

**Multigrade Rural Education in São Caetano-Pernambuco: a study of the Mathematics curriculum framework for early years**

**Educación Multigrado en el Campo de São Caetano-Pernambuco: un estudio del organizador curricular de Matemáticas de los primeros años**

**Éducation multi-séries à Campo de São Caetano-Pernambuco : une étude de l'organisateur du programme de mathématiques dans les premières années**

**Educação Multisseriada do Campo de São Caetano-PE: um estudo do organizador curricular de Matemática dos anos iniciais**

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**Abstract**

This article is part of a dissertation, in multipaper format, developed within the scope of the Graduate Program in Science and Mathematics Education at the Federal University of Pernambuco (UFPE), Academic Center of Agreste. Our objective was to analyze the Mathematics curriculum organizer in the reference curriculum for the teaching of this subject in the early years, within the context of Countryside Multigrade Education in the municipal education network of São Caetano-PE. To achieve this objective, we adopted a qualitative and documentary approach in the methodology and analyzed data collected from the Curriculum of Pernambuco and other sources. Among the results obtained in this investigation, we found that the Mathematics curriculum organizer in the reference curriculum is generic and limited when

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it comes to the inclusion of mathematical knowledge, without considering specific school context or other cultures.

**Keywords:** Mathematics Education, Countryside Multigrade Education, Curriculum Organizer, Ethnomathematics, Municipal education network of São Caetano- Pernambuco.

### **Resumen**

Este artículo es parte de una disertación, en formato multipaper, desarrollada en el ámbito del Programa de Posgrado en Educación en Ciencias y Matemáticas de la Universidad Federal de Pernambuco (UFPE), Centro Académico de Agreste. Nuestro objetivo fue analizar el organizador curricular de Matemática del currículo de referencia para la enseñanza de esta disciplina en los primeros años, en el contexto de la Educación Multiserial del Campo de la red municipal de São Caetano-PE. Para alcanzar ese objetivo, adoptamos un enfoque cualitativo en la metodología de carácter documental y analizamos datos recogidos en el Currículo de Pernambuco y en otras fuentes. Entre los resultados obtenidos en esta investigación encontramos que el organizador del currículo de Matemáticas del currículo de referencia es genérico y limitado en cuanto a la inclusión de saberes matemáticos, no incluyendo saberes del contexto escolar específico o de otras culturas.

**Palabras clave:** Educación Matemática, Educación Multigrado en el Campo, Organizador curricular, Red municipal de São Caetano- Pernambuco.

### **Résumé**

Cet article fait partie d'une thèse, en format multipaper, développée dans le cadre du Programme d'études supérieures en enseignement des sciences et des mathématiques à l'Université fédérale de Pernambuco (UFPE), Centre académique d'Agreste. Notre objectif était d'analyser l'organisateur du programme de mathématiques du programme de référence pour l'enseignement de cette discipline dans les premières années, dans le cadre de l'éducation multi-séries du domaine du réseau municipal de São Caetano-PE. Pour atteindre cet objectif, nous avons adopté une approche qualitative dans la méthodologie de nature documentaire et analysé les données recueillies dans le Pernambuco Curriculum et dans d'autres sources. Parmi les résultats obtenus dans cette enquête, nous avons constaté que l'organisateur du programme de mathématiques du programme de référence est générique et limité en ce qui concerne l'inclusion des connaissances mathématiques, n'incluant pas les connaissances du contexte scolaire spécifique ou d'autres cultures.

**Mots-clés :** Enseignement des mathématiques, enseignement multi-séries sur le terrain, organisateur de programmes d'études, réseau municipal de São Caetano- Pernambuco.

### **Resumo**

O presente artigo faz parte de uma dissertação, no formato *multipaper*, desenvolvida no âmbito do Programa de Pós-Graduação em Educação em Ciências e Matemática da Universidade Federal de Pernambuco (UFPE), Centro Acadêmico do Agreste. Nosso objetivo foi analisar o organizador curricular de Matemática do currículo de referência para o ensino dessa disciplina nos anos iniciais, no contexto da Educação Multisseriada do Campo da rede municipal de São Caetano-PE. Para alcançarmos esse objetivo, adotamos na metodologia a abordagem qualitativa de caráter documental e analisamos dados coletados no Currículo de Pernambuco e em outras fontes. Dentre os resultados obtidos nessa investigação, constatamos que o organizador do currículo de Matemática do currículo de referência é genérico e limitado quando se trata da inclusão de saberes matemáticos, não constando saberes do contexto escolar específico nem de outras culturas.

**Palavras-chave:** Educação Matemática, Educação Multisseriada do Campo, Organizador curricular, Rede municipal de São Caetano-Pernambuco.

## **Multigrade Rural Education in São Caetano-PE: a study of the Mathematics curriculum framework for early years**

In general, public school education is a right for all Brazilian communities, and there is a cultural diversity among school communities in both rural and urban educational contexts. It is pertinent that, in the provision of Basic Education, investments are sufficient, and the curricula are appropriate. However, it is worth noting that currently we can observe in practice the situation of rural areas, which experience limitations both in terms of lack of investments and curriculum updates.

