



World hunger from the perspective of members of the Pedagogical Residency Program: contributions from Critical Mathematics Education

Abstract: The qualitative study whose objective is to identify, from the perspective of the advisor and the preceptor of a Pedagogical Residency Program, dialogues between a project developed with sixth-grade classes in a public school, focused on the theme of world hunger, and the principles of Critical Mathematics Education (CME). The stages of the project were analyzed in light of discussions in CME, which seeks to train students to develop a critical view of the society in which they live and to think about possibilities for transforming it. This process gave rise to some significant dialogues between the project and CME, especially those related to the exploration of Mathematics beyond calculation, the type of communication established in Mathematics classes, and the practices of reading and writing about the world mediated by Mathematics.

Keywords: Teaching Project. Critical Mathematics Education. Pedagogical Residency.

El hambre en el mundo desde la perspectiva de los miembros del Programa de Residencia Pedagógica: aportes desde la Educación Matemática Crítica

Resumen: El estudio cualitativo busca identificar, desde la perspectiva del profesor supervisor y el preceptor de un Programa de Residencia Pedagógica, los diálogos entre un proyecto desarrollado con clases de sexto grado en una escuela pública, centrado en el tema del hambre en el mundo, y los principios de la Educación Matemática Crítica (EMC). Las etapas del proyecto se analizaron a la luz de las discusiones en la EMC, que busca formar estudiantes capaces de desarrollar una visión crítica de la sociedad en la que viven y de pensar en las posibilidades de transformarla. Diversos diálogos significativos surgieron de este proceso entre el proyecto y la EMC, especialmente aquellos relacionados con la exploración de las Matemáticas más allá del cálculo, el tipo de comunicación que se establece en las clases de Matemáticas y las prácticas de lectura y escritura sobre el mundo mediado por las Matemáticas.

Palabras clave: Proyecto de Enseñanza. Educación Matemática Crítica. Residencia Pedagógica.

A fome no mundo sob o olhar de integrantes do Programa Residência Pedagógica: contribuições da Educação Matemática Crítica

Resumo: Apresenta-se um estudo de natureza qualitativa cujo objetivo é identificar, na perspectiva do docente orientador e da preceptora de um Programa de Residência Pedagógica, diálogos entre um projeto desenvolvido com turmas do sexto ano de uma escola pública, centrado no tema da fome no mundo, e os princípios da Educação Matemática Crítica (EMC). As etapas do projeto foram analisadas à luz das discussões em EMC, que busca formar estudantes capazes de desenvolver um olhar crítico sobre a sociedade em que vivem e de pensar em possibilidades de transformá-la. Emergiram, desse processo, alguns diálogos significativos entre o projeto e a EMC, especialmente aqueles relacionados à exploração da Matemática para além do cálculo, ao tipo de comunicação que se estabelece nas aulas de Matemática e às práticas de leitura e escrita do mundo mediadas pela Matemática.

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**DOSSIER — PEDAGOGICAL
RESIDENCY PROGRAM IN
MINAS GERAIS**

Palavras-chave: Projeto de Ensino. Educação Matemática Crítica. Residência Pedagógica.

1 Introduction

According to Milani, Silva, and Saullo (2011), we always hear or read about the need to work in the classroom in such a way that students give meaning to what they learn. We agree with the authors that this discourse is recurrent.

In the field of Mathematics, where failure rates are high (Conceição and Rodrigues, 2015), this appeal may be even greater. For the authors, failure may be related to the way Mathematics is explored, with repetitive exercises that are classified as right or wrong, leaving no room for reflection and making learning uninteresting. The lack of interest in Mathematics classes is also addressed in Torisu (2018), where it is discussed that

many teachers, especially mathematics teachers, have complained about their students' lack of interest during classes. In an attempt to reverse this situation, some seek alternatives to make teaching more attractive, so that students feel more motivated (p. 550).

However, students' lack of interest in Mathematics does not stem exclusively from the way teachers conduct their teaching of this subject. Considering that schools are part of a broader social context, being influenced by it and also influencing it, it is necessary to recognize the existence of multiple factors that can cause students to lose interest in classes.

Garcia, Halmenschlager, and Brick (2021) address disinterest in studies in general, but their discussions include a lack of interest in learning mathematics. The authors identify, in addition to teaching practices, other possible causes for this disinterest, such as: teacher-student relationships that may not foster a welcoming environment, indiscipline, lack of spaces for the development of autonomy, and issues of self-esteem and self-concept. They also point out that the lack of use of digital technologies as teaching tools can be a barrier to student interest.

