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Financial Education in the light of Critical Mathematics Education: theory, stricto sensu research in Brazil (2012 – 2021) and directions

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SUMMARY

Although investigations prior to 2018 have discussed Financial Education and highlighted the importance of including studies on this topic in Basic Education, it was only explicitly included in the Brazilian curriculum through the National Common Curricular Base (BNCC), especially ideas related to skills and competences in the area of Mathematics. In this sense, with the growing approach to Financial Education in Brazilian schools, questions emerge that turn to the importance of having a dimension of how research has debated the scenario of Financial Education in Brazil, revisiting them to analyze what has been available so far on the said topic. Therefore, we consider the following question: in what ways is Financial Education approached in master's and doctoral research, carried out in Brazil, under the theoretical lens of Critical Mathematics Education? And we aim to present directions to promote Financial Education in Higher Education, especially in Mathematics Degree Courses, based on a bibliographical survey of academic productions available in the Catalog of Dissertations and Theses of Capes and in the Brazilian Digital Library of Theses and Dissertations. To do so, we assume theoretical perspectives on Critical Mathematics Education, such as the concepts of mathemacy, mathematics in action and learning environments with a focus on scenarios for investigation. Through the aforementioned repositories, we searched for the term “Financial Education AND Critical Mathematics Education” and obtained a corpus of analysis consisting of 38 surveys, completed between 2012 and 2021. The data indicate a predominance of investigations carried out in Elementary and High School, mainly focused on the development of didactic activities on Financial Education or the analysis of textbooks. In addition, when considering the lack of research that addressed Financial Education in Higher Education and the importance of inserting discussions inherent to this theme in Mathematics Licentiate Courses, preparing teachers to address Financial Education, we present some referrals in this regard and indicate the need for further reflection.

KEYWORDS: Mathematics Education. Higher education. Bibliographic survey. Capes catalogue. BDTD. Dissertations and theses.

INITIAL CONSIDERATIONS

In 2005, the Organization for Economic Cooperation and Development (OECD, 2005) produced publications focused on Financial Education (FE). This organization developed an understanding of the aforementioned theme, with the aim of encouraging studies, initiatives and practices aimed at FE. Thus, it was deduced that this theme is:

> The process by which financial consumers/ investors improve their understanding of financial products, concepts and risks and, through information, instructions and/or objective advice, develop the skills and confidence to become more aware of financial risks and opportunities, to make informed choices, knowing where to go for help and taking other effective actions to improve their financial well-being (OECD, 2005, p. 4).

This definition leads us to infer that the OECD's purpose is mainly focused on individualistic aspects, as produced in the excerpt that points to the improvement of individuals' personal financial well-being. Furthermore, the OECD was concerned with benefiting the economy of countries linked to this organization. Furthermore, according to Baroni (2021), the emphasis on FE presented by the OECD is focused on working with personal finances and the behavior of individuals in relation to consumption. In this way, the organization does not make explicit opportunities to discuss the use of money in the social context and the functioning mechanisms of the market.

However, with the deepening of ideas and research focused on FE, understandings of this theme that cover aspects related to critical positions on financial, non-individualistic, invitational and people's social and economic context issues were discussed by Silva and Powell (2013) and Muniz (2016). One of them, Scholar Financial Education (SFE), is understood as:

> [...] a set of information through which students are introduced to the universe of money and encouraged to produce an understanding of finance and economics, through a teaching process, which makes them able to analyze, make reasoned judgments, take decisions and have critical positions on financial issues that involve their personal and family life and the society which they live in (SILVA; POWELL, 2013, p. 12-13).

In addition to what was exposed by Silva and Powell (2013), Muniz (2016) emphasizes mathematical and non-mathematical aspects that can be considered in decision-making in economic-financial situations, which generates reflections on a FE that goes beyond mathematical content and raise, in fact, discussions about other disciplines and factors related to human experience. In this way, we seek an understanding of FE focused on criticality and that includes notes from Critical Mathematics Education (CME) (SKOVSMOSE, 2001; 2007; 2008; 2014), but that goes beyond these.

Therefore, we understand FE not only as a theme that develops the ability to calculate and use mathematical techniques, but as a competence associated with reflection to act in a world strongly structured by mathematical models. Our understanding of FE is an invitation to actions and dialogues about the social, financial and economic context of citizens, aiming at improving the quality of life of people and the society in which they live, enabling decision-making based on economic, financial aspects, social, cultural and behavioral.

