de pedagogía en Minas Gerais

Mathématiques en présentiel Cours de pédagogie en Minas Gerais

Matemática(s) em cursos presenciais de pedagogia de Minas Gerais

Rejane Siqueira Julio[1]
Universidade Federal de Alfenas (UNIFAL-MG)
Doutora em Educação
https://orcid.org/0000-0002-3248-800X

Vanessa Nogueira Oliveira[2]
Universidade Federal de Alfenas (UNIFAL-MG)
Mestranda em Educação
https://orcid.org/0009-0009-0818-9833

Abstract

In mathematics education, few studies focus on analyzing the Pedagogical Course Projects (PPC) of pedagogy programs, particularly regarding the presence of mathematics in these documents. This article aims to examine how the word “mathematics” is used in these texts. The PPC collection was carried out by mapping in-person and ongoing courses in the state of Minas Gerais, initially using the e-MEC website, and later cross-referencing this data with information from the websites of higher education institutions (HEIs) that offer these programs. The analysis of the PPCs was inspired by Ludwig Wittgenstein’s aphorisms and the notion of plausible reading, which is part of the model of semantic fields. The results indicate that the number of hours dedicated to mathematics-related subjects remains low, that the titles of these subjects require revision, that the most frequently covered topic in school mathematics is numbers, and that the most commonly used methodology is problem-solving. Furthermore, elements of mathematics education have been incorporated; however, there is little discussion about the different types of mathematics, such as school mathematics and street mathematics. We conclude that, although significant changes have been made in mathematics-related subjects in pedagogy courses, longstanding issues persist and require political decisions regarding the focus of these programs.

[1] rejane.julio@unifal-mg.edu.br
[2] vanessa.oliveira@sou.unifal-mg.edu.br

Keywords: Curriculum, Pedagogy, Model of semantic fields, Education of teachers who teach mathematics.

Resumen

En educación matemática, son pocos los estudios que toman como objeto de investigación el análisis de Proyectos Pedagógicos de cursos de pedagogía (PPC), en particular, en lo que se refiere a la presencia de las matemáticas en ellos. En este artículo el objetivo es realizar una lectura de los usos de la palabra matemáticas en estos documentos. La recolección del PPC se realizó mediante el mapeo de los cursos presenciales y en curso en el estado de Minas Gerais en un primer momento en el sitio web e-MEC y cruzando los datos de este mapeo con los datos de los cursos recolectados en los sitios web de las instituciones de educación superior (IES) que ofrecen los cursos. Los PPC fueron analizados con inspiración en los aforismos de Ludwig Wittgenstein y a través de la noción de lectura plausible, perteneciente al modelo de campos semánticos. Como resultados señalamos que persiste una baja carga de trabajo de asignaturas que involucran matemáticas en estos cursos, que es necesario revisar los títulos de las asignaturas, que el contenido de matemática escolar más cubierto es números, que la metodología más cubierta es resolución de problemas, que se han incorporado elementos de educación matemática, pero que hay poca discusión sobre matemáticas diferentes, como la matemática escolar y la matemática de la calle. Concluimos que han ocurrido cambios importantes en relación a las disciplinas que involucran matemática(s) en los cursos de pedagogía, pero que viejos problemas persisten y requieren posiciones políticas sobre el enfoque de estos cursos.

Palabras clave: Currículo, Pedagogía, Modelo de campos semánticos, Formación de docentes que enseñan matemáticas.

Résumé

En didactique des mathématiques, il existe peu d'études qui prennent comme objet de recherche l'analyse des Projets Pédagogiques de Cours (PPC) des formations en pédagogie, en particulier en ce qui concerne la présence des mathématiques dans ceux-ci. Dans cet article, l'objectif est de réaliser une lecture des usages du mot mathématiques dans ces documents. La collecte des PPC a été réalisée en cartographiant les cours en présentiel et en cours d'exécution dans l'État de Minas Gerais dans un premier temps sur le site e-MEC, puis en croisant les données de cette cartographie avec les données relatives aux cours, collectées sur les sites web des établissements d'enseignement supérieur (EES) qui proposent les cours. Les PPC ont été analysés en s'inspirant

des aphorismes de Ludwig Wittgenstein et en mobilisant la notion de lecture plausible, appartenant au modèle des champs sémantiques. En conséquence, nous soulignons qu'il existe une faible charge horaire en matières impliquant les mathématiques dans ces cours, que les titres des matières doivent être révisés, que le contenu le plus abordé en mathématiques scolaires est celui des nombres, que la méthodologie la plus abordée est la résolution de problèmes, que des éléments de la didactique des mathématiques ont été incorporés, mais qu'il y a peu de discussions sur les différentes mathématiques, telles que les mathématiques scolaires et les mathématiques de la rue. Nous concluons que des changements importants ont eu lieu en ce qui concerne les disciplines impliquant les mathématiques dans les cours de pédagogie, mais que de vieux problèmes persistent et nécessitent des positionnements politiques quant à l'orientation de ces cours.

Mots-clés: Curriculum, Pédagogie, Modèle de champs sémantiques, Formation des enseignants qui enseignent les mathématiques.

Resumo

Na educação matemática, são poucos os estudos que tomam como objeto de pesquisa análises de Projetos Pedagógicos de cursos de pedagogia (PPC), em particular, no que se refere a presença da matemática neles. Neste artigo, o objetivo é realizar uma leitura de usos da palavra matemática nesses documentos. A coleta de PPC foi realizada, em um primeiro momento, por meio do mapeamento dos cursos presenciais e em andamento no Estado de Minas Gerais no website e-MEC e, em seguida, o cruzamento de dados desse mapeamento com dados sobre os cursos coletados em websites de instituições de ensino superior (IES) que oferecem esses cursos. Os PPC foram analisados com inspiração nos aforismos de Ludwig Wittgenstein e por meio da noção de leitura plausível, pertencente ao modelo dos campos semânticos. Como resultados apontamos que: há permanência de baixa carga horária de disciplinas que envolvem matemática nesses cursos; os títulos das disciplinas precisam ser revistos; os conteúdos da matemática escolar mais abordados são números; a metodologia mais abordada é resolução de problemas; e elementos da educação matemática têm sido incorporados, mas há pouca discussão sobre diferentes matemáticas, como matemática escolar e matemática da rua. Concluímos que têm ocorrido mudanças importantes em relação às disciplinas que envolvem matemática(s) nos cursos de pedagogia, mas que problemas antigos persistem e requerem posicionamentos políticos sobre o foco desses cursos.

Palavras-chave: Currículo, Pedagogia, Modelo dos campos semânticos, Formação de professores que ensinam matemática.

Mathematics in in-person pedagogy courses in Minas Gerais

How is mathematics present in pedagogy courses? Moreover, what math are we talking about? Motivated by these questions, we developed a research project called "Mapeamento e análise da presença da matemática nos cursos de pedagogia de Minas Gerais" [Mapping and analysis of the presence of mathematics in pedagogy courses in Minas Gerais], funded by the Fundação de Amparo à Pesquisa do Estado de Minas Gerais [Minas Gerais State Research Support Foundation] (process APQ-02172-18), which aimed to map and analyze the presence of mathematics in pedagogy courses in Minas Gerais. In this text, we will present the results of this research, which falls within the field of curriculum discussions, in particular, official, formal, or prescribed curricula, "names given to what is officially planned, generally expressed in terms of purposes, objectives, contents, methodological guidelines" (Pires, 2013, p. 43).

