

Financial Education in textbooks: transforming mathematical exercises into powerful reflective landscapes

Educación financiera en los libros de texto: transformando ejercicios matemáticos en poderosos escenarios reflexivos

L'éducation financière dans les manuels scolaires : transformer les exercices mathématiques en de puissants scénarios de réflexion

Educação Financeira em livros didáticos: transformando exercícios matemáticos em potentes cenários reflexivos

Wellington Moisés de Oliveira¹
Universidade Estadual Paulista (Unesp Rio Claro)
Estudante de graduação em Matemática
<https://orcid.org/0009-0006-6153-7620>

Lucas Carato Mazzi²
Universidade Estadual Paulista (Unesp Rio Claro)
Doutorado em Ensino de Ciências e Matemática
<https://orcid.org/0000-0003-3395-3724>

Abstract

At the beginning of the 21st century, with the Financial Education project, elaborated by the Organization for Economic Co-operation and Development (OECD) and coordinated by the Financial and Insurance Markets Commission and the Private Pensions Commission, interest in educating individuals financially was gaining ground space in different areas of society, arriving in Brazil, with more impact, in 2010. More recently, through curricular reforms such as the approval of the National Common Curricular Base, in 2018, Financial Education gains prominence in the school environment, becoming a topic to be included in Brazilian Textbooks. To understand which discourses are produced and perpetuated in mathematical situations, based on understandings of Financial Education produced within the scope of Mathematics Education, this article is concerned with analyzing a collection of Mathematics Textbooks, approved in the National Textbook Program in 2020, referring to the Final Years of Elementary School, seeking to transform some mathematical exercises into powerful reflective scenarios.

¹ E-mail: wellington.moises@unesp.br

² E-mail: lucas.mazzi@unesp.br

Supported by a qualitative approach and assuming the concerns of Financial Education in a critical perspective, the research identified that the predominant discourse in textbooks reinforces the neoliberal logic and the episodes in which Financial Education can be seen are reduced to Financial Mathematics concepts. However, we understand that these can be transformed into reflective environments, which can contribute to a more critical training of our students.

Keywords: Mathematics education, Financial education, Final years of elementary School, Mathematics textbooks.

Resumen

A principios del siglo XXI, con el proyecto de Educación Financiera, elaborado por la Organización para la Cooperación y el Desarrollo Económico (OCDE) y coordinado por la Comisión de Mercados Financieros y de Seguros y la Comisión Privada de Pensiones, fue ganando interés por educar financieramente a las personas espacio en diferentes áreas de la sociedad, llegando a Brasil, con mayor impacto, en 2010. Más recientemente, a través de reformas curriculares como la aprobación de la Base Curricular Común Nacional, en 2018, la Educación Financiera gana protagonismo en el ámbito escolar, convirtiéndose en un Tema a incluir en los libros de texto brasileños. Para comprender qué discursos se producen y perpetúan en situaciones matemáticas, a partir de comprensiones de Educación Financiera producidas en el ámbito de la Educación Matemática, este artículo se ocupa de analizar una colección de Libros de Texto de Matemáticas, aprobados en el Programa Nacional de Libros de Texto en 2020, haciendo referencia a los Últimos Años de Educación Primaria, buscando transformar algunos ejercicios matemáticos en potentes escenarios reflexivos. Apoyada en un enfoque cualitativo y asumiendo las preocupaciones de la Educación Financiera en una perspectiva crítica, la investigación identificó que el discurso predominante en los libros de texto refuerza la lógica neoliberal y los episodios en los que se percibe la Educación Financiera se reducen a conceptos de Matemática Financiera. Sin embargo, entendemos que estos pueden transformarse en ambientes reflexivos, que pueden contribuir a una formación más crítica de nuestros estudiantes.

Palabras clave: Educación matemática, Educación financiera, Últimos años de educación primaria, Libros de texto de matemáticas.

Résumé

Au début du XXI^e siècle, avec le projet d'éducation financière, élaboré par l'Organisation de coopération et de développement économiques (OCDE) et coordonné par la Commission des marchés financiers et d'assurance et la Commission des pensions privées, l'intérêt pour l'éducation financière des individus gagnait en popularité espace de terrain dans différents domaines de la société, arrivant au Brésil, avec plus d'impact, en 2010. Plus récemment, grâce à des réformes curriculaires telles que l'approbation de la base nationale commune des programmes, en 2018, l'éducation financière prend de l'importance dans l'environnement scolaire, devenant un sujet à inclure dans les manuels brésiliens. Pour comprendre quels discours sont produits et perpétués dans des situations mathématiques, sur la base des compréhensions de l'éducation financière produites dans le cadre de l'enseignement des mathématiques, cet article s'intéresse à l'analyse d'une collection de manuels de mathématiques, approuvés dans le cadre du Programme national des manuels scolaires en 2020, en faisant référence aux dernières années de l'école primaire, cherchant à transformer certains exercices mathématiques en de puissants scénarios de réflexion. Soutenue par une approche qualitative et assumant les préoccupations de l'éducation financière dans une perspective critique, la recherche a identifié que le discours prédominant dans les manuels scolaires renforce la logique néolibérale et que les épisodes dans lesquels l'éducation financière peut être vue sont réduits à des concepts mathématiques financiers. Cependant, nous comprenons que ceux-ci peuvent être transformés en environnements de réflexion, qui peuvent contribuer à une formation plus critique de nos étudiants.

Mots-clés: Enseignement mathématique, Education financière, Dernières années du primaire, Manuels de mathématiques.