In this sense, disinterest in school is a social and historical construct directly conditioned by the realities in which children and young people are inserted. Understood as historical-social subjects, students have their dispositions and attitudes shaped by the relationships they establish in the social fabric of which they are a part (Garcia, Halmenschlager and Brick, 2021).

Given this understanding, there is no guarantee that it will be possible to completely eliminate disinterest in the school environment. However, it is believed that pedagogical practices that favor the attribution of meaning to knowledge can motivate and engage students during classes, thus contributing to the improvement of their academic performance. But what does it mean to give meaning to what is learned? For Skovsmose (2009), the notion of meaning is complex.

Let's imagine that the teacher proposes a problem in math class that refers to a real situation, for example, related to deforestation. The problem may require various area calculations, knowledge of percentages, proportionality, etc. The teacher may suggest that students compare a deforested area with the area of a soccer field, but not as a naive request. The fact that students are familiar with a soccer field can give them a clearer idea of the size of the deforested area. This may be a way to give meaning to mathematical learning. But let us note that deforestation is a sensitive issue for countries such as Brasil, where this practice occurs illegally in various parts of the Amazon rainforest, for example, causing countless environmental damages.

Considering the importance of this topic for society, it would be interesting to ask students to explore the topic in greater depth through research that could bring new elements to

the discussion. Researching and bringing ideas to be discussed in the classroom frees students from the role of content recipients and places them in the role of contributors to their own learning. The underlying topic does not have to be deforestation. It can be suggested by the class.

To this end, teachers can adopt different approaches, and research in Mathematics Education offers relevant clues about these possibilities. A powerful way to give meaning to learning is through project development. According to Valero (2002), working with projects makes Mathematics more meaningful for participants. Gerardo (2010) points out that this modality can contribute significantly to a Mathematics Education connected to the social, political, economic, and cultural dimensions of society.

Valero is a researcher who has been prominent in research on Critical Mathematics Education (CME). The example we use to present an understanding of what meaning is for us is in line with what CME advocates.

Project work can be developed at different stages of teacher education. In initial education, this approach can be learned and experienced in teaching practice classes or during supervised internship activities. In addition to these possibilities, projects can also be carried out within the scope of teaching incentive programs, such as the Pedagogical Residency Program (PRP). In this Program, teacher education students, as residents, are accompanied by a teacher from a Basic Education school (preceptor) and a professor (advisor), which creates a favorable environment for the development and implementation of pedagogical reflection projects.

In view of the above, the objective of the study presented in this paper is to reveal, from the perspective of the supervising professor and the mentor of a PRP Mathematics subproject, dialogues between a project focused on the issue of world hunger and EMC.

The paper is divided as follows: after the introduction, the following sections will be developed: *Pedagogical Residency Program (PRP)*; *Critical Mathematics Education*; *Methodology*; *The millet project*; *Revealing dialogues*; and *Final considerations*. At the end of the paper, we include the bibliographical references.

2 The Pedagogical Residency Program (PRP)

The PRP was an initiative to encourage teaching, promoted by the Brazilian Federal Agency for Support and Evaluation of Graduate Education (Capes), whose main objective was to enable teacher education students, when immersed in Basic Education, to experience moments that combined theory and practice. As a result, the PRP strengthened and highlighted the importance of the partnership between universities and public schools in promoting quality education and teaching (Capes, 2018).

To participate in the PRP, the Higher Education Institution (HEI) had to submit a project in response to the public call for proposals launched by Capes. This institutional project consisted of subprojects linked to each of the institution's undergraduate courses, enabling coordination between courses through interdisciplinary proposals. The subprojects involved the following participants: advisor, professor, and subproject coordinator; residents, teacher education students; and preceptors, public school teachers, referred to as field schools (Capes, 2018).

The project referred to in this paper was developed at one of the field schools of the Mathematics subproject of the PRP at the Federal University of Ouro Preto in the 2022-2024 version. In addition to the preceptor and the supervising professor, four residents also participated in the project.

3 Critical Mathematics Education (CME)

Skovsmose (2007, p. 73) states that

critical mathematics education is not to be understood as a special branch of mathematics education. It cannot be understood as a certain classroom methodology. [...] I see critical mathematics education as defined in terms of some concerns emerging from the critical nature of mathematics education.

CME is concerned, for example, with using Mathematics to promote discussions about social justice (Skovsmose, 2012). Another concern of CME is to develop in people a competence called *matemacia* (Skovsmose, 2001, 2012). Milani, Silva, and Saullo (2011) consider that *matemacia*

is an understanding of how school mathematics can help students read the world and transform it critically. In addition to enabling students to perform mathematical calculations (technical aspect), *matemacia* aims to bring situations from different contexts [...] to reflect on them in order to question and modify them. Students who are developing the ability to reflect on a given situation somehow transform their way of seeing that situation, and this can lead to changes in their daily actions.