The study of prescribed curricula is characterized as documentary research, which, according to Bogdan and Biklen (2006), enables the identification of a portrait of the official discourses that comprise an institution. An official discourse, as in the case of Pedagogical Projects for Pedagogy courses (PPC), which is characterized by influences from public policy actions (Brasil, 2006, 2015, 2019a, 2024) and by the "expression of desires, yearnings and power struggles that organize and shape its structure" (Julio, Mariano, & Silva, 2022, p. 18).

Research in mathematics education has focused on the education of pedagogy students who will (or will be able to) teach mathematics. We highlight the pioneering research by Curi (2005), who analyzed the syllabuses of 36 pedagogy courses that included topics related to mathematics, and by Gatti and Nunes (2009), who analyzed, more broadly, the syllabuses of 71 in-person pedagogy courses. Recently, we highlighted, for example, the research that comprised the dossier: "Formação inicial de professores que ensinam matemática com foco na licenciatura em Pedagogia EaD" [Initial education of teachers who teach mathematics with a focus on DL teaching degree in pedagogy] (Lopes, et al., 2022), analyzing the teaching degree in pedagogy in the distance learning modality of 238 institutions; Julio, Mariano, and Silva (2022), Silva (2023), and Julio (2023), who analyzed 25 teaching degree courses in pedagogy offered in public institutions in the face-to-face modality in the state of Minas Gerais; Julio et al. (2025) who analyzed, mainly, quantitative data from 115 pedagogy courses in Minas Gerais, and Cavalheiro, Alencar, and Cassimiro (2022), who analyzed subjects of and for the teaching of mathematics in nine teaching degree courses in pedagogy at public institutions in Mato Grosso do Sul.

The data from these surveys have indicated a persistent low workload for specific knowledge subjects in these courses over the years, particularly subjects involving

mathematics, which are often limited to two subjects that focus on methodologies for teaching, to the detriment of knowledge of and about mathematics. This reality impacts pedagogy students' education in terms of producing or expanding knowledge about school mathematics and other mathematics, as they do not contribute to handling problems related to school mathematics and the way it has been approached in basic education (Julio & Silva, 2018; Moraes, 2021) or expectations regarding mathematics in these courses (Zanetti & Julio, 2020). Regarding this knowledge of and about mathematics, Curi (2020, p. 16) asks us an important question: "What mathematics should be proposed in pedagogy courses and how should it be treated, considering the small workload hours allocated to the subject?"

Curi's (2020) question, as well as approaches that discuss mathematics, such as street mathematics and school mathematics (Lins & Gimenez, 1997), or mathematician's mathematics and the mathematics of the pre-service mathematics teacher in pedagogy training (Paulo & Julio, 2022), brought another possibility for the research we were developing on mathematics in face-to-face pedagogy courses in the state of Minas Gerais, since, until then, the mathematics analyzed was centered on both school mathematics content, in which we found that the number approach is predominant, followed by the geometry approach, and methodological trends for teaching this mathematics, with the highest occurrence being problem solving, followed by games.

Thus, our perspective broadened when considering mathematics as sociocultural practices (Vilela, 2013), encompassing both school mathematics and the other mathematics we identified in these courses. From this, we proceed to examine the uses of the word "mathematics,' which is our objective of discussion in this article. In the next section, we discuss our data collection process from in-person pedagogy courses in the state of Minas Gerais, presenting some discussions of the quantitative data based on Julio et al. (2025), as well as our theoretical framework for the intended analyses of the qualitative data. In the following sections, we will continue with analyses, focusing on regulations, titles, and syllabi of mandatory subjects involving mathematics, as well as considerations of the presence of theories in mathematics education that point to other directions in the education of pedagogy students who will teach mathematics.

Methodological procedures of data collection and analysis

The aforementioned research was developed in two phases. In the first instance, data were collected from in-person and ongoing teaching degree pedagogy courses in Minas Gerais, Brazil, on the e-MEC website, an official database of courses and higher education institutions

(HEIs) in Brazil, from July to August 2023. We found 147 courses, distributed among public (federal and state) and private (profit and non-profit) institutions. To collect data on these courses, with the priority being their PPCs, the website of each HEI was accessed and, due to discrepancies between the data from e-MEC and these websites, and vice versa, such as, for example, a course appearing on e-MEC but no longer appearing on the website or the course becoming distance learning, we chose to collect data from courses whose website was consistent with the e-MEC data, totaling 115 courses, offered by 93 HEIs. Of these 115 courses, 32 are offered in public HEIs, 13 in 12 federal HEIs, and 19 in two state HEIs, and 83 courses are offered in private HEIs, 42 in 38 for-profit HEIs, and 41 in 41 non-profit HEIs.

During the process of collecting data on the 115 courses listed on the websites of the 93 HEIs, we identified all the PPCs of public HEIs. A very different scenario occurred in private HEIs, with only three of the 42 for-profit courses and only six of the 41 non-profit courses presenting PPCs. Given the lack of data from private HEIs, we attempted to collect additional data from these institutions that could provide a better characterization of subjects involving mathematics. We obtained only one more course from for-profit HEIs and three courses from non-profit HEIs that provide syllabuses for these subjects. In Julio et al. (2025), we discussed this data, pointing out that most pedagogy courses in Minas Gerais are offered by private HEIs, which are the institutions that offer the least data about the courses. Usually, only the names of the subjects offered are available, without further information, which does not allow for the production of meaningful interpretations, suggesting a need for greater demands from regulatory bodies and higher education evaluators to disclose data.

With the data collected, we began analyzing the quantitative data. We found that, on average, they offer two subjects involving mathematics, with an average workload of 4.5% compared to the total course workload. This workload is predominantly theoretical, with a predominance of theoretical content over practice or supervised practicum, a trend that has been maintained over the years, according to the research mentioned. These subjects take place, mostly, in the fourth or fifth period of the course, which can contribute to a greater relationship, according to Julio, Mariano, and Silva (2022), with schools through supervised practicum as a curriculum component; that is, even when the subjects have a greater theoretical workload, the courses may relate these subjects to others.

Regarding the low workload allocated to mathematics [education], this has raised a widespread discourse in the educational field that courses should expand it, looking specifically at the problems of mathematics education, disregarding broader discussions about the focus of a pedagogy course (Julio et al., 2025).