Resumo

No início do século XXI, com o *Financial Education Project*, elaborado pela Organização para a Cooperação e Desenvolvimento Econômico (OCDE) e coordenado pela Comissão de Mercados Financeiros e de Seguros e pela Comissão de Pensões Privadas, o interesse em educar financeiramente os indivíduos foi ganhando espaço em diversas esferas da sociedade, chegando no Brasil, com mais impacto, no ano de 2010. Mais recentemente, por meio de reformas curriculares, como a homologação da Base Nacional Comum Curricular, em 2018, a Educação Financeira ganha destaque no ambiente escolar, tornando-se, em especial, um tópico a ser inserido nos Livros Didáticos brasileiros. A fim de compreender quais discursos são produzidos

e perpetuados em situações matemáticas, a partir de compreensões de Educação Financeira produzidas no âmbito da Educação Matemática, este artigo se preocupa em analisar uma coleção de Livros Didáticos de Matemática, aprovada no Programa Nacional do Material e do Livro Didático de 2020, referente aos Anos Finais do Ensino Fundamental. Para dar conta desse propósito, propomos transformar alguns exercícios matemáticos em potentes cenários reflexivos. Apoiados em uma abordagem qualitativa e assumindo as preocupações da Educação Financeira em uma perspectiva crítica, identificamos que o discurso predominante nos Livros Didáticos reforça a lógica neoliberal e que os episódios nos quais a Educação Financeira pode ser enxergada, frequentemente, estão reduzidos a conceitos da Matemática Financeira. No entanto, entendemos que tais episódios podem ser transformados em ambientes reflexivos, os quais, por sua vez, podem contribuir para uma formação mais crítica de nossos estudantes dos Anos Finais do Ensino Fundamental.

Palavras-chave: Educação matemática, Educação financeira, Anos finais do ensino fundamental, Livros didáticos de matemática.

Financial Education in textbooks: transforming mathematical exercises into powerful reflective landscapes

Financial Education (FE) began to gain prominence at the beginning of the 21st century, with the development of a project by the Organization for Economic Cooperation and Development (OECD), entitled the Financial Education Project, in 2003. This project, led by the Committee on Financial Markets and Insurance and the Committee on Private Pensions, aimed to financially “educate” individuals in OECD member countries and eventually expanded these actions to the other countries.

Based on the results of this project, the OECD³ published the report *Improving Financial Literacy: analysis of issues and policies*, which defines FE as

[...] the process by which financial consumers/investors improve their understanding of financial products and concepts and, through information, instruction and/or objective advice, develop the skills and confidence to become more aware of financial risks and opportunities, to make informed choices, to know where to go for help, and to take other effective actions to improve their financial well-being (OECD, 2005, p. 13).

Referring to its potential students as “consumers and investors” - which already makes us wonder what kind of “education” we are talking about - this definition reveals the market vision that FE has from the OECD's perspective, focusing on the production of subjects who adapt to the financial capitalism that is in force (Saraiva, 2017), to the point that “individuals accept and adapt to the situations put in place and do not problematize them, so that their maintenance is guaranteed and the status quo is maintained” (Mazzi & Baroni, 2021, p. 40).

It should also be noted that this way of understanding FE aims not only to provide “the knowledge and personnel necessary for the expanding productive machinery of the capitalist system, but also to generate and transmit a framework of values that legitimizes the dominant interests” (Mészáros, 2008, p. 35). Bringing these ideas to Brazil, the National Strategy for Financial Education was established (ENEF) through Decree no. 7.397⁴, of December 22, 2010 (Brasil, 2010). An analysis of its documentation shows that it is a translation of the definition elaborated by the OECD (OECD, 2005) and that, despite the modification of some terms and expressions, it has the same concern as the Organization, i.e., it aims to adapt the subject to the neoliberal logic, providing tools and financial knowledge so that they become responsible for themselves, without relying on the State.

³ To avoid repetition of the OECD acronym, we will also refer to it as Organization

⁴ It is worth mentioning that this decree was revoked by Decree No. 10.393, of June 2020, which instituted the new ENEF and created the Brazilian Financial Education Forum, that established the non-mandatory gratuity of Financial Education actions (Brasil, 2020).

These approaches to FE ignore the need for support to ensure minimum conditions for individuals, such as employment, food, housing, among other basic requirements for individuals to live well and dedicate themselves to their potential. In this direction, Sachs et al. (2023, p. 452) point out that FE “has promoted an intense process of ideological inculcation, reinforced neoliberal ideology and constituted itself as an organic part of social life, becoming one of the instruments for internalizing capitalist logic”. In this sense, such views are in the interests of the hegemonic institutions of capital, which do not aim to train people to be critical about financial concepts - or any other topic, really - but rather to preserve and intensify the direction of the accumulation of wealth, naturalizing dynamics that aggravate social and economic inequalities in a society, through semiotic traps that are present from an early age in the lives of individuals, such as in advertisements, commercials, films, etc. Based on these discussions and considering the approval of the National Common Curricular Base (Brazil, 2018), which places FE as a cross-curricular theme⁵ for Primary Education in 2017 and Secondary Education in 2018, there is an urgent need to understand which visions of FE are proposed by the materials produced using the BNCC as support in the national territory. Among these materials, we highlight the Textbooks (TB).

In Brazil, TBs are the most widely used materials in mathematics classrooms (Silva, 2012) and have been connected to this subject since colonial Brazil (Valente, 2008), expanding more and more due to the National Textbook Program (PNLD), which distributes them free of charge to all schools that adhere to the program.

The notion of what a TB is seems intuitive and automatically refers to the object we are talking about. However, we understand the importance of bringing an understanding of aspects that permeate these materials. In this direction, we rely on the understanding of Amaral et al. (2022, p. 30, emphasis added), who describe TB as

[...] as a printed or digital material designed and edited to contribute to the educational processes of teaching and learning, composed of knowledge of a particular curriculum component or area of knowledge proposed based on the official curricular prescriptions in force at the time of its elaboration. [...] Furthermore, the textbook production *is not neutral. On the contrary, it has an ideology that supports it* and is a means of disseminating the values and beliefs of a given culture located in a specific historical period.