Based on this understanding, we indicate that FE has been discussed in Brazilian research associated with CME, mainly focused on Basic Education, for example, those developed by Campos (2013), Oliveira (2017), Frederic (2018) and Pizzolatto (2019). Furthermore, with its inclusion in the National Common Curricular Base (BNCC) (BRASIL, 2018), largely associated with the area of Mathematics, questions arise about its thematization in the training of future teachers in this area. Thus, we ask ourselves: in what ways is Financial Education approached in master's and doctoral research carried out in Brazil, under the theoretical lens of Critical Mathematics Education?

To this end, we aim to present directions to promote Financial Education in Higher Education, especially in Mathematics Degree Courses, based on a bibliographical survey of academic productions available in the Catalog of Dissertations and Theses of Capes and in the Brazilian Digital Library of Theses and Dissertations. We indicate that partial results of this work were published in the annals of the VIII International Seminar on Research in Mathematics Education (SIPEM), related to GT 04 – Higher Education.

FINANCIAL EDUCATION AND CRITICAL MATHEMATICS EDUCATION: THEORETICAL DISCUSSIONS AND POSSIBLE APPROACHES

Although guiding documents for Brazilian Basic Education mention topics such as consumption and everyday situations involving concepts of financial mathematics, FE was only included for the first time, explicitly, from the BNCC (BRASIL, 2018). At the BNCC, this theme is presented as transversal and inclusive, but strongly related to the skills and competencies in the area of Mathematics – Elementary School – and Mathematics and its Technologies – High School.

However, there is a lack of clear guidance on how to introduce FE allied to Mathematics and also to the other curricular components of Basic Education, in view of the defense of being a theme capable of permeating the entire curriculum. A proposal to include FE in Basic Education was elaborated by Silva and Powell (2013), as part of the students' Mathematics Education, aiming to develop their financial thinking.

Thus, the authors adopted the term EFE, defending a critical position of the students, which is in line with the ideas of Skovsmose (2001; 2008) in relation to CME. Furthermore, Silva and Powell (2013) state that FE studies should involve issues related to personal, family and social life, expanding work possibilities and non-individualistic views. Still, these researchers indicate decision-making, which occurs at times when students can reflect on their attitudes and their consequences, which is also mentioned in studies by Skovsmose (2001; 2007; 2014).

Thus, we understand that relationships between FE and CME can be established, mainly because we understand a FE that discusses not only mathematical content, but that extends these moments to critical reflections on economic and social aspects of the students' reality, seeking a democratic movement. These factors are exposed in our understanding of FE, when we defend the exposure of mathematical and non-mathematical arguments in decision making, based on the study by Muniz (2016).

Such arguments are able to encourage discussion, for example, of explicit characteristics of a group or factors related to habits, beliefs and family (cultural) values; or those of social classes, work relations and "the movements of certain classes towards others" (MUNIZ, 2016, p. 21) (social). In this context, we corroborate the general and unifying idea of the CME concept, which argues that: "for education, both as practice and as research, to be critical, it must discuss basic conditions for obtaining knowledge, it must be up to date of social problems, inequalities, suppression [...]" (SKOVSMOSE, 2001, p. 101).

In Skovsmose (2001; 2007; 2008; 2014) we find concerns with Mathematics Education and the political aspects of this area. In his understanding of Critical Education, Skovsmose (2007, p. 19) mentions that "education cannot only represent an adaptation to political and economic priorities (whatever they may be); education must engage in the political process, including a concern for democracy". Based on this assertion, we realize that – when we defend a FE that encourages students to criticize aspects such as: the misuse of public money; poor distribution of income; political actions aimed at their own benefits and a minority of the population; – our conception of FE encompasses CME issues.

Among the notes made by Skovsmose (2001; 2007; 2008; 2014), we briefly discuss the concepts of mathemacy, mathematics in action and learning environments, especially the scenarios for investigation, which can be intertwined with ideas and understandings of FE. The first of them, mathematics, is directly related to aspects of social responsibility (SKOVSMOSE, 2014), based on Paulo Freire's ideas associated with understanding the social, political, cultural and economic aspects of individuals' lives.