When it comes to the multigrade educational context in rural Brazil, some studies (Silva, 2019; Silva & Miranda, 2020) indicate that historically there are two paradigms of school education - Rural Education and Education of the Field. In the paradigm of Rural Education, the rural areas are seen as spaces with difficult living conditions, often compared to urban areas. The education provided is usually multigrade schooling, characterized by a lack of investments and a curriculum that is centered around urban perspectives, neglecting the specificities of rural areas and the knowledge of its people. On the other hand, there is the paradigm of Education of the Field, which considers the rural areas as spaces where people can live and emphasizes the importance of providing quality multigrade schooling in the field of public policies, with a curriculum that is not centered around urban perspectives.

Such understanding leads us to realize that in the perspective of Countryside Education, it is pertinent for multigrade schools in rural areas<sup>4</sup> to overcome the reference to an urban-centered curriculum. In line with this perspective, one of the theoretical concepts in the field of Mathematics Education that can contribute to overcoming limitations in the curriculum and teaching of the subject in multigrade schools in Brazilian rural municipalities is Ethnomathematics. Ethnomathematics is a trend that recognizes that mathematics is not limited to the scientific realm, but rather encompasses diverse mathematics (ethnomathematics) that are produced and experienced in various social contexts by different cultural groups. The Mathematics educator Ubiratan D'Ambrosio<sup>5</sup> is considered the principal researcher and founder of Ethnomathematics as a research program.

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<sup>4</sup> In rural areas, it is common to find schools that have one or more multigrade classes, where teachers are responsible for teaching subjects such as Mathematics, Portuguese Language, and others, to students who are at different learning levels and grade levels within the same class (Silva & Miranda, 2019, 2020; Silva, Miranda & Carvalho, 2022).

<sup>5</sup> Ubiratan D'Ambrósio (1932-2021). <https://www.unicamp.br/unicamp/noticias/2021/05/13/professor-ubiratan-dambrosio-uniu-matematica-educacao-e-busca-por-justica>.

In this sense, it may be important to include mathematical knowledge from the school culture (content) and sociocultural contexts in the Mathematics curriculum framework for teaching this subject in basic education schools in rural municipal networks that offer Multigrade Countryside Education. However, it is worth noting that there are still municipal education networks in Brazil that use a curriculum framework for Mathematics where the knowledge of rural communities is not included.

Therefore, focusing specifically on the multigrade educational context in the rural municipal network of São Caetano, in Pernambuco, this article presents the results of an investigation guided by the following research question: What is the current Mathematics curriculum framework in the reference curriculum for teaching Mathematics in the early years within the context of Multigrade Countryside Education in the municipal network of São Caetano-PE?

Our objective was to analyze the Mathematics curriculum framework in the reference curriculum for teaching this subject in the early years within the context of Multigrade Countryside Education in the municipal network of São Caetano. In general, we organized the information in this article into four sections. The first section presents the theoretical framework on "Mathematics Education and Countryside Education: school curriculum"; the second section discusses the methodological procedures; the third section presents the results and discussions; and finally, the fourth section provides the concluding remarks of the research.

### **Mathematics Education and Countryside Education: school curriculum**

The educational process is a way of constructing knowledge in our society that can occur both within the school context and in the everyday lives of different communities. According to Roseli Caldart:

The countryside comprises different subjects. They are small farmers, quilombolas, indigenous peoples, fishermen, peasants, settlers, resettled individuals, riverside dwellers, forest communities, caipiras, agricultural workers, landless people, sharecroppers, rural wage laborers, and other groups. Among them, some are connected to popular forms of organization, others are not; there are also differences in terms of gender, ethnicity, religion, and generation; these are different ways of producing and living; different ways of perceiving the world, understanding reality, and solving problems; different ways of resisting in the countryside; different struggles" (Caldart, 2004, pp. 153).

Given this diversity of subjects, who possess different cultures, knowledge, and practices in the countryside, it is important for rural basic education schools to offer not only formal school knowledge but also consider sociocultural knowledge. This involves achieving a

harmonious integration between the two rather than hierarchical ranking that prioritizes school knowledge over sociocultural knowledge. According to Arroyo (2011, p. 78), “the school and school knowledge are the rights of men and women in rural areas, but this school knowledge must be in harmony with the knowledge, values, culture, and education that take place outside the school”

In addition, the author emphasizes that “[...] the curricula of rural basic schools should not reproduce the set of useless knowledge that we are now removing from urban schools themselves” (Arroyo, 2011, p. 82). According to this theorist, the mentioned knowledge refers to the content of school subjects that do not contribute to the life context of rural communities.

When we delve into the field of Mathematics Education, we can observe that there is a diversity of trends that can contribute to different perspectives on curriculum and teaching of Mathematics in Multigrade Countryside Education. Ethnomathematics can be of great significance when it comes to considering and incorporating mathematical knowledge from the school culture and sociocultural contexts of rural communities into the curriculum and teaching of the subject in the multigrade countryside context.

From the etymology and ideas of Ethnomathematics, according to Ubiratan D'Ambrosio, each rural community has its own “[...] ways, styles, arts, techniques (tica) of explaining, learning, understanding, and dealing with (mathema) the natural, social, cultural, and imaginary environment (ethno)” (D'Ambrosio, 2001, p. 2). In other words, each rural community has its own ethnomathematics (various ways of mathematizing in the countryside). Therefore, it is pertinent that multigrade countryside schools and the curricula used for teaching the subject consider and include both the mathematical knowledge from the school culture and the sociocultural mathematical knowledge.