Regarding the year of publication of the pedagogy course PPC or curriculum matrices, this data was important to us because 107 courses are under the legislation of the Diretrizes Curriculares Nacionais para o Curso de Graduação em Pedagogia [National Curriculum Guidelines for the Undergraduate Course in Pedagogy] (Brasil, 2006) and Diretrizes Curriculares Nacionais [National Curriculum Guidelines] for initial higher education (Brasil, 2015), while eight align with the Base Nacional Comum para a Formação Inicial de Professores da Educação Básica (BNC-Formação) [Common National Base for Initial Training of Basic Education Teachers] (Brasil, 2019a), a document that was revoked by CNE Resolution N. 4, of May 29, 2024 (Brasil, 2024), which provides for the Diretrizes Curriculares Nacionais para a Formação Inicial em Nível Superior de Profissionais do Magistério da Educação Escolar Básica [National Curriculum Guidelines for Initial Training at a Higher Education Level of Basic School Education Professionals] (teaching-degree courses, pedagogical training courses for licensed and non-licensed graduates and courses offering a second teaching degree), according to which the courses will have two years to alter the curriculum. It is interesting to note that there was strong resistance to the proposal by Brasil (2019a), resulting in no changes to the PPC or minimal changes, as discussed in Oliveira and Julio (2023).

To identify the subjects that involve mathematics, as well as the presence of mathematics in PPC, we were inspired by Wittgenstein (2009) to go through the uses of the word mathematics in PPC, because, according to him, "the meaning of a word is its use in language" (Wittgenstein, 2009, §43, p. 38). We can set limits, as is done in mathematics when defining concepts, such as the definition of a field, which requires a non-empty set, two operations, and the need to satisfy properties like commutativity, associativity, a neutral element, an inverse, and the distributivity of one operation in relation to another. But this does not mean that in other activities this expression has a mathematical use, as it depends on the different language games, which, according to Wittgenstein (2009, §23, p. 27) is an expression with imprecise contours and that "[...] must emphasize that speaking a language is part of an activity or a way of life." Therefore, going through the uses does not aim to generate a definition of mathematics or to seek unity in these approaches, but rather to describe the uses, highlighting this diversity.

Identifying where mathematics was being used in the PPC to describe its uses or possible uses, we proceeded to analyze them through assumptions of the semantic field model (SFM) (Lins, 1999, 2012), in particular, mobilizing what Lins (1999, 2012) called plausible reading, as it is an analysis procedure when there is no interaction, for example, between us and the PPC proponents. Thus, we place ourselves in the position of producing meanings from what

we believe has been said by the proponents of the PPC, characterizing this process as a plausible reading where, "[...] Every attempt to understand an author must involve the effort of looking at the world through the author's eyes, of using the terms he uses in a way that makes the whole of his text plausible, and it is here that we must pay attention to the definitions that an author proposes" (Lins, 1999, p.93).

When reading a PPC and producing meaning for it, from the SFM perspective, we are not looking at whether definitions or statements are better or worse, whether they are true or not, even because something is true for someone and that someone is not an isolated individual but rather an individual with social and cultural practices, who shares interlocutors and communicative spaces. What we seek is to establish coherence, that is, to produce meanings for speeches that make them coherent, speeches that, at the same time as constituting coherences, present themselves as within a legitimate cultural horizon.

Production of meanings and interlocutors are also notions of the SFM, the first being everything that can and is effectively said about something in an activity or situation (Lins, 1999). The pedagogy PPCs are legitimate for these courses, to the extent that they are used to parameterize the education of future pedagogy holders. The legitimacy of specific modes of production of meanings is not given by a particular individual or by logical or empirical criteria, but by the sharing of interlocutors. For the SFM, an interlocutor "is a direction in which one speaks. When I speak toward an interlocutor, it is because I believe that this interlocutor would say what I am saying and would accept/adopt the justification that authorises me to say what I am saying" (Lins, 2012, p. 19). An example of shared interlocutors is the existence of cultural institutions, such as pedagogy course boards, which determine what will be carried out in the course through their PPCs, which are governed by more stringent regulations (Brasil, 2006, 2015, 2024).

For the reading we proposed, we initially searched in the PPCs, examining the uses of the word 'mathematics,' distinguishing three uses: in the very texts, in subjects carrying mathematics in the title, and in the syllabi of the subjects, whether having the word 'mathematics' in the title or not. In the analytical process, that is, the plausible reading of these uses, we problematized and uttered some statements, seeking to contribute to the area of mathematics education.

A reading of the uses of mathematics in general

This first use of the word mathematics, in general, when it happened, was the citation of Brasil (2006), when mentioning that pedagogy-degree holders are or should be able to teach

content from different areas, among them mathematics, in an interdisciplinary way, and appropriate to the different phases of human development (Brasil, 2006) or by the citation:

> The structure of the pedagogy course, respecting national diversity and the pedagogical autonomy of institutions, will consist of: [...] decoding and use of codes of different languages used by children, in addition to didactic work with content, relevant to the first years of schooling, related to Portuguese language, mathematics, cciences, history and geography, arts, and physical education. (Brasil, 2006, p. 3).

We consider it plausible that the PPC mentions Brasil (2006), which, together with Brasil (2015), is the main document in force that regulates pedagogy courses in Brazil. This political influence on the writing of the PPCs impacts, for example, the evaluation of the courses. However, we believe that there is a lack of discussions involving specific knowledge subjects beyond their listing.

A reading of uses of mathematics based on subject titles

Regarding the use of mathematics in the titles of mandatory subjects that involve it, the word ‘mathematics’ never appears alone, but is linked to other expressions. With this, we characterized those subjects by separating them by word centrality, that is, those that inserted a word or expression before the insertion of a colon or in a continuous way, for example: Mathematics: contents and methodologies and Mathematics Content and Methodology, as we understand that there is a reference to mathematics and not to Portuguese or sciences, for example. These words or expressions were categorized, and we counted the titles in each category. These are the categories and the occurrences of titles in them: Mathematics (32), Mathematics Teaching (22), Mathematics Education (8), Mathematical Alphabetization/Literacy (6), Basic Mathematics (or Instrumental or Leveling) (3), and Mathematical Language (1). Table 1 indicates the centrality of the words and what complements the titles, except for the categories Basic Mathematics, Mathematical Language, and Mathematical Aphabetization/Literacy, as they are presented in this way in the titles.

Table 1.

Characterization of titles based on the centrality of the word mathematics.