Thus, "mathematics can be conceived as a way of reading the world through numbers and graphs, and of writing it while being open to changes" (SKOVSMOSE, 2014, p. 106). When discussing this term, the theorist mentions that mathemacy can involve acts to criticize the goods and evils of consumption. According to Skovsmose (2014, p. 110, emphasis added), "mathematics education is also concerned with preparation for consumption, and we can reflect on social responsiveness[1] in this case".

Thus, moments of discussion of aspects of FE can be created, since this can contemplate critical actions on consumption and discuss mathematical contents through created spaces. For example, students can research a product they intend to purchase and, using the data found, discuss the interest rates involved in cash and term payments, the number of installments and their values, in addition to the need or not to purchase the product and the consequences of that act.

Still, the ideas of mathemacy can be related to mathematics in action, focused on the social roles of mathematics (SKOVSMOSE, 2008). For this author, Mathematics can constitute economic procedures and decision-making.

> By mathematics in action, I mean those practices that include mathematics as a constituent part of themselves, for example, technological innovation, production, automation, management and decision-making, financial transactions, risk estimation, cost-benefit analysis, etc. Such practices contain actions based on mathematics that can be reason for reflection (SKOVSMOSE, 2008, p. 52).

Thus, FE makes it possible to observe mathematics in action in the Basic Education Mathematics classroom, in teacher training courses and in research. Therefore, the economic procedures of financial transactions can be studied through analysis of the differences between credit and debit cards, credit card invoices and the fees involved in the installment of these invoices, involving a criticality of these situations and who benefits from the system; and decision-making is approached by questioning individuals about which product they prefer to purchase and why, what payment method, which mathematical and non-mathematical aspects they consider for the choice (MUNIZ, 2016; HARTMANN, 2021).

Still, Mazzi and Baroni (2021), through the notes of Skovsmose (2014), show that mathematics in action is not neutral, requiring a critical approach to it, considering that it can serve different interests. According to the same authors, when performing an interweaving between FE and CME, it is necessary to question what is set, which we corroborate. According to Baroni (2021), mathematics in action enables the discussion of important elements to consider about financial life, namely the social role and the critical conception of Mathematics.

Finally, we consider that the relationships of mathemacy and mathematics in action, with FE, can constitute learning environments in which students carry out investigations (SKOVSMOSE, 2008). To this end, this author considers two paradigms of teaching practices for mathematical content: exercises and scenarios for investigation. These two are combined with three references (pure mathematics, semi-reality and reality), with six learning environments proposed, as shown in Chart 1.

Table 1 – Learning environments

	Exercises	**Scenarios for investigation**
References to pure mathematics	(1)	(2)
References to semi-reality	(3)	(4)
References to reality	(5)	(6)

Source: Adapted from Skovsmose (2008, p. 23).

From what is shown in Table 1, we show that environments of type (1) and (2) are related to references to pure mathematics. In (1) students perform exercises characterized by “reduce the expression”, “calculate” and “solve the equation”. In environment (2), although it has references to pure mathematics, “students are engaged in carrying out activities through investigation, criticism, action and dialogue, in which the teacher is part of this process and asks questions” (HARTMANN, 2021, p. 58). Still, according to Mazzi and Baroni (2021), in this environment there is no mechanized reproduction of the steps necessary to solve the problem. In addition, Baroni (2021) recommends that in environment (2) items from the History of Financial Mathematics be addressed.

In turn, environments of type (3) and (4) involve a semi-reality, that is, they are characterized by non-truthful data that can help students in the proposed resolution. An exercise of type (3) has characteristics such as: the problem data characterize the semi-reality; additional information is not important for

resolution; solving the problem is the goal. “Thus, in this environment, criticism of the prices presented and the proposal to carry out a survey to compare them with prices in other locations, can be interpreted as an obstruction of students to the Mathematics class” (HARTMANN, 2021, p. 59). For Mazzi and Baroni (2021), an environment (4) can give rise to investigations and reflections, as in the analysis of a situation in which a young apprentice starts to invest part of his salary, comparing this condition with income tax and research on products similar to the situation proposed.

After all, environments of type (5) and (6) are related to situations that refer to reality, that is, that allow those involved to assume real data and situations of their daily lives. According to Baroni (2021), learning environments with references to reality – type (5) and (6) – can be explored through analyzes focused on the minimum wage. When performing the correction of values, only from exercises and mathematical calculations, one can explore the environment (5). On the other hand, in the environment (6) moments of reflection are extended, thinking about whether the minimum wage is enough or not to guarantee decent living conditions for families.