The actors of multigrade countryside school communities can take as a reference for constructing their mathematical curricula, through the lens of Ethnomathematics and Countryside Education, the results regarding the school curriculum based on an ethnomathematical perspective. According to the literature studied by Hilbert Blanco-Álvarez, Alicia Fernández-Oliveras, and Maria Luiza Oliveras, there are seven characteristics of this movement, which are:

- Recognizing mathematics as a human, social, and cultural construction (Bishop, 1995; Gerdes, 1996; among others);
- Acknowledging that in addition to Western mathematical thinking, whose emergence in Greece is historically recognized, there is a great diversity of mathematical thinking in the world and other rationalities (BISHOP, 1995; SHIRLEY, 2001; among others) or multimathematics (Oliveras, 1999);

- Include mathematical knowledge by incorporating extracurricular mathematics into the classroom and students' prior knowledge (Blanco-Álvarez, 2011; Domite, 2012; among others);
- Recognize the existence of transcultural mathematical practices, such as counting, measuring, designing, locating, playing, and explaining (BISHOP, 1995);
- Incorporate activities based on the cultural experiences of students and the community from diverse cultures (Gavarrete, 2013; Moreira, 2004; among others);
- Promote respect, tolerance, and equity through the study and reflection on the ethnomathematics of different cultures;
- Recognize students as recreators and reconstructors of cultural knowledge (Bishop, 1995). (Blanco-Álvarez, Fernández-Oliveras & Oliveras, 2017, pp. 569, translation ours).

In this regard, taking the school curriculum from the perspective of Etnomatemática as a reference and considering that the right to Countryside Education applies to different rural communities (Brazil, 2008), we can consider the perspective of Ubiratan D'Ambrosio, who discusses different mathematical knowledge and practices based on the life realities of rural communities, whether in forests, rivers, or other related contexts. Additionally, it is necessary to affirm that rural schools have their own identity, therefore it is of utmost importance that each multigrade school belonging to a specific community in this region includes considerations of the local socio-cultural context in its school curriculum.

In this regard, considering a school curriculum from the perspective of Etnomatemática and Countryside Education, focusing on the life reality of peasants and the production of their mathematical knowledge in the rural context, Cruz and Szymanski (2011, p. 6) aptly emphasize that "peasants have their own culture and way of life, which is permeated with mathematical knowledge that can, and considering ethnomathematics, should be considered an integral part of the school curriculum." This conception leads us to realize that each rural community has diverse cultures according to their life realities, as well as different mathematical knowledge, which should also be considered as an part of the school curriculum.

Therefore, having a curriculum in countryside multigrade schools developed and provided solely by municipal education departments, without the participation of community members, disregards the different ways of mathematizing in the rural context. Undoubtedly, the construction of the Mathematics curriculum with the participation of the school communities that work in multigrade schools is a positive alternative for the inclusion of not only sociocultural mathematical knowledge but also scientific knowledge of the discipline.

Rebouças (2020), on the other hand, emphasizes that:

School education should contribute to human emancipation, consequently promoting social, economic, and cultural development [...] within the context of the school. I

advocate for the incorporation of the ethnomathematics curriculum perspective in countryside education as a research program that values rural knowledge (Rebouças, 2020, Introduction section).

Corroborating the position of the previously mentioned author, Figueirêdo, Andrade, and Pereira (2018, p. 48) emphasize that:

Considering all the achievements that rural individuals have been acquiring and the possibility of having a curriculum focused on countryside education, we must take into consideration the possibility of linking a Mathematics teaching proposal focused on ethnomathematics. This requires a change of perspective and the integration of new relationships, learning from differences and acknowledging each student's uniqueness and multitude of knowledge. It involves developing pedagogical practices that encompass the various ways of mathematizing the world within the school curriculum.

Amidst the aforementioned discussions, when we look at the practice of providing Multigrade Countryside Education in the educational network of Brazilian municipalities, there are multigrade schools that lack a curriculum that encompasses the specificities of their context, as well as the students' prior knowledge and other essential characteristics of a curriculum in the perspective of Ethnomathematics and Countryside Education. Thus, according to Silva (2016, p. 69):

The environmental reality that prevails in the school system is one that is much more concerned with fulfilling a fragmented curriculum disconnected from the context. And the further away from urban centers a school is, the more distorted the process of dialogue between knowledge becomes. The reality of countryside schools represents good examples of a school system that does not meet the aspirations of rural communities, as the curriculum suffers from the "disturbance of universal standardization" (Silva, 2016, p. 69).

In the same line as the researcher mentioned earlier, Câmara (2017, p. 22) states that:

[...] students in Countryside Schools face a unique curriculum and school calendar that do not respect the cultural diversity of the group and the social aspects inherent to rural life, such as planting and harvesting seasons. There is a certain discrepancy between what is proposed by official documents and public policies and what is actually implemented in practical terms, both by the school agents (administration and teachers) and by the government.

This discussion leads us to realize that the limitations in not developing the mathematics curriculum by multigrade school communities in the rural municipal education system, considering the perspective of Ethnomathematics and Countryside Education, are not due to a lack of theoretical discussions or official curriculum documents and public policies. Instead, they are a result of municipal education networks that do not create their own reference



curricula or provide support for their school communities to develop them, often due to a lack of unity and consensus among all actors in the educational system present there.

### **Methodological Procedures**

The methodology adopted in this article follows a qualitative and documentary approach, based on the study by Silva and Santos (2019). Regarding qualitative research and documentary research, the authors emphasize that "according to Moretti (2018), qualitative research provides results through perceptions and analyses. Documentary research, on the other hand, examines the research problem through documentary analysis" (Silva & Santos, 2019, p. 7).