In view of its presence in practically the entire national territory, we believe that understanding how FE is present in such materials can provide insight into how and what type

⁵ Despite presenting FE as a cross-cutting theme, the document associates it exclusively with mathematical skills.

of FE is being discussed in Basic Education, as well as revealing which discourses are produced and perpetuated from mathematical situations, often said to be naive and neutral, but which, as Amaral et al. (2022) point out, come from ideologies that support the TBs.

Bearing these elements in mind, this article aims to foster reflection on mathematical problems that can be transformed into powerful reflective scenarios. To do this, we will initially present understandings of FE in the context of Mathematics Education, to support the view we have taken. Next, the qualitative approach will be discussed and the way in which data is produced and organized will be detailed. Finally, we will problematize some examples that have potential for critical discussions in the field of FE.

Theoretical references

In contrast to the definitions of FE proposed by the OECD (OECD, 2005) and ENEF (Brazil, 2010), other view regarding the field of Mathematics Education is more committed to educating people financially, beyond concerns about investments and products. Several authors (Silva & Powell, 2013; Baroni, 2021; Mazzi & Baroni, 2021; Lima, 2023; Hartmann, 2022; Menecucci, 2023; Merola, 2023; Sachs et al., 2023; Silva, 2024) consider FE to be fertile ground for problematizing the social situation and, consequently, the reality of students, since they criticize the formation of a potential consumer who simply learns to operate different financial products.

Of these more critical and problematizing understandings, we would like to highlight those of Silva and Powell (2013) and Baroni (2021). In their discussions, Silva and Powell (2013) elaborate a view on what a School Financial Education would be. For these authors, this school-based FE can be understood as

[...] a set of information through which students are introduced to the world of money and stimulated to produce an understanding of finance and economics, through a teaching process that enables them to analyze, make informed judgments, make decisions and take critical positions on financial issues that involve their personal lives, families and the society in which they live (Silva & Powell, 2013, p. 13).

This more scholastic dimension of FE illustrates how it can be present in students' lives, in their realities, becoming a lens for reading their worlds, helping them to interpret and make decisions within the world of money, considering not only it, but all the ethics and social awareness it implies.

In addition, the authors created a curriculum proposal (Table 1) for school FE, not in the sense of plastering it, but rather proposing some themes that they believe belong to this scope.

This proposal invites us to reflect that FE articulates knowledge from different areas, permeating different areas of society.

Table 1.

FE curriculum proposal (Based on Silva & Powell, 2013, p. 14)

| | |
|---|---|
| <p>I – Basics of Finance and Economics</p> <p>The topics discussed are: money and its role in society; the relationship between money and time; the notions of interest, savings, inflation, profitability and liquidity of an investment; financial institutions; the notion of assets and liabilities and financial investments.</p> | <p>II – Personal and Family finance</p> <p>This axis will discuss topics such as: financial planning; managing personal and family finances; strategies for managing money; saving and investing finances; household budgeting; taxes.</p> |
| <p>III – The opportunities, risks and traps of managing money in a consumer society</p> <p>This axis will cover topics such as: investment opportunities; the risks involved in investing money; the traps of consumption behind marketing strategies; as well as how the media encourages consumerism.</p> | <p>IV – The social, economic, political, cultural and psychological dimensions that involves FE</p> <p>This axis will discuss topics regarding consumerism and consumption; the relationship between consumerism, waste production and environmental impact; wages, social classes and social inequality; need vs. desire; ethics and money.</p> |

These four axes dialogue with each other, since discussions about the world of money and its function in our society at different times allow us to reflect on these implications on an individual or family scale, resulting in reflections on financial planning and strategies for managing finances, a process in which it is necessary to consider the subject in constant contact with different offers and countless investment opportunities (not just financial products), and with this, the pitfalls that can be involved in the act of consuming. This movement has material consequences on a collective scale, in which social, political and economic aspects cannot be ignored, and it is essential to reflect on the way in which the capitalist production system uses and disposes of environmental resources and the waste it produces, respectively.

Esses quatro eixos dialogam entre si, uma vez que discussões acerca do universo do dinheiro e a função dele em nossa sociedade, em diferentes momentos, permitem-nos refletir sobre essas implicações em escala individual ou familiar, resultando em reflexões acerca de

planejamentos financeiros e estratégias para administrar e gerir finanças. Processo em que é necessária a consideração do sujeito em contato, constantemente, com diferentes ofertas e inúmeras oportunidades de investimento (não só de produtos financeiros) e, com isso, as armadilhas que podem estar envolvidas no ato de consumir. Tal movimentação percebe consequências materiais, de escala coletiva, em que aspectos sociais, políticos e econômicos não podem ser ignorados. Outrossim, é indispensável refletir sobre a forma que o sistema produtivo capitalista usa e descarta, respectivamente, os recursos do meio ambiente e seus lixos produzidos.

These conclusions, arising from the problematization of the aforementioned issues, dialectically generate historical and cultural knowledge for the construction of new conceptions of what it means to organize oneself in society, thus questioning the function of money and its role in it. This web of possibilities that FE allows and makes it possible to debate is clearly shown in a diagram, shown in Figure 1, elaborated by Baroni (2021).