Also, proposing learning environments with references to the real life of students is in line with the ideas of Hartmann, Mariani and Maltempi (2021): that FE activities should allow participants to interpret contexts, through mathematical and non-mathematical arguments. mathematicians. Thus, we emphasize that these are just some of the various notes and possibilities of interweaving between FE and CME.

Finally, we indicate that a perspective that starts from this interweaving needs to overcome the idea of homo economicus, which is someone who assumes submission and adapts to economic orders. Ole Skovsmose, in the preface to the book by Baroni, Hartmann and Carvalho (2021), points out that homo economicus, by assuming the logic of the market and provoking tensions, brings challenges to Mathematics Education.

Given the above, FE appears to be an extremely important topic, as it enables the study of mathematical curriculum content through issues related to human experience. Students are given moments of critical reflection on economic, social, political and cultural aspects. In the face of the capitalist society in which we are inserted, providing discussions about the social, financial and economic context of individuals, aiming at improving their quality of life, through FE, is a way capable of allowing citizens to assume critical positions in the face of so many inequalities and injustices that still permeate human experience in the 21st century.

METHODOLOGICAL CONSIDERATIONS

Through our objective, already presented, this study is classified as a qualitative bibliographic survey. Fiorentini and Lorenzato (2006) explain ideas about qualitative research, which we corroborate, as we value the understanding of the data found and describe them, emphasizing the significance of the actions. Despite the above, we understand that quantitative data can also be important in the qualitative research approach, when collected critically (BOGDAN; BIKLEN, 1994).

With regard to the bibliographical characteristic, we emphasize the exposed by Fiorentini and Lorenzato (2006, p. 71), who affirm that the bibliographical research "proposes to carry out historical analyzes and/or review of studies or cultural productions mined from archives and collections". For this purpose, as already mentioned, as repositories for data collection, we consider the Capes Catalog of Dissertations and Theses and the BDTD, to catalog the master's and doctoral research that thematized FE in the light of CME. We evidenced that in both platforms we adopted as search term "'Financial Education' AND "Critical Mathematics Education'" and we did not restrict the data to time periods of completion of the works.

In a first instance, on January 22nd, 2021, we were able to observe 15 productions arranged in the BDTD and 27 searches in the Capes Catalog, that is, a total of 42 works. However, when analyzing this data, we observed that eight surveys were the result of searches on both platforms. In addition, after reading the title, abstract and keywords, we discarded a production, since, despite having been mapped, it did not thematize CME allied to FE, but Records of Semiotic Representation and Plane Geometry. Therefore, in this initial search we found 33 works, completed between 2012 and 2019.

To complement this data, on August 5th, 2021, we performed a new search in both repositories. In this, there was no change in the data observed in the BDTD, however, the Capes Catalog returned five new productions, defended in 2020 and 2021. Therefore, when considering the two mapping processes of dissertations and theses, we constituted our corpus of analysis by 38 productions, which are presented and discussed in the next section.

RESULTS ANALYSIS AND DISCUSSION

As mentioned in the previous section, our analysis is based on 38 master's and doctoral researches. In Chart 2 we have a list of these, distributed by higher education institution (HEI), title, author and year.

Chart 2 – List of the 38 surveys mapped

HEI (total)	Title	Year
Pedro II (1)	Financial Education in Elementary School: a Good Business	2016
IFES (3)	Financial mathematics in high school from an investigative perspective	2015
	Financial education: a case study in the initial training of mathematics teachers	2019
	Financial Education for high school students: an investigative approach to learning in Mathematics classes	2021
IFSP (3)	A proposal for Financial Education activities in High School	2018
	Contributions of Statistical, Socio-emotional and Financial Education to the citizen's health	2018
	Financial Education: an analysis of Mathematics textbooks from the final years of Elementary School	2018
UFJF (6)	Financial Education: a critical documentary research	2012