Like the authors, we also consider the qualitative research perspective in our study, following Moretti's (2018) approach. However, regarding documentary research, our focus was on analyzing how the curriculum organizer for mathematics is presented in the reference curriculum for mathematics education in the early years, within the context of Multigrade Countryside Education in the municipal network of São Caetano-PE. This was our research objective.

To achieve this objective, we analyzed data collected from the source of the Pernambuco Curriculum, accessed online through the State Department of Education and Sports, as well as data related to the first author's knowledge of this curriculum and the multigrade educational context in the countryside municipal network of São Caetano.

Furthermore, it is worth noting that during the overall analysis of the Pernambuco Curriculum, we observed that it was mainly constructed based on official curriculum documents such as the General National Guidelines for Basic Education (Resolution CNE/CEB No. 4/2010), the Pernambuco Curriculum Parameters (2012), and the National Common Curricular Base (2017). In the theoretical framework of this article, we pointed out that the lack of development of the mathematics curriculum in multigrade school communities in the countryside municipal education network may not be due to a lack of official curriculum documents. This prompted us to expand our investigation to determine whether these documents provide curriculum guidelines that the multigrade school communities in São Caetano's countryside education network can follow in order to develop a mathematics curriculum from the perspective of Ethnomathematics and Countryside Education.

Therefore, we also collected data from these curriculum documents through online access from sources such as the Department of Education and Sports of Pernambuco, the Basic

Education Council, the Ministry of Education, and the National Council of Education (CNE). This analysis is presented in the following section.

## **Results and Discussions**

In this section, we present the results and discussions regarding our investigative journey, which focused on the municipal education network of São Caetano-PE. In this vein, the present study divides our overall analysis into four parts: the first discusses the curriculum organizer for mathematics in the reference curriculum for the teaching of mathematics in the early years, in the context of Countryside Education in the selected municipal network; the second pertains to the General National Curriculum Guidelines for Basic Education (Resolution CNE/CEB No. 4/2010); the third deals with the Curriculum Parameters of Pernambuco (2012); and finally, the fourth covers the National Common Curriculum Framework (2017).

### **Curriculum organizer for Mathematics in the reference curriculum for the teaching of Mathematics in the early years, within the context of Countryside Education in the municipal network of São Caetano-PE.**

In the provision of Countryside Multigrade Education in the municipal network of São Caetano, as mentioned in the studies by Silva (2019), Silva and Miranda (2020), and Silva, Miranda and Carvalho (2022), there are multigrade schools that encompass Early Childhood Education and the early years of Elementary Education (Elementary School I). Furthermore, it is worth noting that each multigrade school in the countryside network is located in different sites (communities) that have specific characteristics (social, political, cultural, and economic context).

Regarding the relationship of the first author of this article with the multigrade educational context of the municipality, as a former student and a researcher in a field study conducted in 2018 (Silva, 2019; Silva & Miranda, 2020; Silva, Miranda & Carvalho, 2022), and due to knowledge of teachers who teach in the aforementioned educational stages within this context, it is known that teachers in this educational context use the Curriculum of Pernambuco as a reference for their lesson planning in various subjects (curricular components such as mathematics, history, Portuguese, etc.) and fields of experience in multigrade schools, according to the stages of basic education in which they teach.

In general, it can be observed that teachers in the multigrade educational context refer to this generalized curriculum<sup>6</sup> since it is currently the only curriculum that the Department of

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<sup>6</sup> During the analysis of the Curriculum of Pernambuco, we referred to the curriculum perspective as "generalized curriculum" because it is currently used as a reference in both rural and urban schools in the municipality of São

Education of São Caetano uses as a reference, both in multigrade rural schools and in mixed rural schools and schools within the city. Regarding the development process of this curriculum, specifically in the presentation section of the Curriculum of Pernambuco for Elementary Education, Amâncio and Silva (2019, p. 11) argue that:

[...] The curriculum construction dates back to 2011 when we began the debate on curriculum parameters in the state. Pernambuco was one of the pioneers in Brazil to develop a document that would assist schools in structuring their curricula and pedagogical projects. From 2015, we actively participated in the discussions on the preliminary versions of the National Common Core Curriculum (BNCC), which was approved in 2017 for Elementary Education and Early Childhood Education. The year 2018 was filled with challenges, including the revision of the Elementary Education curriculum and the development of a curriculum for Early Childhood Education.

Furthermore, regarding the development of the Curriculum of Pernambuco, the state coordinators emphasize:

The Curriculum of Pernambuco was developed with broad participation from administrators, coordinators, teachers, and other education professionals from the state network, municipal networks, private schools, municipal authorities, public and private universities, through in-person seminars and online public consultation. It is based on the knowledge defined by the National Common Core Curriculum for Early Childhood Education and Elementary Education, the Curricular Parameters of the State of Pernambuco, and legal documents that guide national education. It is worth noting that this is the first time that Pernambuco has built a curriculum for Early Childhood Education, marking a milestone for educational policies focused on this stage of basic education, ensuring the rights of learning and development for all children in early childhood education. The Curriculum of Pernambuco should be the reference document for the development of municipal curricula, pedagogical proposals, and the pedagogical political project of all schools in the education networks of Pernambuco (Selva & Diógenes, 2019, pp. 13-14).