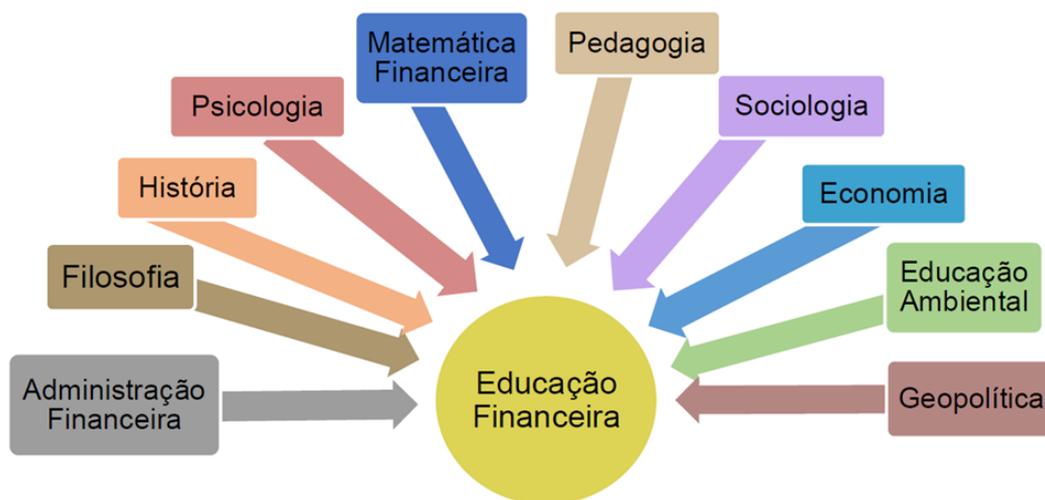


Figure 1.

Areas whose specificities have been revealed in the FE world (Baroni, 2021, p. 233)

In this diagram, the author highlights the relationship between FE and different areas of knowledge, especially in the act of using these connections as conducive threads for greater problematization and transformative character. Viewing FE through different lenses enriches the reading of the world, enabling a more elaborate understanding with more parameters of how our society works as a whole and how we are affected by the neoliberal system that constantly comes across us in all human relations.

This way of looking at FE can be a way for students - and individuals in general - not only to identify themselves in a world and be able to interpret it, but also to be critical and

capable of acting for their social transformation. According to Baroni (2021, p. 239-240), FE can be understood as

[...] a process of problematizing personal and collective financial life, with the aim of understanding and critically analyzing the financial world and its social, political and economic implications, with a view to transforming the mechanisms of economic dependence and social inequality.

Based on Baroni's considerations (2021), we understand the need and urgency for a confrontation against hegemonic ideas, with a view to social transformation. In this direction, we consider it necessary for Financial Education in schools to contribute to a discussion and problematization of the current neoliberal system, so that our students understand what tools are used to immobilize us as a class, in addition to understanding how this system affects us.

By neoliberalism, we are taking the perspective of Dardot and Laval (2016, p. 14) in assuming that it is more than an economic policy, and can be understood as a norm that imposes on each of us to live in a universe of generalized competition, encourages wage earners and populations to engage in economic struggle against each other, orders social relations according to the market model [...] (Dardot; Laval, 2014, p.14). The neoliberal system then becomes

[...] a system of norms now profoundly inscribed in government practices, institutional policies and managerial styles". Moreover, we must make it clear that this system is even more 'resilient' because it far exceeds the mercantile and financial sphere in which capital reigns. It extends the logic of the market far beyond the strict boundaries of the market, by producing an 'accounting' subjectivity through the creation of systematic competition between individuals (Dardot & Laval, 2016, p. 30).

In this direction, Hamann (2012, p. 101) states that neoliberalism strives to ensure that subjects assume "market-based values in all their judgments and practices in order to gather sufficient human capital and thus become self-entrepreneurs", i.e. this system creates the false idea that we are the only ones responsible for our achievements and failures, without taking into consideration the contexts and their specificities.

This neoliberal system, in its perversity, creates fallacies of merit (Markovits, 2021), blaming the subject for not having dedicated themselves enough, when, in fact, we have problems of structural inequalities that already place subjects in different positions, favoring some and leaving others on the margins of opportunities. Therefore, discussing FE we understand that we need to promote spaces in which this whole system in which we are immersed is problematized and that the discussions are not just about personal organization and investments. We do not deny the importance of these elements, but focusing only on these discussions does not contribute to tackling inequalities and fighting for social transformation.

The considerations listed in this section comprise what we understand by FE and some of the concerns it should address, whether at school or in other environments and situations. Next, we present the methodological approach and how the data was organized.

Methodological Approach and Data Organization

Our study adopted a qualitative approach, since we were not only concerned with quantifying the FE activities present in the volumes, but also with understanding what these numbers represent, promoting discussions of examples selected to illustrate our motivations, shedding light on what we can find about FE in these materials in dialog with the literature in the area. Regarding the qualitative approach, Denzin and Lincoln (2011, p. 3) describe it as

[...] a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible. These practices transform the world. [...] This means that qualitative researchers study events within their natural contexts, trying to understand, or interpret, phenomena in terms of the meanings that people attribute to them.

Therefore, when we turn our attention to the material, we carry out the task of translating and organizing what we find, to interpret and reveal probable motivations and possibilities that a textbook can represent. This kind of concern finds the qualitative approach a fertile ground for our discussions.

The TB selected (Figure 2) for the research belong to the collection “*Matemática Compreensão e Prática*”, in the Teacher's Manual version, by Ênio Silveira, published by Moderna and approved by the PNLD 2020. The choice was made because the researchers had access to the materials in physical format, facilitating the analysis process. Amaral et al (2022) argue that, due to the difficulty of finding materials, one of the criteria for selecting a textbook is precisely having access to the work, that is, having been able to access it.



Figure 2.

"Mathematics Understanding and Practice" collection (Silveira, 2018)

The collection analyzed is aimed at the final years of elementary school, with one book for each grade, making a total of four. Each of the books is organized into four units in each volume, which discuss in their chapters (to meet certain skills required by the BNCC) the Thematic Units of Mathematics: Numbers; Algebra; Geometry; Quantities and Measures; Probability and Statistics.

The textbook is designed in a "U" format, i.e. in the central region of the page (which is common to the student) the content is presented, in this case mathematical content, and on the sides, there are guidelines and suggestions on how to approach these subjects, exclusive to the educator.