Centrality of the word mathematics	Titles
Mathematics	Mathematics: content and methodology* or Mathematics content and methodology
	Mathematics: contents, methodologies, and practices
	Mathematics fundamentals and methodology
	Mathematics fundamentals and didactics
	Theoretical and methodological foundations of/in mathematics
	Mathematical knowledge in early childhood education
	Mathematics and education
Mathematics teaching	Mathematics teaching
	Mathematics teaching methodology
	Content and methodology of mathematics teaching
	Curriculum methodological knowledge of mathematics teaching
	Methodological fundamentals of mathematics teaching
	Fundamentals and methodology of mathematics teaching
	Methodological theoretical fundamentals of mathematics teaching
	Pedagogy of teaching knowledge: mathematics teaching
	Content of mathematics teaching
Mathematics education	Mathematics education**
	Theoretical and methodological fundamentals of mathematics education
	Mathematical education: algebraic and geometric thinking in early childhood education and the early years of elementary school
	Mathematics education: mathematical games and play in early childhood education and the initial years of elementary school
	Mathematics education: Information processing and mathematics teaching in early childhood education and the initial years of elementary school

We use an asterisk (*) in the title Mathematics: contents and methodologies and two asterisks (**) in the title Mathematics education to demarcate an interesting divergence. In

subjects titled Mathematics: contents and methodologies, when a HEI offers two subjects with the same title, they are identified, in most cases, by Roman numerals (I, II, …) and, to a lesser extent, by stage of education, with one subject aimed at early childhood education and another at the initial years of elementary school. This last situation occurs in all mathematics education subjects, which seems to indicate the recognition of the area due to the specificities of each stage of schooling. Furthermore, subjects that have mathematics rducation in their title, although fewer in number than those of mathematics teaching or mathematics, seem to indicate a recognition of the courses of the solidification of mathematics rducation as an area of scientific investigation that impacts the professional practices of teachers who teach mathematics (Viola dos Santos, & Lins, 2016) and that generates influence in pedagogy curricula. This impact can also be noted in the Mathematical Alphabetization/Literacy subjects, which, once again, seems to indicate how much discussions in this area are beginning to be incorporated into those courses, and within the scope of public policies such as the Plano Nacional de Alfabetização na Idade Certa (PNAIC) [National Literacy Plan at the Right Age] (Brasil, 2014).

Curi's (2005) findings— and the findings of other studies we mentioned, as the focus of the specific knowledge subjects was on methodologies —also occurred in the courses we analyzed. The word methodology was the one that appeared most in the titles, after mathematics, indicating that 'how to teach' prevails over 'what to teach'. However, title analyses enable different ways of producing meanings, even because a title can be thought of as "a name or expression that is placed at the beginning of a book, [...] etc., which can indicate the subject or simply identify, individualize the work or task" (Houaiss, Villar, & Franco, 2009, p. 1849). Therefore, it can be challenging to characterize the subjects based on titles alone, which may raise questions such as: What is the difference between subjects of Mathematics Content and Methodologies when they refer to mathematics and when they refer to mathematics teaching? Do Basic Mathematics/Leveling subjects only refer to school mathematics content? How is mathematical literacy addressed in the syllabi? If methodologies appear more in the titles, how are the subjects of content and methodologies or only methodologies characterized? What is the difference, for example, between the subjects Theoretical-Methodological Fundamentals in Mathematics I, and Theoretical-Methodological Fundamentals in Mathematics Education?

We will approach these questions to problematize title writing, as well as the insufficient characterization of subjects through them alone. Before addressing these questions, which make it necessary to refer to the course syllabi, it is important to say that we will not mention the

names of the HEIs that provided the titles and course syllabi, even though we cite them in the usual way, that is, in the form of a direct citation. Our intention is to carry out readings and problematizations, rather than pointing out deficiencies or defects in what was found. Therefore, we refer to HEIs as HEI A, HEI B, HEI C, and so on.

Another important observation is that the syllabi are not standardize, as they can include: only the subjects that will be covered; a course program, containing the title, program content and bibliography; subjects to be covered and bibliographic references; subjects, objectives and bibliographies, without the program content; subjects, objectives, skills, and competencies, contributions of the subject to achieve the course objective and bibliography; topics, contribution to the graduate profile, and bibliographies; subjects to be addressed, their contents, and bibliographies. We also note that there are very succinct syllabi containing: the construction of rational numbers (fractions and decimals) and geometry in early childhood education and the initial years of elementary education. However, some syllabi comprise many topics, making it seem unfeasible to complete them, as is the case with the syllabus below, for a 60-hour course:

> Mathematics and its subject matter: an overview of the history of mathematics, fields of research, and its role in contemporary societies; school mathematics: history, trends, and curriculum reforms in teaching; analysis of mathematics curricula in Minas Gerais, other Brazilian states, and other countries since the 1980s; dominant practices and conceptions; guidelines, national curriculum parameters, and curriculum references; studies and research in mathematics education: the psychogenesis of numerical writing, the theory of conceptual fields, geometry, problem solving, and the impacts and uses of technology; mathematics and reasoning: recognition and application of reasoning processes; mathematics and communication: problem solving using oral, written, pictorial, graphical, algebraic, and geometric methods; mathematical notation and its role in the development of mathematical ideas; development of conceptual content and procedures: numbers and operations; the construction of numbers and their graphic representation; natural numbers: children's logic in representing numbers; the decimal number system; operations with natural numbers; computational techniques and the construction of algorithms; systematization of teaching solutions; creation, implementation, and evaluation of teaching situations in mathematics; methodological alternatives for teaching mathematics, permeating the specific content (HEI A).

We have problematized the relationship between the contents and methodologies of mathematics and the contents and methodologies of mathematics teaching, agreeing with Silva (2023):

> At first, while "Mathematics Teaching Methodologies" may be related to ways of teaching mathematics, mathematics methodologies may be related to how mathematics is constituted or organized, for example, while academic mathematics is made up of axioms (truths that are accepted by the community of mathematicians without the need for demonstration) and theorems (statements that require demonstrations), school

> mathematics has statements that are not demonstrable due to the stage of schooling that a person is at (Silva, 2023, p. 71).

We compared the syllabi of both subjects, 'Contents and Methodologies of Mathematics Teaching' and 'Mathematics Contents and Methodologies'. The mathematics teaching syllabi contained mathematical content or knowledge, but did not specify the primary theme. The other topics addressed were: teaching and learning processes; teacher education; curriculum references; methodological trends (problem solving, technologies, games); use of teaching resources (textbooks, supplementary materials, videos, magazines, and newspapers); interdisciplinarity; planning and evaluation; analysis of teaching situations and production of teaching materials. On the other hand, the Mathematics Contents and Methodologies syllabi address mathematics teaching and learning more broadly, through topics such as theoretical-epistemological assumptions, error analysis and assessment, teaching methods, characteristics, needs, and planning, as well as challenges and difficulties, and didactic guidelines. Furthermore, trends in mathematics teaching (problem solving, games, history of mathematics and technologies) are mentioned, as well as: mathematical literacy; studies and research in the area of mathematics education; studies of curricula and curriculum reforms, and the relationship between mathematics and everyday life and other subjects. However, the centrality of the subjects of these syllabuses revolves around the contents of school mathematics, among them: number construction; numerical writing; decimal system; numeration system; basic operations; arithmetic of natural numbers, seriation, ordering, classification and exploration of space; logic; fractions; rational numbers; measurements of length, area, volume, capacity and mass; quantities and measurements; units of measurement and conversions of units of measurement; monetary system; percentage; exponentiation; statistics and probability; probabilistic thinking; information processing: reading and interpreting data; construction of graphs and tables; arithmetic mean; spatial perception; topological, projective and Euclidean geometries; plane and spatial geometry; geometric thinking; elements of geometry; spatial orientation; geometric shapes; perimeter and area; algebraic thinking; numerical patterns and functional relationships; computational techniques and construction of algorithms.