There is a close relationship between *Mathematics* and reading and writing about the world with Mathematics. In our interpretation, as students are exposed to a situation through Mathematics, they can reflect on it and gain a deeper understanding of it. It is the readings of the world that can generate in students a genuine interest in change, that is, an interest in writings of the world. In the words of Skovsmose (2012, p. 19), “reading, in the sense that one can interpret sociopolitical phenomena; and writing, in the sense that one becomes capable of promoting change.” For Gutstein (2017, p. 12),

reading and writing the world with mathematics” essentially means that students should use and learn mathematics to study their social reality, so that they can have a deeper understanding of the world and be prepared to change it as they see fit.

Furthermore, for this author, students read the world when they “gain sociopolitical awareness of the conditions of their lives, communities, and broader society/world (reading the world)” (Gutstein, 2009, p. 332); and they write it when they acquire “a sense of social *agency* or a belief that they are capable of acting in the world to affect change toward social justice (writing the world)”.

Reading and writing the world, although distinct concepts, are interrelated. In our view, writing the world is enabled by reading the world. In the words of Gutstein (2016, p. 456), the two concepts “are dialectically intertwined as people participate in daily life and reflect on their actions”.

The project presented in this paper consists of moments that can be discussed in light of EMC. The way the project was developed helps to remove students from the condition of being mere repositories of information, as occurs in the banking model of education criticized by Freire (1970).

The meetings that took place during the course were not modeled on the exercise

paradigm (Skovsmose, 2000; Alrø and Skovsmose, 2006), in which the teacher explains mathematical content using techniques and algorithms that will be reproduced in exercise lists. In this paradigm, the student does not speak much. Communication generally occurs in a sandwich pattern (Alrø and Skovsmose, 2006): the teacher asks a question, the student answers, and their answer is evaluated by the teacher as right or wrong. We can see that the student's answer is sandwiched between the teacher's statements.

In contrast, the activities were organized in such a way that, at various times, the students had to engage with Mathematics, but beyond calculations. With the mediation of the residents, the preceptor, and the advisor, the students were led to reflect on real-life situations, on a path of understanding, of reading the world. They were also encouraged to propose solutions to some of these situations, on a path that led to writings about the world. In this way, Mathematics Education creates connections with the outside world, possibly enabling the development of critical skills in students by involving them in the social, political, and economic context in which they live (Conceição and Rodrigues, 2015).

4 The Milheto Project

The rural school where the PRP actions described in this text were developed is affiliated with the United Nations Educational, Scientific and Cultural Organization (Unesco), which annually seeks to engage school students in an educational project aligned with a theme proposed by the Organization, which changes each year. In 2023, the proposed theme was *the international year of millet*.

According to Garcia and Duarte (2016), millet is a type of grass with small grains, cultivated in various parts of the world and used for animal or human consumption. It is drought-tolerant and, therefore, its production is high when compared to other crops grown under the same conditions. For this reason, it is one of the main foods in regions with severe water shortages.

Millet is a very nutritious food, full of complex carbohydrates, proteins, fiber, B vitamins, and minerals such as iron, calcium, and magnesium. It is also gluten-free, making it an alternative food source for people with celiac disease.

In Brasil, millet cultivation began in Rio Grande do Sul, where it quickly spread as feed for animals. Later, it began to be cultivated in the Cerrado, due to its easy adaptation to unfavorable growing conditions, such as long periods of drought, for example (Garcia and Duarte, 2016).

However, even though it is a type of food used in other countries as food and has nutritional characteristics that make it an excellent option for human consumption, millet is still rarely cultivated for this purpose. Considering this contradiction, the group that comprised the Mathematics subproject at the field school proposed the development of a project entitled *Millet seeds: could this be the solution to world hunger?*.

The title leads us to reflect on the real possibility of using a nutrient-rich food as an option to end world hunger. This proposal makes sense because, according to the United Nations Brasil *website*¹ (2024), in Brazil,

about 733 million people went hungry in 2023, equivalent to one in every 11 people in the world and one in every five in Africa, according to the latest State of Food

¹ ONU: Níveis de fome seguem persistentemente altos por três anos consecutivos, enquanto as crises globais se aprofundam [UN: Hunger levels remain persistently high for three consecutive years, while global crises deepen], July 24, 2024. Available at <https://brasil.un.org/pt-br/274884-onu-niveis-de-fome-seguem-persistentemente-altos-por-tres-anos-consecutivos-enquanto-crises>

Security and Nutrition in the World (SOFI) report published today by five specialized agencies of the United Nations.