Through the analysis of this curriculum, it was not possible to identify whether the Municipal Education Department of São Caetano, teachers, and other stakeholders of countryside multigrade education in the municipality were involved in its development and construction. However, it was observed that regarding the official curricular documents that served as a reference for the construction of this curriculum, in the introduction, specifically in the Curriculum of Pernambuco for Elementary Education, it states that:

For this construction, national and local normative documents were used as references, especially the General National Curriculum Guidelines for Basic Education

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Caetano-PE. We did not find any information indicating that it is an urban-centric curriculum designed specifically for urban educational contexts (Silva, 2016; Destefani, 2019)..

(Resolution CNE/CEB No. 4/2010), the Curricular Parameters of Pernambuco (2012), and the National Common Core Curriculum (2017) (Pernambuco, 2019, pp. 18-19).

Analyzing the aforementioned curriculum, regarding mathematics, we found that the curriculum organizer for the early years (1st, 2nd, 3rd, 4th, and 5th grades) of this generalized curriculum is structured into thematic units for each school year according to the BNCC (Brasil, 2017): Numbers, Algebra, Geometry, Measurement, Probability and Statistics; Objects of Knowledge and PE Skills. Next, we will present an example of the curriculum organizer excerpt for the 1st grade, including the thematic unit of Numbers, and the corresponding Objects of Knowledge and PE Skill.

Table 1.

*Mathematics curriculum organizer board (Pernambuco, 2019, p. 387-388)*

Matemática		
ORGANIZADOR CURRICULAR		
1º ANO		
UNIDADES TEMÁTICAS	OBJETOS DE CONHECIMENTO	HABILIDADES PE
NÚMEROS	Contagem de rotina	(EF01MA01PE) Utilizar números naturais como indicador de quantidade ou de ordem (valor monetário, número de estudantes em sala de aula, etc.) em diferentes situações cotidianas e reconhecer situações em que os números não indicam contagem nem ordem, mas sim código de identificação (número de telefone, casa, placa de carro, etc.).
	Contagem ascendente e descendente	
	Reconhecimento de números no contexto diário: indicação de quantidades, indicação de ordem ou indicação de código para a organização de informações	(EF01MA02PE) Contar de maneira exata ou aproximada, utilizando diferentes estratégias como o pareamento e outros agrupamentos.
	Quantificação de elementos de uma coleção: estimativas, contagem um a um, pareamento ou outros agrupamentos e comparação	(EF01MA03PE) Estimar e comparar quantidades de objetos de dois conjuntos (em torno de 20 elementos), por estimativa e/ou por correspondência (um a um, dois a dois) para indicar "tem mais", "tem menos" ou "tem a mesma quantidade".
	Leitura, escrita e comparação de números naturais (até 100)  Reta numérica	(EF01MA04PE) Contar a quantidade de objetos de coleções até 100 unidades e apresentar o resultado por registros verbais e simbólicos em situações de seu interesse como jogos, brincadeiras, materiais da sala de aula, entre outros.  (EF01MA05PE) Comparar números naturais de até duas ordens em situações cotidianas, com e sem suporte da reta numérica, como também de materiais manipuláveis diversos.

<p style="text-align: center;"><b>Construção de fatos básicos da adição</b></p>	<p><b>(EF01MA06PE)</b> Construir fatos básicos da adição (utilizando-se de diversas estratégias de cálculos: composição e decomposição por meio de adições; procedimentos de contagem, diversas formas de representação) e utilizá-los em procedimentos de cálculo para resolver problemas.</p>
<p style="text-align: center;"><b>Composição e decomposição de números naturais</b></p>	<p><b>(EF01MA07PE)</b> Compor e decompor número de até duas ordens por meio de diferentes adições (por exemplo: <math>10=2+8</math> ou <math>2+8=10</math>; <math>10=5+5</math> ou <math>5+5=10</math>, etc.), com o suporte de material manipulável, contribuindo para a compreensão de características do sistema de numeração decimal e o desenvolvimento de estratégias de cálculo.</p>
<p style="text-align: center;"><b>Problemas envolvendo diferentes significados da adição e da subtração (juntar, acrescentar, separar, retirar)</b></p>	<p><b>(EF01MA08PE)</b> Resolver e elaborar problemas de adição e de subtração, envolvendo números de até dois algarismos, com os significados de juntar, acrescentar, separar e retirar, com o suporte de imagens e/ou material manipulável, utilizando estratégias e formas de registro pessoais.</p>

In analyzing the information from this excerpt, as well as other information from this curriculum organizer, we found that there is a focus on valuing the teaching and learning of scientific and sociocultural mathematics. Although the objects of knowledge refer to content, concepts, and processes involved in different skills related to each thematic unit, there is no inclusion of mathematical knowledge (content) specific to the school context or from other cultures. However, the Municipal Education Department of São Caetano provides this same curriculum, as well as the content of the Mathematics subject, to teachers in multigrade education in rural areas for their lesson planning according to the grade levels they teach.

### **National General Curriculum Guidelines for Basic Education (Resolution CNE/CEB No. 4/2010)**

In Resolution CNE/CEB No. 4/2010, specifically in Article 2, it states that the objectives of the National General Curriculum Guidelines for Basic Education are:

I - Systematize the principles and general guidelines of Basic Education contained in the Constitution, the Law of Guidelines and Bases of National Education (LDB), and other legal provisions, translating them into guidance that contributes to ensuring a national common basic education, focusing on the individuals who bring the curriculum and school to life; II - Stimulate critical and proactive reflection that should support the formulation, implementation, and evaluation of the political-pedagogical project of Basic Education schools; III - Guide initial and continuing training courses for teachers and other professionals in Basic Education, the educational systems of different federative entities, and the schools that comprise them, regardless of the network to which they belong (Brasil, 2010, pp. 1).