In the basic mathematics (or instrumental or leveling) subjects, the title suggests that the focus is on school mathematics subjects. However, the three basic mathematics subjects present different characteristics. While in one HEI, 'Mathematics-Leveling' presents mathematical content without specifying it, in another institution, 'Instrumental Mathematics' includes specific mathematical content, as well as discussions on mathematics teaching in general, also focusing on early childhood education and the initial years of elementary education. In the third basic subject, in another HEI, yet, specific content, methodologies, and strategies for developing logical-mathematical thinking were mentioned; the only subject directly related to mathematics teaching was the tendency toward mathematical modeling and problem situations, and a relationship between mathematics and teaching appears in the subject historical-pedagogical construction of mathematical practice and thinking. We noticed, in the analysis, that the titles seem to indicate a treatment of school mathematics. However, it addresses aspects related to teaching and its history, as well as the history of mathematics. There is a greater focus on mathematical content; while 22 mathematical topics, such as the numbering system and natural numbers, among others, are covered, only two teaching methodologies appear (mathematical modeling and problem situations). Even so, with these three subjects, it is already clear that the title is insufficient to characterize them, which requires an analysis of the syllabi due to their particularities.

We can make a similar comment about 'Curriculum Methodological Knowledge – Mathematics Teaching III' with the following syllabus: "Studies magnitudes and measurements: measurements of area, volume, capacity, length, and mass. Studies rational numbers, representations, equivalences, and operations. Studies teaching materials to aid in mathematics teaching and the production of teaching materials" (IES B). A relationship between curriculum and methodology of mathematics teaching seems plausible to us, in which teaching and auxiliary materials would be related to what we read as methodologies proposed by the BNCC (Brasil, 2018) such as problem solving, mathematical modeling, mathematical investigation and project work or other curriculum proposals, such as those developed by the state organs or schools, not limited to the school mathematics subjects covered in this syllabus.

In another subject entitled ‘Theoretical-Methodological Fundamentals in Mathematics I’, it seems plausible to say that both topics are addressed: ‘what to teach’ and ‘how to teach’, influenced, for example, by Curi (2005, 2020) and Gatti and Nunes (2009). Furthermore, what the syllabus of this subject provides us is:

> Philosophical, epistemological, and methodological foundations of school mathematics; reflections on content and the production of appropriate spaces for inventive learning of those mathematical contents for the initial years of elementary school, based on studies of conceptions of mathematics and mathematics education; understanding mathematics education as an area of research and studies on mathematics and its processes of production and dissemination; mathematics as a sociocultural, historically situated human production; school mathematics: curriculum compositions and alternative approaches; the school as a space for the production of inventive learning spaces (IES C).

In this syllabus, “what to teach” and “how to teach” were superficially addressed because it seemed important to its creators to convey their conceptions of mathematics and mathematics education, focusing less on the conceptions of school mathematics and inventive learning. Regarding the list of topics, as suggested by a dictionary entry of the word syllabus, “1 written record; note, list, role; 2 text reduced to essential points; summary, synthesis, synopsis [...]” (Houaiss, Villar, & Franco, 2009, p. 737); i.e., course syllabi can be thought of as a list of topics to be covered in courses, which enables different ways of producing meanings.

Considering the differentiation between mathematics and mathematics education proposed in the syllabus of the subject ‘Theoretical-Methodological Fundamentals in Mathematics I’, we encounter the subject entitled ‘Theoretical-Methodological Fundamentals of Mathematics Education’, whose use of the term “mathematics education” is still limited in the subject titles. In this particular subject, the syllabus presented was:

> Fundamentals of mathematics education in early childhood education and the initial years of elementary school: history, meanings, trends, possibilities, and limits. Psychogenetic, historical-cultural, epistemological, and methodological aspects of mathematical learning by children, young people, and adults in the early stages of schooling. Current trends in mathematics teaching: theoretical assumptions, procedures and techniques. Analysis and organization of teaching programs. Mathematics curriculum in early childhood education and the initial years of elementary school. The construction of mathematical knowledge: concepts and uses of natural numbers, rational numbers, integers, fractions, and decimals. Fundamental operations and problem solving. (HEI D).

Our production of meanings from the influence of research in the area of mathematics education seems plausible to us, as the syllabus carries themes that are discussed in the area, such as methodological trends for mathematics teaching, curriculum analysis, differentiation between stages of schooling, and being subjects of school mathematics, such as concepts and uses of natural numbers, something also within the domain of mathematics education.

Regarding the syllabi of 'Mathematics Alphabetization/Literacy', only one HEI explores the terms 'alphabetization' and 'literacy' in mathematics in the conceptual aspect, in program and project proposals, and in the development of affective factors, including alphabetization and statistical literacy in the syllabus. In this HEI, the formation of mathematical concepts, specific topics in school mathematics (the meaning of numbers, the meaning of operations, and different types of calculations), trends in mathematics teaching in general, and interdisciplinarity are brought into relation with these terms. We consider it important to work with these concepts not in terms of achieving unicity, but to understand the different perspectives for mathematical alphabetization and mathematical literacy from the perspective of literacy. An example of conceptualization can be found in the PNAIC material (Brasil, 2014), in which:

> Mathematical alphabetization from the perspective of literacy was an assumption adopted in line with the formative material in language. In this way, mathematical alphabetization is understood as an instrument for reading the world —a perspective that extends beyond the simple decoding of numbers and the resolution of the four basic operations (Brasil, 2014, p. 5).

The diversity of conceptualizations is evident in the research conducted by Stein, Melo, and Richit (2023), which investigated the conceptions of literacy present in research on the teaching of mathematics in the initial years of elementary school. The authors identified in 42 analyzed works (theses and dissertations), three conceptions of mathematical literacy from the perspective of literacy: multiple literacies, ideological literacy, and schooled literacy, considering that the three conceptions complement each other, pointing out that:

> Mathematical alphabetization from the perspective of literacy needs to be considered with dedication and courage, not exhausted by this analysis. On the contrary, there are questions to be investigated given the implications that mathematical alphabetization, from the perspective of literacy, has on formal learning contexts, such as curriculum,

> initial education of polivalent teachers, and teaching strategies (Stein, Melo, & Richit, 2023, p. 26).

In other HEIs, the following topics are covered in the subjects categorized under alphabetization/literacy: history of mathematics; trends in mathematics teaching; didactic and methodological resources for teaching mathematics; official curriculum documents such as the BNCC and Curriculum Guidelines; importance and meaning of mathematics in basic education; construction of mathematical knowledge; concepts of school mathematics; in general and related to social function, the concept of mathematical reasoning applied to everyday life/reality; mathematical language and its relationship with the mother tongue; numeracy; the construction of numbers by the child; concepts of school mathematics (decimal number system; logic; geometry; geometric shapes; space-time orientations; measurements; four operations; notions of statistics and probability; reading graphic data and problem solving; games and activities). In these other HEIs, the concept or concepts of alphabetization and/or literacy in mathematics are not topics on the syllabuses. Considering Brasil's (2014) conception of mathematical alphabetization from the perspective of literacy, widely disseminated in Brazil through continuing education courses, and the work by Stein, Melo, and Richit (2023), in our reading, the topics presented contribute to alphabetization and literacy in mathematics. However, the way they are presented may not be directly related to these terms, except for the title, which does not differ from the syllabuses of the subjects in the categories of mathematics, mathematics teaching, and mathematics education.