To organize the topics found in the TBs, we chose to divide them into *Panels and Activities*, as suggested by Amaral et al. (2022). The Panels are the parts of the textbooks in which the contents are addressed – in this case, mathematical content; concepts; theories; as well as solved examples. Activities, on the other hand, are "the proposals in the TB that involve a solution process to be developed by the students" (Amaral et al., 2022, p. 224).

When analyzing the material, we first tried to quantify the “Episodes of Financial Education” that are present in each volume of the collection and then tried to categorize them. These movements ended up intertwining, since as we quantified, there was a need for further refinement, opening space for new quantifications.

In this dialectical process, we polished our understanding of how to organize our data, which is one of the results of this article: to understand, in form and content, which and how discussions about FE are addressed in a Mathematics TB collection elaborated for the Final Years of Elementary School.

It is also worth noting that the textbooks analyzed do not present what they understand by Financial Education, nor do they highlight throughout their collection that a certain exercise and/or theoretical part is related to Financial Education. Therefore, our first step in organizing the data was to take our view of FE in line with Baroni's (2021) discussions and Silva and Powell's (2013) curricular axes so that we could then look for FE Episodes in the materials.

Having categorized and thematized the four axes elaborated by Silva and Powell (2013), to organize the information resulting from the analysis process when we looked at the books in the collection, we produced two tables summarizing how many FE episodes there were and which thematic sections, by axes, are present throughout the collection, both in the Activities and in the Panels.

Table 2 shows a high concentration of activities within axis I (Basics of Finance and Economics) (46.25%), in which percentages, simple and/or compound interest are worked on. As illustrated by Baroni's diagram (2021), Financial Mathematics is a very important area of dialog within the potential of FE, but it is a risk to limit oneself to it. The remaining activities involve situations in which consumption is present (approximately 38%), which is why it is concentrated in axis IV (The social, economic, political, cultural and psychological dimensions surrounding FE), which addresses environmental issues and contextualized buying and selling situations. Axis II (Personal and family finance) and Axis III (The opportunities, risks and pitfalls of managing money in a consumer society) have less impact on the activities, with a percentage of 9.67% and 6.17% respectively.

Table 2.

Quantification of Activities identified as FE in the Collection

| Volume | Axis I | Axis II | Axis III | Axis IV | Total |
|-----------------|---------------|----------------|-----------------|----------------|--------------|
| 6th year | 14 | 7 | 2 | 25 | 48 |

| | | | | | |
|-----------------|-----|----|----|----|------------|
| 7th year | 36 | 7 | 5 | 27 | 75 |
| 8th year | 11 | 4 | 1 | 16 | 32 |
| 9th year | 44 | 4 | 6 | 18 | 72 |
| Total | 105 | 22 | 14 | 86 | 227 |

Similarly, Table 3 shows the quantification of these FE episodes identified in the Panels.

Table 3.

Quantification of the episodes identified as EF in the Panels

| Volume | Axis I | Axis II | Axis III | Axis IV | Total |
|-----------------|---------------|----------------|-----------------|----------------|--------------|
| 6th year | 4 | 0 | 2 | 10 | 16 |
| 7th year | 9 | 0 | 0 | 5 | 14 |
| 8th year | 3 | 0 | 0 | 8 | 11 |
| 9th year | 10 | 4 | 1 | 11 | 26 |
| Total | 26 | 4 | 3 | 34 | 67 |

As mentioned about Activities, the greatest concentration is between axes I (38.81%) and IV (50.75%), but now the fourth axis is the most numerous, occupying half of the collection. Axes II and III have very little space, occupying 5.97% and 4.48% respectively. In view of this quantitative presentation of the data, in the next section we will discuss some mathematical problems listed in the TBs analyzed that have the potential to promote rich, more social reflections.

Data discussion

We selected four examples for our discussion which, although not aimed at this purpose, enable critical discussions about Financial Education, since they can trigger critical reflection on students, inviting them to question their own realities. The role of the teacher, however, is fundamental to this movement (Silva, 2024).

When we talk about Financial Education, many people still think that we are talking exclusively about mathematical and financial calculations. This view is corroborated when we realize that most of the episodes we identified are related to Financial Mathematics. But how

can these problems, which account for most FE discussions, be maximized? To discuss this idea, we present a block with four exercises that use the concept of simple and compound interest (Figure 3).

Figure 3.

Exercise on simple interest and compound interest (Silveira, 2018d, p. 74)

These problems are classic examples from math textbooks. What we need to discuss, whenever we work with these cases, is the veracity of the data that the exercises provide. Bearing in mind that the book analyzed is from 2018, it is important to be aware that, in this particular year, the basic interest rate, called the Selic rate, was 6.50% per year. But what does that mean?

In a simplified way, the Selic rate is Brazil's basic interest rate and serves as a parameter in determining other rates. Making a simple conversion, we have:

$$i_{monthly} = \sqrt[12]{1 + i_{annual}} - 1$$

$$i_{monthly} = \sqrt[12]{1 + 0,065} - 1$$

$$i_{monthly} = \sqrt[12]{1,065} - 1 = 1,00526 - 1 = 0,00526$$

$$i_{monthly} = 0,52\%.$$

In other words, a rate of 6.50% per year is equivalent to a rate of approximately 0.52% per month. When we look at historical data, we notice that the Selic rate did not increase - in fact, it decreased - until October 2021, when this book was the most up-to-date for the Final Years segment (Central Bank, 2024). In other words, the rates presented by the exercises are

practically unrealistic, if we consider investments with at least some kind of guarantee and protection, as is the case with fixed income investments.

This kind of consideration is fundamental if we are to prepare our students to recognize the countless financial scams that exist today. It's not uncommon to hear about people - including famous people - who have fallen for the 10% monthly income scam. Furthermore, society needs to start questioning why, when we lend our money to the bank (i.e. invest in a bank product), the annual return is close to the Selic rate, but when we borrow, the rate charged to us is much higher. We need to use mathematics to our advantage in the fight against the attacks that the population suffers on a daily basis and which, in the search for a better life, end up falling into financial traps.