The quote presents alarming data on world hunger, which makes this discussion urgent in all spaces. In our case, we opted for a project as a way to bring this topic, which is so relevant to all of us, up for discussion and reflection. The development of projects that address urgent social issues, such as world hunger, is considered by the *Base Nacional Comum Curricular* [National Common Core Curriculum — BNCC] (Brasil, 2018) as a mathematics competency for high school. However, we understand that such competencies can be mobilized and developed in Middle School, as they can promote critical thinking and the articulation between mathematical knowledge and contemporary social issues. According to this document, it is important to “develop and/or discuss projects that address, above all, issues of social urgency, based on ethical, democratic, sustainable, and supportive principles, valuing the diversity of opinions of individuals and social groups, without prejudice of any kind” (Brasil, 2018, p. 263).

The discussions presented in the previous paragraph and in the quote are in line with what Abrantes (1995) advocates about project work. For the author, the project starts from situations based on reality. In our case, the project arises to discuss hunger. They are also in line with the fact that project work is very useful if we intend to develop a mathematical analysis related to the social, political, economic, and cultural reality of society, with a view to education critical, reflective, interventionist, and participatory citizens within a democracy, as argued by Gerardo (2010). Skovsmose (2000) also advocates the use of projects in Mathematics Education. The author considers that projects are appropriate for the development of *Mathematics*, as they require reflection on how Mathematics acts as an integral part of society.

The ideas previously defended in favor of project work converge on the definition of this concept, given by Cortesão (1990):

an intentional activity through which the social actor, taking up the problem that interests them, produces knowledge, acquires skills, reviews and/or acquires attitudes, and/or solves problems that concern them through study and involvement in an authentic or simulated real-life issue.

For Rangel and Gonçalves (2011), project work involves the following stages: problem definition, work planning, research-production, formative assessment, presentation of results, critique and globalization, and final assessment.

We will identify these stages in our project. First, however, we will present the three parts into which it was divided.

Part 1 — We wanted to draw students' attention to the problem of hunger in Brasil in order to sensitize them to the issue. To do this, we showed a video report from CNN network, entitled *Fome atinge 33 milhões de pessoas no Brasil*² [Hunger affects 33 million people in Brazil]. After showing the video, a mysterious box, shown in Figure 1, containing cards, was presented to the students. The cards, shown in Figure 2, could contain *cartoons*, news articles, graphs, or other data, all related to the topic of hunger and millet, which was still unknown to the students.

The activity proposed to the students was as follows: each student had to take a card from the box. The class was then divided into groups based on the similarity of the cards. For example, students who had taken cards containing *cartoons* stayed in the same group; others who had taken cards containing graphs created another group. After the class was divided,

² <https://www.cnnbrasil.com.br/nacional/fome-no-Brasil-ong-lanca-campanha-nacional-para-ajudar-33-milhoes-de-pessoas>

residents and the instructor began a discussion about the information contained in the cards, which led students to reflect on the theme of *hunger and millet*. They were also asked to associate the information contained in their card with a single word. Sadness, pity, and injustice were recurring responses. After the discussions, we provoked the class with the following question: Could millet be the solution to hunger in Brazil?. An important consideration to be made about this first part was the creation of a workshop to explore reading graphs with the students, after residents and the instructor diagnosed difficulties with this content.



Figure 1: Mystery box (Own collection, 2023)