We can illustrate this statement by comparing a subject called 'Mathematics Alphabetization and Literacy' with the subject entitled 'Mathematical Knowledge in Early Childhood Education,' whose syllabus is:

> Mathematics in the curriculum references for early childhood education. History of mathematics and problem solving in early childhood education. Reflections on the development of mathematical knowledge. The construction of the number by the child. The development of spatial notions by children. Mathematical knowledge and fields of experience. Teaching resources for working with mathematics in early childhood education: games, toys, activities, manipulative materials, children's literature, and use of technologies. (HEI E)

Except for the use of the term social function in one and not the other, there are similar subjects, which makes us question whether there is a specificity when the term used is *mathematical alphabetization.* This specificity could only be verified by addressing the topics of the syllabuses in the classroom, which requires research that analyzes the practice of teacher educators in subjects involving mathematics in pedagogy courses.

A reading of uses of mathematics in course syllabuses

In the analysis of the syllabi of mandatory courses that involve mathematics, we examine how the word 'mathematics' is used, noting that it is approached in different ways and a relational manner. If we are discussing mathematics as a social practice, we realize that the approach to characterizing it is almost non-existent. What we found in the syllabi was: mathematics as a sociocultural, historically situated human production; conception of mathematics; the nature of mathematical knowledge and the function of mathematics in early childhood education and the initial years of elementary school; understanding the different mathematical languages and didactic tools for teaching, contextualizing the teaching process. In our reading, while one is open to other mathematics through the characterization of mathematics as a human production and the understanding of mathematical languages, there is also the use of a conception of mathematics and the nature of mathematical knowledge, which seems to indicate closure in a conception of mathematics, in this case, school mathematics.

Writing school mathematics involves using adjectives for the term 'mathematics.' We found only two adjectives: school mathematics, including curriculum compositions and alternative approaches, and interactive mathematics. However, we find many relationships with mathematics, through the expression "mathematics and...", and it is common to find mathematics and connections, whether connections with everyday life, with different contexts, or with the knowledge necessary for everyday life, most of the time in a broad way and, in a few cases, as "mathematics in children's daily lives." Oliveira et al. (2022) addressed, for example, the importance of experiencing everyday issues in pedagogy courses, because students who had contact with these issues in the course reported that they were previously unable to see the relationship between everyday life and mathematics. There were also

connections between mathematics and: native language; other curriculum subjects or areas of knowledge, i.e., interdisciplinarity; different fields of mathematical knowledge.

In particular, when there are connections with everyday life, they appear, for example, as mathematics used to interpret the world, help solve everyday problems, and analyze dimensions of life in which mathematics is present. Still in relation to everyday life, but not limited to it, some syllabi mention critical mathematics education (CME). CME, from Skovsmose's (2000) perspective, offers contributions to problematizing mathematics and mathematics in everyday life, i.e., how mathematics can impact people's social, cultural, economic, and political lives. Some syllabis do not mention CME, but they do address the following topics: the social function of mathematical content; the social and political function of mathematics; discussing the social role of mathematics, combating its formative power in society; mathematical concepts to identify and understand the role of mathematics in the modern world and as a language for mediating with reality. In all these connections, what we notice is a perspective from a mathematical standpoint, which seems to us to be typical of school mathematics. We are not denying or diminishing this mathematics, after all, it assumes centrality in schools backed up by public policy actions, such as Brasil (2018), and play an important role in our society. However, we are pointing out that the approach to mathematics is an opportunity for what Lins (1999) calls the expansion of cultural repertoire, of knowledge, and the fact that the approach to different mathematics can contribute to the readings of students in basic education, their production of meanings, and how the licensed in pedagogy deals with these readings.

Most of the time, mathematics was connected to teaching and learning issues, with relationships to theories of educational psychology, such as the construction of concepts by children through Piaget's phases, and the syllabus that relates constructivism to mathematics. We believe there was a relationship with French didactics through the topic: epistemological and didactic obstacles linked to mathematics teaching and learning. Another approach that we identified in a syllabus and that is related to discussions on cognition, in particular from Cammarota and Clareto's (2012) perspective on inventive cognition, through the theme: reflections on content and production of adequate spaces for inventive learning of these

mathematical contents for the initial years of elementary school, based on studies of conceptions of mathematics and mathematics education. Without a specific approach that we could have identified, we find topics such as: mathematical learning; the importance and objectives of mathematics teaching in basic education; mathematics teaching in adult education; mathematics teaching as an instrument of emancipation and its literacy perspective; the history, meanings, trends, possibilities, and limits of mathematics teaching in early childhood education; the study of phenomena related to mathematics teaching and learning and the analysis of the variables involved in this process—student, teacher, and mathematical knowledge, and the relationships between them; difficulties in learning language, reading, writing, and mathematics; the study of cultural aspects, languages, and practices in the process of teaching and learning mathematics in early childhood education and elementary school; difficulties in systematizing mathematical knowledge; the challenges and difficulties in the process of teaching and learning mathematics in early childhood education and the early years of elementary school; analysis of mathematics teaching practices in early childhood education and the early years of elementary school; and critical analysis of the objectives, content, methodologies, teaching resources, and assessment in mathematics.

Although early childhood education and the initial years of elementary education were more prominent in the syllabuses, we noticed that youth and adult education was mentioned only once, which seems to us to be a recognition of the work of pedagogy teachers within the scope of mathematics education for this audience. We also emphasize that teaching mathematics as an instrument of emancipation may be related to the connections we discussed above, in particular to CME.

Regarding teaching and learning, we point out the methodological trends that we find in the syllabi based on theorizations of mathematics education or present in public policy actions such as Brasil (1997) and Brasil (2018) in mathematics teaching: problem solving, ethnomathematics, mathematical modeling, active methodologies, history of mathematics, games, plays, and quizzes. In particular, ethnomathematics highlights the existence of alternative ways of viewing mathematics, such as the mathematics practiced in different cultures. Just as everyday life is sometimes unrelated to mathematics, without work involving

ethnomathematics, it may be difficult for a pedagogue to legitimize other forms of mathematics in their professional practice.

The relationship between mathematics and curriculum was addressed in three themes: one as a way to extrapolate public policy actions through the topic "alternative approaches to proposed mathematics curricula," and two others related to them: mathematics and the understanding of social issues, from a curriculum perspective of transversality and contextualization; mathematical knowledge and fields of experience. In them, we see the influence of BNCC (Brasil, 2018), with the term field of experience being used to approach early childhood education and transversality and contextualization in the complementary document to BNCC (Brasil, 2018), which is the document "Temas Contemporâneos Transversais" [Contemporary Cross-Cutting Themes] in the BNCC (Brasil, 2019b) or Brasil (1997).

One syllabus explored the relationship between mathematics and literature, a topic that has been addressed in research on mathematics education, as seen in works by Souza and Oliveira (2010) and Carneiro and Souza (2015). We do not approach literature in conjunction with methodological trends in mathematics teaching, nor as a didactic resource, so as not to underestimate its role as a means of teaching mathematics, but to recognize its value in conjunction with mathematics education.