A second example, shown in Figure 4, is an activity in which percentages are calculated, using an economic socialization scenario: pocket money. (Lellis, Magalhaes & Leite, 2011).

2 Por ter tirado notas baixas, Gisele perdeu R\$ 18,00 de sua mesada, o que corresponde a 20% do que recebia. Qual era o valor da mesada de Gisele? R\$ 90,00

Figure 4.

Exercise on allowance (Silveira, 2018a, p. 194)

The problem itself is reduced to a percentage calculation, however, due to the context in which the problem is inserted, it can generate various reflections. Considering Brazil's intense economic inequality, this exercise may or may not make sense to many children who are studying using the material.

Oliveira (2009, p. 27) argues that pocket money is “a practice that has almost become naturalized in children's childhoods and in their families' household economies”. We wonder, however, which Brazilian families can afford to pay their children pocket money? On this subject, Mazzi and Domingues (2021, p. 13) inquire

[...] what kind of Financial Education produces and/or promotes this discourse? What objectives does it have? What interests are behind it? We know that the Brazilian reality does not make it possible for every child to receive an allowance. Thousands of families struggle to live a decent life, surviving in sub-human conditions. How can we think about 'giving pocket money' in these contexts?

However, the authors are not arguing that the subject should not be dealt with in schools, but rather that it should not be taken for granted. This type of 'naturalization' can generate micro-exclusions which, according to Faustino et al. (2018, p. 900), can be understood as “subtle practices, carried out consciously or not, which tend to ‘isolate’ the individual in a certain

environment, most often considered inclusive”. We need to be aware of these types of discussions.

A way of working on this problem is to initially get to know the reality of the students in which the exercise is being carried out. With this, the teacher can problematize the idea of pocket money with the students, opening up spaces for comments and initial reflections on the subject. There could be a brief discussion about the salary reality of Brazilian families and the fact that having pocket money is a privilege that few children have. This type of discussion can be enhanced by discussing the idea of the minimum wage, as the following example makes possible.

The third example (Figure 5) shows a graph with information from the Inter-Union Department of Statistics and Socioeconomic Studies (DIEESE⁶) on the evolution of the Brazilian minimum wage from 2012 to 2018.

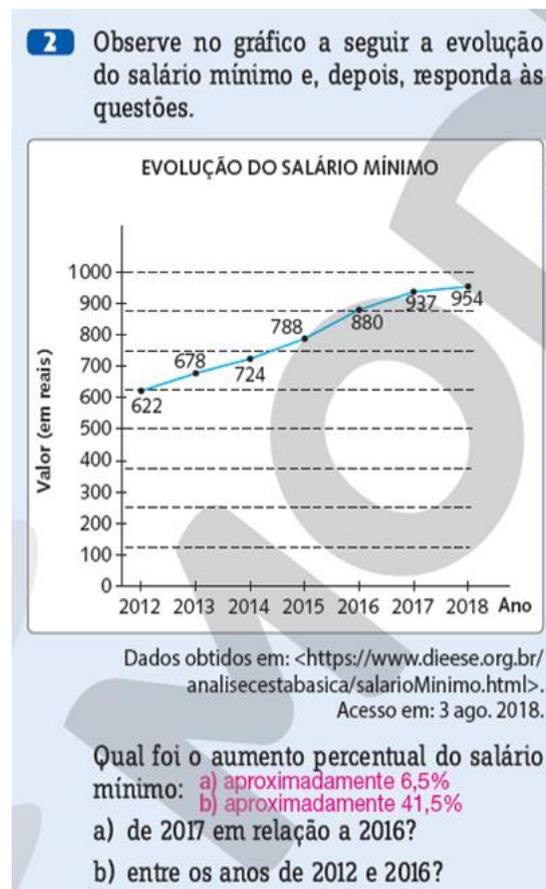


Figure 5.

Exercise on the percentage increase in the minimum wage (Silveira, 2018b, p. 172)

⁶ This department does a very significant job of calculating how much minimum wage would be necessary to live on in Brazil, as well as monitoring the prices of basic food baskets in different regions of our country.

The exercise itself discusses the idea of a percentage increase. Reducing the problem to a calculation misses an important moment in raising awareness about what a minimum wage is and whether, in fact, it covers the minimum. Authors as Lima and Mazzi (2021, p. 105) defend the richness of this theme, stating that this “[...] is a topic that can give rise to discussions and reflections on the social, political and economic issues surrounding it, as well as allowing scenarios to be set up for investigation in the school environment”.

Considering that the data for the exercise was taken from the website in August 2018, it would be interesting to bring in the additional information - even if in the Teacher's Manual - that, in that period, the minimum wage needed to survive was R\$3,636.04 (DIEESE, 2018). In other words, the government's salary in 2018 was almost four times less than what it should be for a family to minimally achieve a reasonable standard of living. This kind of discussion can invite students to question why the values are not updated based on basic food baskets, for example, as DIEESE does, and what the purpose is of having a population with, at least, a minimum of dignity.

Finally, we look at an activity that discusses the thirteenth salary (Figure 6). When confronted with the items, students are exposed to a situation in which they must calculate, according to the rules in force, what the amount received would be in a specific case, allowing them to understand how it works, as well as exposing this dynamic to their knowledge, since we know that with so much misinformation about economic guidelines, it is not uncommon for an individual not to know well how this calculation is carried out and, therefore, would not recognize their rights.

5 Um dos benefícios do trabalhador brasileiro é o décimo terceiro salário, pago pelos empregadores no fim do ano. Para quem trabalhou o ano inteiro, o valor a ser pago corresponde ao salário de dezembro e, para quem trabalhou menos de um ano, o valor a ser pago é proporcional à quantidade de meses trabalhados. 8 meses; $\frac{8}{12}$ (ou fração equivalente)

a) Se uma pessoa foi admitida em uma empresa no dia 1º de maio, quantos meses ela trabalhou nesse ano? Esse período corresponde a que fração de um ano?

b) Sabendo que o salário de dezembro dessa pessoa foi R\$ 2514,50, qual foi o valor do décimo terceiro salário recebido? R\$ 1676,33

Figure 6.