In Article 9 of this official document, it states that a socially equitable school places student and learning at the center, which implies meeting nine requirements, two of which pertain to the curriculum, namely:

IV - Interrelation between curriculum organization, pedagogical work, and teacher's workload, aiming at student learning [...] VI - Compatibility between the curricular proposal and infrastructure, understood as a formative space equipped with effective availability of time for its utilization and accessibility [...] (Brasil, 2010, pp. 3).

Furthermore, in this document, specifically in Article 11, it addresses the curricular organization - concept, limits, and possibilities, pointing out that:

The Basic Education school is the space where inherited culture is reinterpreted and recreated, reconstructing cultural identities and learning to value the roots specific to different regions of the country. Sole paragraph. This conception of school requires overcoming the school ritual, from the construction of the curriculum to the criteria that guide the organization of school work in its multidimensionality, emphasizing exchanges, inclusiveness, and comfort to ensure the well-being of children, adolescents, young adults, and the relationship between all individuals (Brasil, 2010, pp. 4).

In the analysis, it was also observed that, in Article 13, there are points regarding curriculum organization and curriculum definition:

The curriculum, taking as reference the educational principles guaranteed in Article 4 of this Resolution, is configured as a set of values and practices that provide for the production and socialization of meanings in the social space and contribute significantly to the construction of sociocultural identities of the learners. § 1 The curriculum must disseminate the fundamental values of social interest, the rights and duties of citizens, respect for the common good and democratic order, considering the students' educational conditions in each institution, orientation for work, and the promotion of formal and non-formal educational practices. § 2 In the organization of the curriculum proposal, the understanding of curriculum as school experiences that unfold around knowledge must be ensured, permeated by social relations, articulating students' experiences and knowledge with historically accumulated knowledge and contributing to the construction of the learners' identities. § 3 The organization of the open and contextualized formative path must be built based on the peculiarities of the environment and the characteristics, interests, and needs of the students, including not only the compulsory core curriculum components provided for in legislation and educational norms but also other components in a flexible and variable manner, according to each school project, and ensuring: I - conception and organization of the curricular and physical space that intertwine and expand, including spaces, environments, and equipment that go beyond the school classrooms, encompassing spaces from other schools as well as socio-cultural and recreational sports spaces in the surroundings, the city, and even the region; II - expansion and diversification of curricular times and spaces that presuppose education professionals willing to invent and build the school of social quality, with shared responsibility with the other authorities responsible for the management of public power bodies, in the search for possible and necessary partnerships, considering that education is the responsibility of the family, the State, and society; III - choice of a disciplinary, multidisciplinary, interdisciplinary, or transdisciplinary didactic-pedagogical approach by the school, guiding the political-pedagogical project and resulting from an agreement established among school professionals, school councils, and the community, providing support

for the organization of the curricular framework, the definition of thematic axes, and the establishment of learning networks; IV - understanding the curricular framework as a propeller of curricular and educational movement and dynamism, so that different fields of knowledge can harmonize with the set of educational activities; V - organization of the curricular framework as an operational alternative that supports the management of the school curriculum and represents a resource for school management (in the organization of curricular time and space, distribution and control of teachers' work time), a step towards management focused on an interdisciplinary approach, organized by thematic axes, through interplay between different fields of knowledge [...] (Brasil, 2010, pp. 4-5).

We also find, in the aforementioned document, information regarding curricular knowledge in Elementary Education, specifically in Article 23, where it becomes clear that it starts from a perspective of content.

Article 23. Elementary Education, with a duration of 9 (nine) years and compulsory enrollment for children from 6 (six) years of age, has two sequential phases with their own characteristics, referred to as early years, with a duration of 5 (five) years, generally for students aged 6 (six) to 10 (ten) years old; and later years, with a duration of 4 (four) years, for those aged 11 (eleven) to 14 (fourteen) years. Sole paragraph. In Elementary Education, welcoming also means caring and educating, as a way to ensure the learning of curricular contents, so that the student develops interests and sensitivities that allow them to enjoy the cultural assets available in the community, in their city, or in society at large, and that also enable them to feel valued as producers of these assets (Brasil, 2010, pp. 8).

We also found data regarding countryside basic education, found in Article 35 of the aforementioned document, which addresses the curricular knowledge regarding the contents.

In the Countryside Basic Education modality, education for the rural population is provided with necessary adjustments to the specificities of rural life and each region, defining guidelines for three essential aspects of pedagogical action organization: I - curricular contents and methodologies appropriate to the real needs and interests of students in rural areas [...] (Brasil, 2010, pp. 11).

In this sense, it was possible to observe in this official document the presence of general guidelines that can be followed by the multigrade school communities in the countryside of the municipal network of São Caetano-PE, aiming at the construction of the curriculum from the perspective of Ethnomathematics and Rural Education.

### **Curricular Parameters of Pernambuco (2012)**

In the presentation of the Curricular Parameters of Pernambuco (2012), the former Secretary of Education of Pernambuco states that:

The curricular parameters establish the learning expectations of students, year by year, in all stages of Basic Education: early years and final years of Elementary School, High School, and Youth and Adult Education. This is a fundamental document for teacher planning and monitoring in schools. It is expected that this document will contribute to the strengthening of Basic Education in the state of Pernambuco, with a curriculum aligned with the changes arising from a society in constant transformation and increasingly technological (Gomes, 2012, pp. 13).