Mathematics was also linked, in the syllabi, to the contents of school mathematics established by the BNCC (Brasil, 2018), in the form of thematic units such as statistics and probability, or by the PCN (Brasil, 1997), in the form of content blocks: numbers and operations, space and shape, magnitudes and measurements, and information processing. Subjects presented in these thematic units or content blocks were also mentioned as tables, graphs, mathematical notation, numerical patterns, functional relationships, and definitions. Other school mathematics content appeared in the syllabuses, but our focus here was on the relationship with the word 'mathematics'.

Final Considerations

In this article, our objective was to examine the use of the word ‘mathematics’ in pedagogy PPCs, addressing the existence or potential of mathematics in them. To this end, we describe the process followed in our data collection research and our theoretical framework, which was inspired by Wittgenstein (2009) and primarily utilized the notion of plausible reading, derived from the model of semantic fields (Lins, 1999, 2012). From this process, we identified three uses: mathematics in the PPCs in general, mathematics in the titles of subjects that involve mathematics, and mathematics found in their syllabi. We recognize that other identifications may occur, based on alternative theoretical frameworks and research experiences in mathematics education.

In the broad sense of mathematics, i.e., without being limited to subject titles or syllabi, it was referenced through citations from Brasil (2006), which regulates pedagogy courses and explicitly mentions mathematics. We did not find any other types of articulation of the PPC texts other than this.

As for the titles of the subjects, the use of mathematics has always been linked to other words or terms, which have led us to characterize them as mathematics, mathematics teaching, mathematics education, Mathematics alphabetization/literacy, basic mathematics (or instrumental or leveling), and mathematical language. From them, we point out that several problematizations can occur, given their synthetic nature, enabling different ways of producing meanings. We address some issues, for example, the difference between content and methodologies in mathematics and content and methodologies in mathematics teaching, which highlights the need for analyses that relate the titles to the course syllabuses.

Regarding syllabi, we have made some observations, such as a lack of standardization and the varying levels of detail and breadth, which can compromise the execution of subjects and, consequently, the training of pedagogy teachers. More specifically, we examined the uses of the word ‘mathematics’ in them, and found several applications that included mathematics associated with school mathematics content, methodological trends in mathematics teaching, teaching and learning issues, concepts or conceptions of mathematics, adjectives in mathematics, curriculum discussions, and everyday life, for example. Among these uses, we highlight the focus on school mathematics and little openness to other mathematics, which can

happen through, for example, the ethnomathematics approach, which would contribute to expanding knowledge about mathematics and creating strategies to listen to and deal with the production of meanings of students in basic education, as we have defended, based on our theoretical framework (Lins, 1999, 2012).

In both the titles and the syllabi, we see the presence of mathematical education, whether through the use of this term or terms such as mathematical alphabetization, which seems to indicate its greater presence and the legitimacy of the investigations produced in the curriculum formulation of pedagogy courses. Even if this happens and we have pointed out the importance of school mathematics and other mathematics in the courses, the problem of the low workload for subjects that involve mathematics and the small number of these subjects will only have another direction based on the decision of the focus of the pedagogy courses that are not intended only for teaching in basic education, in particular for teaching mathematics [education].

Although PPCs may have limitations, as they are prescribed documents that do not allow for interaction with their creators, it was possible to explore and examine the uses of mathematics in them, which reveals institutional visions in the elaboration of these documents. What opens up in terms of research possibilities after our analyses is the practice of teacher educators, in general, and pedagogy teacher educators, in particular, in terms of participation in writing PPCs and their effective practices in classrooms.

References

Bogdan, R. C., & Biklen, S. K. (2006). *Investigação Qualitativa em Educação.* Porto Editora.

Brasil. (1997). *Parâmetros Curriculares Nacionais: matemática (1ª a 4ª séries).* Ministério da Educação.

Brasil. (2006). *Resolução CNE/CP nº 1, de 15 de maio de 2006.* Institui Diretrizes Curriculares Nacionais para o Curso de Graduação em Pedagogia, licenciatura. Conselho Nacional da Educação. http://portal.mec.gov.br/cne/arquivos/pdf/rcp01_06.pdf.

Brasil. (2014). *Pacto nacional pela alfabetização na idade certa: quantificação, registro e agrupamentos.* Ministério da Educação.

Brasil.(2015). *Resolução nº 2, de 1º de julho de 2015.* http://portal.mec.gov.br/docman/agosto-2017-pdf/70431-res-cne-cp-002-03072015-pdf/file.

Brasil. (2018). *Base Nacional Comum Curricular.* Ministério da Educação.

Brasil. (2019a). *Resolução CNE/CP no 2, de 20 de dezembro de 2019.* CNE/MEC. http://portal.mec.gov.br/docman/dezembro-2019-pdf/135951-rcp002-19/file.

Brasil. (2019b). Temas Contemporâneos Transversais na BNCC. MEC. https://www.gov.br/mec/pt-br/assuntos/eb/guia_pratico_temas_contemporaneos.pdf

Brasil. (2024) *Resolução CNE nº 4, de 29 de maio de 2024*. Dispõe sobre as Diretrizes Curriculares Nacionais para a Formação Inicial em Nível Superior de Profissionais do Magistério da Educação Escolar Básica (cursos de licenciatura, cursos de formação pedagógica para graduados não licenciados e cursos de segunda licenciatura).CNE/MEC. http://portal.mec.gov.br/index.php?option=com_docman&view=download&alias=258171-rcp004-24&category_slug=junho-2024&Itemid=30192.

Cammarota, G., & Clareto, S. M. (2012). A cognição em questão: invenção, aprendizagem e Educação Matemática. *Práxis Educativa*, *7* (2), 585–602. https://doi.org/10.5212/PraxEduc.v.7i2.0013.

Carneiro, R. F., & de Souza, A. P. G. (2015). Um ensaio teórico sobre literatura infantil e matemática: práticas de sala de aula. *Educação Matemática Pesquisa: Revista Do Programa De Estudos Pós-Graduados Em Educação Matemática*, *17* (2), 392–418. https://revistas.pucsp.br/index.php/emp/article/view/17171

Cavalheiro, R. B., Alencar, E. S., & Cassimiro, S. R. S. (2022). Análise das disciplinas para o ensino da matemática nos cursos de Pedagogia nas instituições públicas de Mato Grosso do Sul. *Revista BOEM*, *10* (19), 63–80. https://doi.org/10.5965/2357724X10192022063.

Curi, E. (2005). *A matemática e os professores dos anos iniciais*. Musa Editora.

Curi, E. (2020). A formação do professor para ensinar Matemática nos anos iniciais do Ensino Fundamental: algumas reflexões. *Revista de Ensino de Ciências e Matemática*, 11 (7), 1-18. https://doi.org/10.26843/10.26843/rencima.v11i7.2787.