Exercise on 13th salary (Silveira, 2018c, p. 23)

In addition to these calculations, the exercise can foster reflection on labor rights and current forms of employment and can even problematize a very relevant issue in our society, the uberization of work. We agree with Franco and Ferraz (2019, p. 845) when they state that

the uberization of work “represents a particular mode of capitalist accumulation, by producing a new form of mediation of the subsumption of the worker, who assumes responsibility for the main means of production of the productive activity”. In this form of work, employees must invest in the machinery needed to carry out the work themselves and, even so, the lion's share of the profits goes to the capitalists who offer some kind of platform to mediate the work on offer. The aforementioned exercise, combined with the discussion on the uberization of work, provides a powerful space for questioning workers' rights and the privileges of those who own the means of production.

We understand that TBs have a very important formative function, especially if we consider that they are widely used and, in this case, their target audience is young people between 11 and 14 years old (Lajolo, 1996; Munakata, 2016; Amaral et al., 2022). In this age group, we can already bring in elements that invite them to reflect on aspects of society and PE can be a means of doing this. In this direction, we corroborate Mazzi and Domingues (2021, p. 21) when they argue that “PE can be a way of questioning the system, understanding our contribution to society, demanding our representatives, being aware of our rights/duties and, consequently, increasing equity between people”.

Final Considerations

After becoming acquainted with the formative perspectives of Financial Education, we were able to recognize moments of FE that run through countless activities, examples and discussions in the textbooks of a mathematics collection for the final years of elementary school. In the school environment, the FE Curriculum Proposal (Silva & Powell, 2013), in its four axes, has been proven to include numerous themes that FE can cross. Baroni's diagram (2021) also illustrates and intensifies the idea that these themes and areas of knowledge are in deep dialogue with FE, so we cannot approach these subjects, discuss the exercises or reflect on the issues without considering other social, political, economic, cultural, anthropological, psychological, environmental and other perspectives or elements.

Quantitatively, the research showed that the collection analyzed assumes an understanding of FE that is mixed with a large part of the discussions that concern Financial Mathematics, in other words, there is a large concentration of FE episodes identified that are reduced to percentage calculations, simple interest and compound interest. We understand the

importance of discussing these concepts, however, we defend the importance of connecting them, at least at times, with problematizing situations, so that students question what those values are telling us and what considerations we can draw up about our society.

Financial Education can be enhanced through Mathematics if data is mobilized to invite students to question. When we reduce situations to mere calculations, we miss opportunities to produce discussions and reflections that are fundamental to the critical formation of any human being.

There is an urgent need to rethink the dangers of a single narrative, without concern for the critical education of individuals. Teaching materials, such as textbooks, are very important and significant tools in the educational process for young people and adults all over the world, especially in Brazil. We would also point out that the Teacher's Manual lacks guidelines so that the educator can provoke the students with problematizations about the contexts shown, trying to create a dialogue between what has been studied and the real scenarios, as well as a dialog with other disciplines such as History, Geography, Sociology, among others.

Finally, we invite the authors of mathematics textbooks to dare to present current situations that question, for example, how long profit will be normalized while people die of hunger every day around the world; that show the disregard for the environment in favor of greater effectiveness and productivity, regardless of what is caused in nature; or that bring dangerous neoliberal discourses disseminated by the media, in the direction of blaming the individual, to be deconstructed. Situations involving these themes have data that can be connected to different topics in mathematics, enriching our students' education and helping them to be subjects who take a stand and do not simply settle for injustice.

Referências Bibliográficas

- Amaral, R. B.; Mazzi, L. C.; Andrade, L. V.; Perovano, A. P. (2022). *Livro didático de matemática: compreensões e reflexões no âmbito da Educação Matemática*. Mercado de Letras.
- Banco Central do Brasil. (2024). *Histórico das taxas de juros fixadas pelo Copom e evolução da taxa Selic*. <https://www.bcb.gov.br/controleinflacao/historicotaxasjuros>
- Baroni, A. K. C. (2021). *Educação Financeira no contexto da Educação Matemática: possibilidades para a formação inicial*. [Tese de doutorado em Educação Matemática, Universidade Estadual Paulista].