Looking specifically at the Curricular Parameters for Mathematics in Elementary and High School, we find that:

[...] it was chosen [...] to present the contents of Basic Education in three major stages of schooling: early years of Elementary School; final years of Elementary School; and High School. In the EJA modality, three stages were also used: Phases 1 and 2 - early years of Elementary School; Phases 3 and 4 - final years; Modules I, II, and III - High School (Pernambuco, 2012, pp. 14).

In the section regarding the status of Mathematics and its role in basic education, there is a mention that:

[...] building a curriculum involves making choices that promote in the individual the conditions for interpreting their reality and intervening in it. To do so, it is necessary to break away from a mathematics education marked by the conception that learning mathematical content leads, automatically, to the construction of competencies. (Pernambuco, 2012, pp. 21).

Furthermore, we observed in the analysis of this document from the state that it presents the learning expectations by year of schooling and by content block. Therefore, the multi-grade school communities in the rural areas of the municipal network of São Caetano-PE can consider it in the construction of the curriculum from the perspective of Ethnomathematics and Rural Education.

### **National Common Curricular Base (2017)**

In the official curriculum document concerning the National Common Curricular Base (Brasil, 2017), it states that it is a "[...] normative document [...]" (Brasil, 2017, p. 7) that determines the essential competencies, skills, and learning outcomes that all students must develop during each stage of basic education and each school year. It is also described as a "national reference for the formulation of curricula in the systems and school networks of the States, the Federal District, and the Municipalities" (Brasil, 2017, p. 8). Additionally, it is emphasized that "in Brazil, a country characterized by the autonomy of federated entities, pronounced cultural diversity, and deep social inequalities, the education systems and networks must build their curricula [...]" (Brasil, 2017, p. 15).



Additionally, regarding the National Common Curricular Base (Brasil, 2017) and the curriculum development by education networks and institutions in the country, in the introduction section, the former Minister of Education emphasizes that:

The National Common Curricular Base (BNCC) expresses the commitment of the Brazilian State to promote comprehensive education focused on welcoming, recognizing, and fully developing all students, with respect for differences and the fight against discrimination and prejudice. Therefore, for each education network and school institution, this will be a valuable document, both to adapt or develop their curricula and to reaffirm the commitment of everyone to reduce educational inequalities in Brazil and promote equity and quality in the learning of Brazilian students (Filho, 2017, pp. 5).

Regarding the curricular issue in Brazil, the mentioned official document states that Article 9 of the Law of Guidelines and Bases of National Education (LDB) (Brasil, 1996) provides that:

[...] it clarifies two decisive concepts for the entire development of the curricular issue in Brazil. The first, already anticipated by the Constitution, establishes the relationship between what is basic-common and what is diverse in terms of curriculum: competencies and guidelines are common, while curricula are diverse. The second refers to the focus of the curriculum. By stating that curricular contents are at the service of competency development, the LDB guides the definition of essential learning, not just the minimum contents to be taught. These are two foundational notions of the BNCC (Brasil, 2017, pp. 11).

In relation to curriculum development in the Brazilian territory, there is information that "over the past two decades, more than half of the states and many municipalities have been developing curricula for their respective education systems, including to meet the specificities of different modalities" (Brasil, 2017, p. 18). Additionally, it is also stated that both public and private schools have accumulated experiences in curriculum development, as well as the creation of materials that support the curriculum.

Moreover, in relation to the new national curriculum and curricula, specifically in the introduction of the BNCC (Brasil, 2017), the then Minister of Education emphasizes that:

The BNCC is a pluralistic and contemporary document that clearly establishes the set of essential and indispensable learning that all students, children, youth, and adults are entitled to. With it, public and private educational networks and institutions now have a mandatory national reference for the development or adjustment of their curricula and pedagogical proposals. This reference is the point they aim to achieve at each stage of Basic Education, while the curricula pave the way to get there (Filho, 2017, pp. 5).

Nonetheless, despite these documents having different purposes, the base reveals information that:

[...] Furthermore, despite these documents having different purposes, the base contains information that the BNCC and curricula have complementary roles in ensuring the essential learning defined for each stage of Basic Education, as such learning only materializes through the set of decisions that characterize the curriculum in action. It is these decisions that will adapt the propositions of the BNCC to the local reality, considering the autonomy of education systems or networks and educational institutions, as well as the context and characteristics of the students. These decisions, resulting from a process of involvement and participation of families and the community, involve, among other actions: • Contextualizing the content of the curriculum components, identifying strategies to present, represent, exemplify, connect, and make them meaningful based on the reality of the place and time in which the learning is situated. • Deciding on forms of interdisciplinary organization of curriculum components and strengthening the pedagogical competence of school teams to adopt more dynamic, interactive, and collaborative strategies in relation to the management of teaching and learning [...] (Brasil, 2017, pp. 16).

In this sense, among other actions,

These decisions also need to be considered in the organization of curricula and proposals suitable for different modalities of education (Special Education, Youth and Adult Education, Rural Education, Indigenous School Education, Quilombola School Education, Distance Education), following the guidelines of the National Curriculum Guidelines (Brasil, 2017, pp. 17).