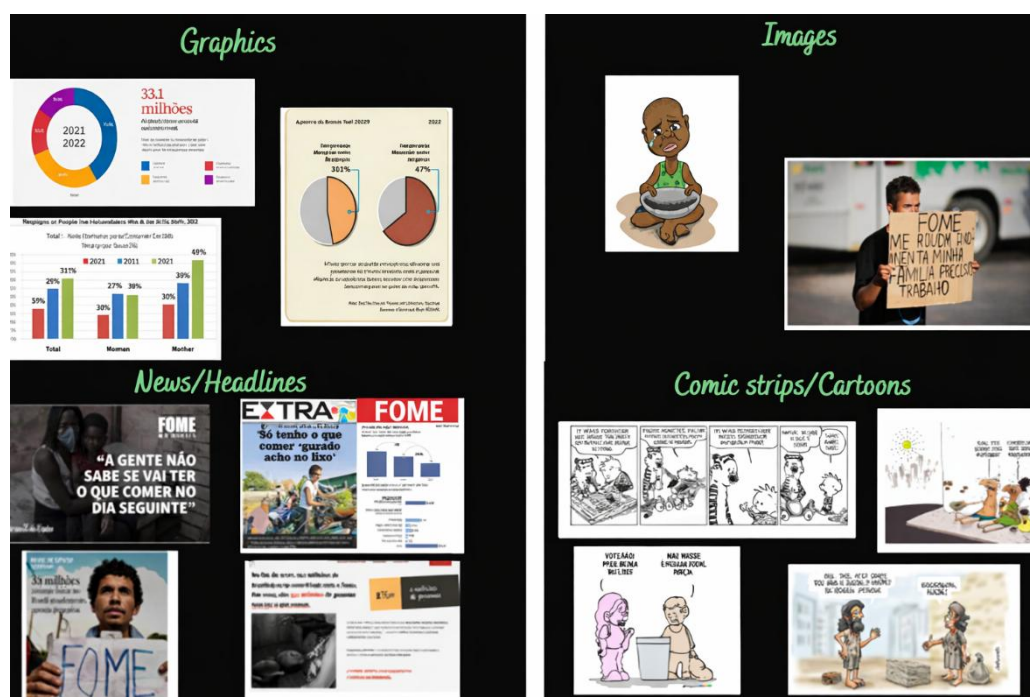


Figure 2: Cards from the mystery box (Own collection, 2023)

Part 2 — After the first contact with the theme *hunger and millet* as a possible solution to the problem of hunger, we asked the students to conduct research on millet, since in Part 1 there were several questions surrounding this subject. Given the plurality of themes that could arise, we decided to divide the research into subtopics. The students had to choose a subtopic for their research, but it had to be related to millet. The subtopics were: worsening and combating hunger in the world; strengthening the economy; global warming and climate change; job creation in agribusiness; and physical and nutritional characteristics of different

grain crops. The idea behind this part was to promote discussion and reflection on the chosen subtopics.

Part 3 — In this part, students were asked to develop questions based on the research conducted in Part 2. To record the questions, they made posters containing questions and their answers.

The final product was an activity book, shown in Figure 3, containing the questions created by the students, divided into groups. This book was presented at the cultural exhibition promoted by the school. Each group presented their posters and gave explanations to visitors about the theme *hunger and millet*.

We understand that the stages of a project considered by Rangel and Gonçalves (2011) took place, in the case of our project, throughout the three parts into which it was divided, as described above. Therefore, in what follows, we will present each of the stages succinctly.

Definition of the problem — Based on the general theme proposed by Unesco, the international year of millet, the advisor, preceptor, and residents considered that hunger could be the problem to be explored.

Work planning — In this stage, we seek to define how to carry out the actions. Although the students did not participate directly in this stage, it is desirable that they do so. The planning of the project led us to divide it into three parts, which were described earlier in this text.

Research-production — Research-production refers to the collection of information and objects, research, visits. This took place in the second part of the project, when students conducted research with the aim of learning about millet and its relationship to world hunger, through the exploration of subtopics proposed by residents and the preceptor.

Formative assessment — This refers to interim assessments or revisions in planning. In the first part of the project, the residents and the preceptor realized that the students had difficulty understanding the graphs contained in the files presented to them in the first part of the project. They then decided to create a workshop to explore graph reading, that is, a necessary change within the planning.

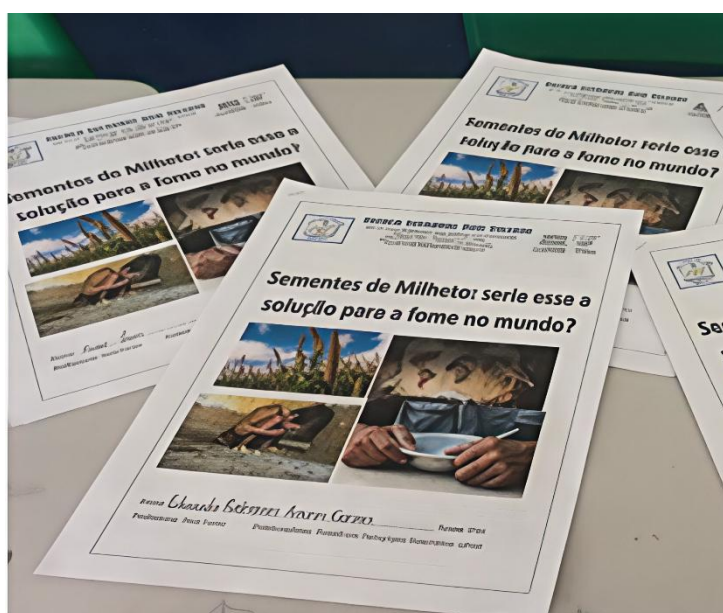


Figure 3: Final product (Own collection, 2023)

Presentation of results — This refers to the sharing of experiences, lessons learned, and productions. This occurred, for example, when students made posters with statistical data

represented in tables, graphs, and/or infographics.