- Bauman, Z. (2008). *Vida para consumo: a transformação das pessoas em mercadoria*. Zahar.
- Bicudo, M. A. V. (2012). Pesquisa qualitativa e pesquisa qualitativa segundo a abordagem fenomenológica. In: Borba, M. C.; Araújo, J. L. (Org.). *Pesquisa qualitativa em Educação Matemática*. Belo Horizonte: Autêntica, p. 111-124.
- Brasil. (2018). *Base Nacional Comum Curricular – BNCC*. Ministério da Educação.
- Dardot, P., & Laval, C. (2016). *A nova razão do mundo: Crítica da razão neoliberal*. Boitempo Editorial.
- Decreto 7.397, de 22 de dezembro de 2010. (2010). Institui a Estratégia Nacional de Educação Financeira - ENEF, dispõe sobre a sua gestão e dá outras providências.
- Decreto 10.393, de 9 de junho de 2020. (2020). Institui a nova Estratégia Nacional de Educação Financeira – ENEF e o Fórum Brasileiro de Educação Financeira – FBEF.
- Denzin, N. K. & Lincoln, Y. S. (2011). *Handbook of Qualitative Research*. Sage.
- DIEESE. (2018). Departamento Intersindical de Estatística e Estudos Econômicos. *Pesquisa Nacional da Cesta Básica de Alimentos*.
- Faustino, A. C.; Moura, A. Q.; Gomes, G. H.; Muzinatti, J. L. & Skovsmose, O. (2018). Macroinclusão e microexclusão no contexto educacional. *Revista Eletrônica de Educação*, 12(3), p. 898-911.
- Franco, D. S. & Ferraz, D. L. S. (2019). Uberização do trabalho e a acumulação capitalista. *Cadernos EBAPE.BR*, p. 844-856.
- Hamann, T. H. (2012). Neoliberalismo, governamentalidade e ética. *Ecopolítica*, 3, p. 99-133.
- Hartmann, A. L. B. (2022). *A educação financeira nos cursos de licenciatura em matemática da Universidade Estadual Paulista – Unesp*. Dissertação de mestrado em Educação Matemática, Universidade Estadual Paulista). <http://hdl.handle.net/11449/215835>
- Lajolo, M. (1996). Livro Didático: um (quase) manual de usuário. *Em aberto*, 4(7), p. 116-138.
- Lellis, I. L.; Magalhães, C. M. C.; Leite, E. D. L. (2011). O significado da mesada para pais de crianças e adolescentes. *Rev. Interinst. Psicol. [online]*, vol.4, n.1, pp. 12-25.
- Lima, A. S. (2023). *Educação Financeira no capitaloceno*. [Tese de doutorado em Ensino de Matemática, Universidade Federal do Rio de Janeiro].
- Lima, A. S. & Mazzi, L. C. (2021). Salário-mínimo, orçamento pessoal, sobrevivência e dignidade. In: BARONI et al. *Uma abordagem crítica da educação financeira na formação do professor de matemática*, Editora Appris, 2021, p. 97 - 115.
- Markovits, D. (2021). *A cilada da meritocracia: como um mito fundamental da sociedade alimenta a desigualdade, destrói a classe média e consome a elite*. Tradução: Renata Guerra. Intrínseca.
- Mazzi, L. C. & Baroni, A. K. C. (2021). Diálogos possíveis entre Educação Financeira e a educação matemática crítica. In: BARONI et al. *Uma abordagem crítica da educação financeira na formação do professor de matemática*, Editora Appris, p. 37 - 53.
- Mazzi, L. C. & Domingues, N. S. (2021). Educação Financeira na Educação Básica: um foco nas percepções dos estudantes. *EM TEIA – Revista de Educação Matemática e Tecnológica Iberoamericana*, 12(2).

- Menecucci, F. A. (2023). *Neoliberalismo, consumismo e Educação Financeira: reflexões de cidadãos-professores-estudantes de pós-graduação em Educação Matemática*. [Dissertação de mestrado em Educação Matemática, Universidade Estadual Paulista]. <http://hdl.handle.net/11449/238849>
- Merola, R. M. (2023). *Juros, consumo e meio ambiente: um olhar para a Educação Financeira presente no livro didático do Ensino Médio da Educação de Jovens, Adultos e Idosos*. [Dissertação de mestrado em Educação Matemática, Universidade Estadual Paulista]. <http://hdl.handle.net/11449/238935>
- Mészáros, I. (2008). *A educação para além do capital*. 2 ed. São Paulo: Boitempo.
- Munakata, K. (2016). Livro didático como indício da cultura escolar. *Hist. Educ. (Online)*, 20(50), p. 119-138..
- OECD. (2005). *Improving Financial Literacy: Analysis of Issues and Policies*. OECD Publishing, Paris, <https://doi.org/10.1787/9789264012578-en>.
- Oliveira, H. D. L. (2009). *Entre mesadas, cofres e práticas escolares: a constituição de Pedagogias Financeiras para a Infância*. [Tese de doutorado em Educação, Universidade Federal do Rio Grande do Sul]. <https://lume.ufrgs.br/handle/10183/21369>
- Sachs, L.; Gereti, L. C. V.; Ferraiol, T. F.; Elias, H. R. & Souza, L. G. R. (2023). Crítica da Educação Financeira na Educação Matemática. *Bolema*, 37(76), p. 449-478. <https://doi.org/10.1590/1980-4415v37n76a05>
- Saraiva, K. S. (2017). Os sujeitos endividados e a Educação Financeira. *Educar em Revista*, 66, p. 157-173. <https://doi.org/10.1590/0104-4060.53867>
- Silva, A. M. & Powell, A. B. Um programa de Educação Financeira para a Matemática Escolar da Educação Básica. *Anais do XI Encontro Nacional de Educação Matemática* (pp. 1-17). Curitiba: SBEM.
- Silva, M. A. (2012). A fetichização do livro didático no Brasil. *Educação & Realidade*, 37(3), p. 803-821.
- Silva, P. O. (2024). *Educação Financeira na educação básica: um olhar de professores de matemática*. [Dissertação de mestrado em Educação Matemática, Universidade Estadual Paulista]. <https://hdl.handle.net/11449/252457>
- Silveira, E. (2018a). *Matemática – Compreensão e prática. 6º Ano do Ensino Fundamental*. 5. ed. Moderna.
- Silveira, E. (2018b). *Matemática – Compreensão e prática. 7º Ano do Ensino Fundamental*. 5. ed. Moderna.
- Silveira, E. (2018c). *Matemática – Compreensão e prática. 8º Ano do Ensino Fundamental*. 5. ed. Moderna.
- Silveira, E. (2018d). *Matemática – Compreensão e prática. 9º Ano do Ensino Fundamental*. 5. ed. Moderna.
- Valente, W. R. (2008). Livro didático e educação matemática: uma história inseparável. *Zetetiké*, 16(30), p. 139-162.

Data availability statement: Since the data comes from a collection of mathematics textbooks approved by the National Textbook Program (PNLD), it is available to the public.

Declaration of author contributions: Author 1 - Production of data, preparation and execution of all stages of the study and writing of the manuscript. Author 2 – Guidance on the development of the study, participation in all stages of writing the manuscript.