Based on the analysis of this official curriculum document, it is noted that, although it acknowledges the cultural diversity in the Brazilian context, there is no information found regarding sociocultural knowledge in curriculum components. These aspects are only mentioned in relation to contextualizing the content. It is also noted that there are references to Countryside Education as a modality of education. It is worth noting that in the studies by Silva (2019), Silva and Miranda (2020), and Silva, Miranda, and Carvalho (2022) in the Brazilian literature, Countryside Education is discussed as the second paradigm of rural school education.

In this sense, it is understood that the right to Countryside Education includes different peoples, such as riverside dwellers, family farmers, and coastal communities, among others, who, according to their realities, live in different ways in rural areas. Regarding the stages of basic education in Countryside Education, it is stated in Resolution No. 2, dated April 28, 2008, Article 1, that:

Countryside Education encompasses Basic Education in its stages of Early Childhood Education, Elementary Education, Secondary Education, and Technical Vocational Education integrated with Secondary Education. It is intended to serve rural populations in their various forms of livelihood, including family farmers, extractivists, artisanal fishermen, riverside dwellers, settlers and campers from Agrarian Reform, quilombola communities, coastal communities, indigenous communities, and others (Brasil, 2008, pp. 1).

Currently, we can observe in the practice of countryside education in Brazil that there are multi-grade school communities within the municipal education networks, such as in the municipality of São Caetano-PE, which includes the stages of Early Childhood Education and Primary Education, as well as the modality of Youth and Adult Education (YAE). Thus, although the National Common Curricular Base (Brasil, 2017) mentions Countryside Education as a modality of education, we find general guidelines that the multi-grade school communities within the São Caetano-PE network can consider for the construction of the school curriculum from the perspective of Ethnomathematics and Countryside Education.

We also emphasize that the analyzed BNCC (Brasil, 2017) corresponds to the version approved on December 15, 2017. Currently, there is a final<sup>7</sup> version of this document, in which there have been few changes compared to the initial version, specifically regarding the representatives such as the Minister of Education, Executive Secretariat, and Basic Education Secretariat, as well as in the introductory section. There was also an addition related to the detailed information regarding Secondary Education. Therefore, since our research focus was specifically on the early years, the version approved in 2017 had already been defined, and we understand that it is not necessary to analyze the final version as well.

### **Final considerations**

In this article, our objective was to analyze the Mathematics curriculum organizer of the curriculum framework for teaching Mathematics in the early years within the context of Multigrade Countryside Education in the municipal network of São Caetano-PE. To achieve this, we expanded our investigation by analyzing the official curriculum documents: General National Curriculum Guidelines for Basic Education (Resolution No. 4/2010), Pernambuco Curriculum Parameters (2012), and the National Common Core Curriculum (2017).

In general, the analysis of these official documents aimed to determine if there are curriculum guidelines that multigrade countryside school communities in the municipality can follow in the construction of the school curriculum, from the perspective of Ethnomathematics and Countryside Education. Regarding the research objective, we sought to investigate the current state of the Mathematics curriculum organizer in the referenced curriculum for teaching this subject in the early years within the context of Multigrade Countryside Education in the municipal network.

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7 . National Common Curricular Base. Final version.  
[http://basenacionalcomum.mec.gov.br/images/BNCC\\_EI\\_EF\\_110518\\_versaofinal\\_site.pdf](http://basenacionalcomum.mec.gov.br/images/BNCC_EI_EF_110518_versaofinal_site.pdf).

Therefore, through this investigation, we have found that the analyzed documents provide general guidelines that can be followed by the multigrade countryside school communities in the network of São Caetano-PE for the construction of the school curriculum from the perspective of Ethnomathematics and Countryside Education. On the other hand, regarding the analysis of the Mathematics curriculum organizer currently used as a reference for teaching the subject in the early years within the context of Multigrade Countryside Education in the municipal network, we found that it is generic and limited in terms of the inclusion of mathematical knowledge. It does not include mathematical knowledge from the specific school context or from other cultures. Additionally, we did not identify the participation of any actor from the multigrade countryside educational system of this network in the construction of the Pernambuco Curriculum.

Furthermore, it is important to highlight that the municipal education network of São Caetano-PE has been using this curriculum organizer as a reference for teaching Mathematics in both rural and urban schools (multigrade and mixed) due mainly to the fact that it currently does not have its own education system and relies on the education system of the Regional Education Management of Agreste Centro Oeste (Caruaru-PE). These data demonstrate the urgency for the municipality to have its own education system, which would allow for the overcoming of the reliance on the Pernambuco Curriculum and enable the practice of curriculum construction by its multigrade countryside communities.

Moreover, we found during the research that when it comes to the inclusion of sociocultural mathematical knowledge in the construction of the curriculum for the subject, there are currently only theoretical discussions. Therefore, in order for there to be an actual implementation of a curriculum in the perspective of Ethnomathematics and Countryside Education in these multigrade communities of São Caetano-PE, it is of paramount importance to have the unity and consensus of all actors within the educational system.

In conclusion, we emphasize the importance of translating the discussions presented in this article into practice, rather than keeping them solely in the realm of theory, particularly regarding the construction of mathematics curricula in line with the focus of our investigation. Furthermore, we hope to see examples in academic production and multigrade schools in rural areas, not only in São Caetano-PE but also in other Brazilian municipalities, where considerations for the development of mathematics curricula from the perspective of Ethnomathematics and Countryside Education are taken into account. This would serve to overcome the reliance on generalized state curricula and foster a more contextually relevant approach.

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