Critique/globalization — Final presentation of results. At the end of the project, the questions formulated by the students and the graphs they created were organized in the form of activity books (booklets) and presented at a cultural exhibition promoted by the school.

Final evaluation — Refers to the evaluation of the process. This part did not occur at a specific time involving the students. The final evaluation was recorded in the residents' reports.

5 Methodology

The objective of the paper was to identify, from the perspective of the supervising teacher and the preceptor of a PRP Mathematics subproject, dialogues between a project focused on world hunger and EMC.

The project was developed with sixth-grade classes at a public school in the interior of Minas Gerais, Brazil. The school was chosen as one of the field schools to host the Mathematics subproject. In addition to the supervising teacher, the preceptor and four residents were involved in the project.

Bogdan and Biklen (1994) consider five main characteristics of qualitative research: 1) the source of the data is the natural environment where the events occur — the data was collected at the school, where the events described took place; 2) the data are predominantly descriptive — we describe the stages and actions that composed them; 3) the concern with the process is greater than with the product — for this study, no, we are not concerned with a final product. Our goal was to analyze moments throughout the process; 4) the analysis must be performed inductively — the categories did not exist *a priori*. They emerged from the data processing; 5) the meaning that people give to things and to their lives should be the focus of the researcher — the students were heard and played a leading role in many moments of the process's development. Based on the above, we believe we are authorized to classify the study as qualitative.

The data we used are those related to what occurred during the three parts in which the milheto project was developed. From our perspective — advisor and preceptor —, we used the EMC lens to create categories whose titles refer to constructs or are in line with discussions in EMC.

The analysis of these categories was done by pairing or association, a technique that consists, as the name itself informs, in pairing or associating the theoretical framework and the empirical material, verifying the correspondence between them (Laville and Dionne, 1999).

6 Revealing dialogues

The categories we will present here emerged from looking at the three parts of the project through the lens of EMC. In each part, we identified characteristics that, to some extent, allow us to establish a dialogue between the parts and the discussions in EMC. These characteristics will be presented and discussed within each category below.

Moving away from mathematical calculations and exploring new possibilities — EMC criticizes classes based solely on the exercise paradigm, i.e., classes that prioritize mechanical calculation processes, which are often repetitive and have a single answer. At various points in the project, we identified actions by residents and the preceptor directed at students that resulted in investigative processes, unlike what occurs in a class based on the exercise paradigm.

In the first part of the project, for example, this occurred when students were invited to present their impressions of the cards they had taken from the mystery box. They had to argue in favor of their ideas and reflect on the topic of hunger. By associating the content of the card

with a word, students needed to make connections with the real world. In our view, showing the video with the report on hunger led them to reflect on that same world. Mathematics was present in these moments: in the graphs and numbers contained in the cards, in the alarming numbers in the report. It was there, but in a different way than it is normally presented. It was there to create connections with social, political, and economic aspects of the world, something desirable when dealing with EMC.



Figure 4: Mural of students' feelings about hunger in the world (Own collection, 2023)

Working with Mathematics for Mathematics' sake, as if it were an end in itself, limits the possibilities we have when we perceive it as something that can help us understand the world. This corroborates what Valero (2002) points out in relation to the limitations of a Mathematics class. For the author, the math classroom is rarely seen as a micro-context within a macro-context, which is society, limiting its potential as a tool for understanding the world. In our view, the project allowed the discussions raised by Mathematics to go beyond the school walls and reach the macro-social context.