Gatti, B. A., & Nunes, M. M. R. (orgs). (2009). *Formação de professores para o ensino fundamental: estudo de currículos das licenciaturas em pedagogia, língua portuguesa, matemática e ciências biológicas*. FCC (Fundação Carlos Chagas)/DPE (Departamento de Pesquisas Educacionais).

Houaiss, A.,Villar, M. S., & Franco, F. M. M. (2009). *Dicionário Houaiss da língua Portuguesa.* Objetiva.

Julio, R. S., & Silva, G. H. G. (2018). Compreendendo a Formação Matemática de Futuros Pedagogos por meio de Narrativas. *Bolema: Boletim de Educação Matemática*, 32(62), 1012–1029. https://doi.org/10.1590/1980-4415v32n62a13.

Julio, R. S., Mariano, A. L. S., & Silva, S. I. S. (2022). Pensando numa Lógica Outra a Educação Matemática nos Cursos de Pedagogia. *Perspectivas da Educação Matemática*, *15* (39), 1-21. http://periodicos.ufms.br/index.php/pedmat/article/view/15977.

Julio, R. S. (2023). Permanências, mudanças e possibilidades na formação relacionada à(s) matemática(s) em cursos de Pedagogia. In Manrique, A. L. & Groenwald, C. L. O., *Anais do IX Congresso Iberoamericano de Educação Matemática.* (p. 1303-1312). Editora Akademy. https://www.akademyeditora.com.br/assets/ebooks/akademy-ebook-anaisixcibempucsp2022.pdf.

Julio, R. S., Oliveira, V. N. ., Silva, G. H. G. da ., & Nogueira, D. A. (2025). Mapeamento e análise da presença da [Educação] Matemática nos Cursos de Pedagogia de Minas

Gerais. *Brazilian Electronic Journal Of Mathematics*, 6(Especial), 1-21. https://doi.org/10.14393/BEJOM-v6-2025-74304

Lins, R. C., & Gimenez. J. (1997). *Perspectivas em Aritmética e Álgebra para o século XXI*. Papirus, 1997.

Lins, R. C. (1999). Por que discutir teoria do conhecimento é relevante para a Educação Matemática. In Bicudo, M. A. V. (org.). *Perspectivas em educação matemática: concepções e perspectivas* (pp. 75-94). Editora da Unesp.

Lins, R. C. (2004). Monstros, Matemática e Significados. In Bicudo, M. A. V., & Borba, M. C. (orgs.). *Educação Matemática: pesquisa em movimento.* (pp. 92-120). Cortez.

Lins, R. C. (2012). O modelo dos campos semânticos: estabelecimento e notas de teorizações. In Angelo, C. L., Barbosa, E. P., Viola dos Santos, J. R., Dantas, S. C., & Oliveira, V. C. A. (Org.). *Modelo dos Campos Semânticos e Educação Matemática: 20 anos de história* (pp. 11-30). Midiograf.

Lopes, A. R. L. V., Passos, C. L. B., Alencar, E. S., & Fanizzi, S. (2022). Formação Inicial de Professores que Ensinam Matemática com Foco na Licenciatura em Pedagogia Ead. *Revista Docentes*, *7* (17), 1-94. https://periodicos.seduc.ce.gov.br/revistadocentes/article/view/594.

Moraes, J. C. P. (2021). Lins, você por aqui?! O monstro da matemática encontra a Pedagogia. *Ensino Da Matemática Em Debate*, *8* (2), 58–72. https://doi.org/10.23925/2358-4122.2021v8i2p58-72.

Oliveira, S. A. de, Carvalho, E. P. das N., Ribeiro, M. S. S., & Reis, S. M. A. de O.. (2022). Encontros e Desencontros com a Matemática no Percurso Formativo de Estudantes do Curso de Pedagogia. *Educação Matemática Pesquisa Revista Do Programa De Estudos Pós-Graduados Em Educação Matemática*, *24*(3), 430–463. https://doi.org/10.23925/1983-3156.2022v24i3p430-463

Oliveira, V. N., & Julio, R. S. (2023). Sobre a implantação da BNC-Formação em cursos de Pedagogia de Minas Gerais: o caso de disciplinas que envolvem Matemática. *Anais do VI Congresso Nacional de Formação de Professores e XVI Congresso Estadual Paulista sobre Formação de Educadores*. Águas de Lindóia: Congresso Nacional de Formação de Professores e Congresso Estadual Paulista sobre Formação de Educadores. https://eventos.reitoria.unesp.br/anais/vicnfp-xvicepfe/736418-sobre-a-implantacao-da-bnc-formacao-em-cursos-de-pedagogia-de-minas-gerais--o-caso-de-disciplinas-que-envolvem-ma.

Paulo, J. P. A., & Julio, R. S. (2022). Contribuições do Modelo dos Campos Semânticos para a formação inicial de pedagogas e pedagogos. *Educação Matemática Pesquisa: Revista Do Programa De Estudos Pós-Graduados Em Educação Matemática, 24* (2), 083–107. https://doi.org/10.23925/1983-3156.2022v24i2p083-107.

Pires, C. M. C. (2013). Currículo, avaliação e aprendizagem matemática na educação básica. In INEP (org.), *Avaliações da Educação Básica em debate: Ensino e matrizes de referências das avaliações em larga escala.* (p. 31-54). INEP.

Silva, S. I. S. (2023) *Matemática em cursos de Pedagogia de instituições públicas de Minas Gerais*. [Dissertação de Mestrado em Educação, Universidade Federal de Alfenas]. https://bdtd.unifal-mg.edu.br:8443/handle/tede/2222.

Skovsmose, O. Cenários para investigação (2000). *Bolema, 13* (14), 66-91. http://www.periodicos.rc.biblioteca.unesp.br/index.php/bolema/article/view/10635/7022.

Souza, A. P. G., & Oliveira, R. M. M. A. (2010). Articulação entre Literatura Infantil e Matemática: intervenções docentes. *Bolema*, *23* (37), 955-975. https://www.periodicos.rc.biblioteca.unesp.br/index.php/bolema/article/view/4301

Stein, L., Melo, M. V., & Richit, A. (2023). Alfabetização Matemática na Perspectiva do Letramento: Análise sobre a Produção Brasileira centrada nos Anos Iniciais. *Roteiro, 48*, e32863. https://doi.org/10.18593/r.v48.32863.

Vilela, D. S. (2013). *Usos e jogos de linguagem na matemática*: diálogo entre filosofia e educação matemática. São Paulo: Livraria da Física.

Viola dos Santos, J. R., & Lins, R. C. (2016). Movimentos de Teorizações em Educação Matemática. *Bolema: Boletim De Educação Matemática, 30* (55), 325–367. https://doi.org/10.1590/1980-4415v30n55a02.

Zanetti, M., & Julio, R. S. (2020). Expectativas quanto às Disciplinas de Matemática no Curso de Pedagogia: a importância de ouvir os alunos. *Ciência & Educação (bauru)*, *26*, e20053. https://doi.org/10.1590/1516-731320200053.

Wittgenstein, L. (2009). *Investigações filosóficas*. Trad. M. G. Montagnoli; Rev. e Apres. E. C. Leão. 6ª ed.Editora Vozes.