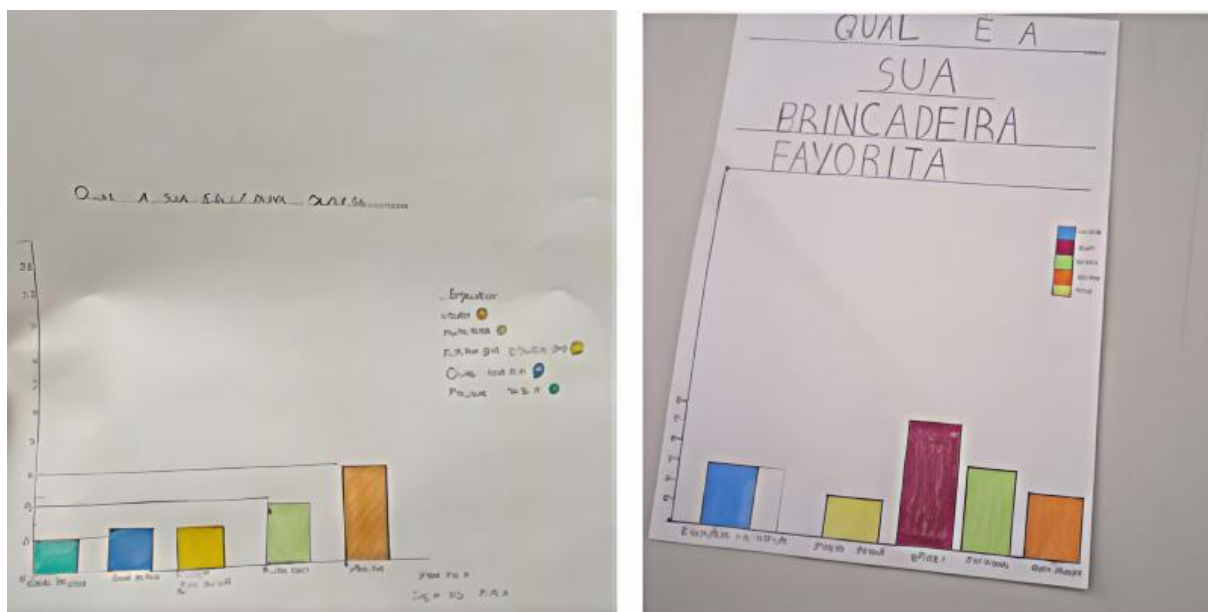


Figure 5: Graphs produced by students (Own collection, 2023)

Mathematics was also present during the workshop on learning and graphing. Even though it was closer to what a traditional math class would be, the students were able to take the lead in some activities. For example, they collected data to create their graphs, according to a topic of interest, experiencing a form of participation that is not common in math classes.

The sandwich communication pattern is set aside — The sandwich communication pattern does not allow students to express their ideas. The teacher asks a question, the student answers, and the teacher evaluates the answer as right or wrong. The teacher is the center of attention and acts as a judge. Throughout the development of the project, students were asked to talk about their impressions, ideas, and reflections.

This was evident in the first stage of the project, when students participated in discussions about the content of the worksheets. It was also present in the second stage, during the presentation of the results of their research on millet and hunger. In these situations, communication did not follow the question-answer-evaluation pattern. Instead, the students presented their ideas and reflections, which were heard, considered, and debated collectively. These contributions served as a starting point for new learning, both for them and for the other participants, including the third stage of the project, in which they gave public presentations at the cultural exhibition.

A particularly revealing moment of abandoning the so-called *sandwich pattern* of communication occurred before the explanation of graphs. The tutor asked the students what they understood by a graph, and they replied that it was “*something that indicates a percentage*” and that it makes it possible to convey information with “*accuracy*”. Another participant added that graphs represent “*the exact quantity and are related to Mathematics*”. Faced with these answers, the instructor did not simply agree or disagree; instead, she used them as a starting point to deepen the discussion about graphs, broadening the collective understanding.

We can also consider the display of posters made as a result of the research carried out in the second part as a type of communication. In the eyes of some, they could be just posters hung on the wall. However, for those who were interested, they communicated a wealth of data about the world. The presentation of the posters was a political statement by the students on the problem of hunger.

Reading and writing the world through Mathematics — Skovsmose (2017) treats reading the world as a way of interpreting it, and writing as a way of acting on it. Gutstein (2017) believes that reading the world with Mathematics means using and learning mathematics to study its social reality, understand it, and change it. In other words, we can understand that reading the world means using Mathematics not only to acquire skills related to calculation and logical reasoning, for example. More than that, it means using Mathematics to better understand situations in which Mathematics is present and to change them. We also believe that, based on Mathematics, teachers can broaden discussions to non-mathematical topics that involve students in investigative processes, contributing to a political education about society. All of this is involved in a larger concept called *matemacia*, discussed by Skovsmose (2001, 2012, 2017). The movement of readings of the world, in our view, permeated all parts of the Milheto project.

In the first part, students began to reflect on world hunger. This does not mean that they knew nothing about this problem. However, when asked to give their opinions and research this topic, they were led to reflect and learn more about it. They gradually became aware of the problem of hunger and perhaps tried out solutions to it.

The mathematical data contained in the report and graphs in the first part served as important ingredients for understanding the extent of hunger in Brasil and around the world. The students' reaction gained depth when they related the workshop content to the presence of homeless people in the school's surroundings, realizing that hunger is not a distant phenomenon, but a concrete and close reality.

During the discussion, comments such as the following emerged: “*A soup kitchen*

opened in the neighborhood near my house”, “Almost every day, people come by my house asking for things”, “There are some homeless people here in front of the school”. This connection between the data presented and the local context highlights the principles of Critical Mathematics Education, showing that understanding social phenomena must start from a reflective reading of the lived world. In this way, students begin to recognize the human dimension behind the numbers and develop a critical awareness of the socioeconomic inequalities that permeate their daily lives.

In the second part, research involving hunger and millet exposed the students to new mathematical data that enabled them to construct graphs and increase their understanding of the problem. They were also able to explore the potential of millet as an alternative to hunger in the world, based on their research. In the third stage, the creation of the notebook and preparation for the presentations were important in reinforcing what they had already learned.

In terms of writing, the project did not enable students to make changes that could alleviate a problem such as hunger. We believe that the presentations at the cultural fair were a step in this direction by raising visitors' awareness of such a serious problem. The students even proposed solutions to end hunger in Brazil (Figure 6).

Solução para a fome no Brasil

Para o país se estabilizar o menos pessoas passarem fome, o governo poderia parar de receber salários, por exemplo ser prefeito no tempo livre ou receber um salário mínimo (que eles mesmos propõem a todos esse valor mínimo pelo trabalho) e além disso tem o dinheiro de impostos que vai para o bolso dos políticos. Com esse dinheiro seria possível investir em plantações de milho por exemplo, além de gerar empregos para cuidar dessas plantações de milho o milho poderia ser doado para moradores de rua. Com essa teoria em mente a corrupção aos poucos diminuiria (pelo fato de o governo não receber) e os salários começariam a se igualar, o professor não receberia algo tão distinto dos médicos e advogados, com o tempo a desigualdade social e fome diminuiriam.

x = valor que o governo ganha
 z = quantidade de fazendas criadas
 p = quantidade de empregos gerados
 y = quantidade de pessoas que passam fome
 n = novo Brasil com menos pessoas passando fome, e menos desigualdade social

$x + z = p - y = n$

Figure 6: Solution to hunger in Brasil (Own collection, 2023)

The readings about the world may not have been very elaborate. In fact, this is understandable, as sixth-grade students are just beginning to form and articulate their ideas about the world more deeply, as Gutstein (2003) considers.

We believe that the students learned about the seriousness of the problem of hunger in Brazil and around the world, the potential of millet as an alternative to the problem of hunger, injustices, and the importance of *seeing* Mathematics beyond the classroom.

In our view, the students' readings about the world contributed to their development, albeit in a discreet manner, of their *empowerment*, understood as a feeling capable of

encouraging people to fight for social change (Jacinto and Torisu, 2025). The notion of *empowerment* is close to the idea of *agency*, also discussed throughout this text.

7 Final considerations

Every day, teachers are challenged to meet many demands, including getting students to engage in class and giving meaning to what is taught. As we know, this is not an easy task.

In this text, we present a proposal for project work, within the scope of the PRP, which can help Mathematics teachers reflect on their practice with a view to creating a classroom environment that is different from what we usually see.

The project, as we organized it, not only explored Mathematics through calculations, but also used it as a starting point to discuss other issues such as hunger, inequality, injustice, solutions to hunger, etc. Associating mathematical learning with such important topics can be an extra ingredient to give it more meaning. The learning that goes beyond Mathematics that results from a project like this contributes to the political education of students.

We recognize, however, that working with projects alone does not guarantee student engagement and active participation. It is necessary to consider other pedagogical and contextual aspects before implementation. Nevertheless, our intention was to provoke reflection in the reader about this possibility of organizing Mathematics classes, highlighting its potential to broaden meanings, promote dialogue, and bring the discipline closer to the concrete lives of students.

An important limitation of this approach concerns the time available for planning and developing projects. Organizing activities that link Mathematics and social issues requires prior study, careful selection of data, analysis of materials, and the development of strategies that dialogue with the context of the class. In scenarios where the curriculum is rigid and the workload is reduced, teachers may face difficulties in dedicating the necessary time to all these stages.

In addition, the execution of the project requires a class pace that does not always fit the school calendar, which is marked by interruptions, external evaluations, make-up classes, and administrative demands. These factors can limit the continuity of activities and compromise the depth of discussions. Thus, we recognize that, although project-based work offers great potential, its effectiveness depends on favorable institutional conditions, support for teacher autonomy, and a school culture that values investigative and reflective practices.

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Conflicts of Interest

The author declare that there are no conflicts of interest that could influence the results of the research presented in this paper.

Data Availability Statement

The data produced, collected, and analyzed in the paper will be made available upon request to the authors.

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