	Financial Mathematics and Technology: Spaces for the Development of the Critical Capacity of Youth and Adult Education Students	2012
	Investigating how critical financial education can contribute to young-individual-consumer (JIC'S) consumption decision-making	2013
	The insertion of financial education in a financial mathematics service course for undergraduates of a Business Administration course	2016
	Structuring and investigating the functioning of the Mathematics Education and Financial Education Laboratory (LABMAT-FE)	2017
	Financial Education in Youth and Adult Education (EJA): seeking an entrepreneurial vision for adult students in the municipality of Irupi - ES	2019
UFU (1)	Didactic possibilities with Critical School Financial Education in the early years of Elementary School	2020
UNIAN (3)	Virtual Learning Environment and Investigation Scenarios: Contributions to an Accessible Financial Education	2016
	Financial education from the perspective of critical mathematics and the continuing education of high school teachers	2017
	The interrelationships of mathematical and financial thinking in education, as a transdisciplinary challenge	2019
Uningranrio (1)	Scenarios for Investigation of Financial Education themes in a public school in Duque de Caxias	2016
USP (2)	Financial Education and the Mathematics textbook: an analysis of the collections approved in the PNLD 2015 for High School	2016
	Financial Education: a scenario proposal for investigation in Elementary Education	2020
UEPB (1)	Financial education in the mathematics textbook (MTB): teaching conception and pedagogical practice	2019
UESC (1)	Scenario of Financial Education to Understand PA and PG in High School: a look at the assumptions of Critical Mathematics Education	2019
UFPE (7)	Financial education in the early years of elementary school: how has it been happening in the classroom?	2017
	Financial education in mathematics textbooks for the early years of elementary school: what are the activities suggested in the students' books and the guidelines present in the teachers' manuals?	2017
	Financial education program in high schools: an analysis of the proposed materials and their relationship with mathematics	2017
	Financial education activities in mathematics textbooks: how do teachers put them into practice?	2018
	Financial education in mathematics textbooks for the final years of elementary school	2019
	Financial Education and Financial Mathematics: understanding possibilities from a study group with high school teachers	2019
	School Financial Education in Early Childhood Education: analysis of the activities of material used in the Municipal Education Network of Recife	2020

UFRPE (1)	Critical Mathematics Education: A didactic sequence for teaching Mathematics and Financial Education based on the theme Inflation	2019
UFN (1)	Financial Mathematics Education: a socioeconomic approach in the 2nd Grade of Polytechnic High School	2016
UFRGS (1)	Research on the contributions of mathematics to the development of financial education at school	2016
UnoChapecó (2)	Critical financial education: new challenges in continuing teacher education	2014
	Critical financial education: a perspective of empowerment for young peasants	2015
UTFPR (1)	Financial education and environmental sustainability: a reflection in high school math classes	2019
IFG (1)	The discipline of financial mathematics in mathematics degrees and a proposal for continuing education from the perspective of critical mathematics	2019
UFG (1)	Decision making and learning financial mathematics: an experience with smartphone apps	2018
UFAC (1)	Critical Financial Education: the case of students in the 2nd grade of high school at a school in Boca do Acre - AM with the mediation of mobile applications	2020

Source: Research Data (2021)[2].

Through the data in Table 2, we initially emphasize the predominance of productions in the Southeast (20 surveys - see data between lines 1 and 20 of the table) and Northeast (10 surveys - according to lines 21 to 30 of the table) of Brazil, totaling 30 works (78.95% of the total). This result is mainly due to the fact that the two institutions that most presented research were concentrated in these regions, the Federal University of Juiz de Fora (UFJF) and the Federal University of Pernambuco (UFPE), respectively, with six and seven works.

Furthermore, these results converge with those presented by Cirani, Campanario and Silva (2015, p. 179) on the "percentage distribution by region of graduates by graduate course in the strict sense", out of a general total of 55,047, 29,009 are located in Southeast region of the country, since this is the region that has the largest number of master's and doctoral programs, in addition to enrollments in these courses. Furthermore, Araújo-Jorge, Sovierzoski and Borba (2017) when presenting considerations on the Capes Teaching area, indicate an effective growth of postgraduate programs when comparing the 2010-2012 and 2013-2016 evaluations. Also, according to these authors, there was a significant increase in professional master's programs, which now represent 56% of the Teaching area, such as the seven researches carried out by the UFJF in a Professional Master's Degree in Mathematics Education.

In addition to the above, although we did not restrict the search for papers to a time period for their completion, research was only found from 2012 onwards, with the majority concentrated between the years 2016 and 2020. This observation converges with what was presented in the last quadrennial evaluation of Capes[3], in 2017, when it was pointed out that there was an effective growth of postgraduate programs in Brazil, between the years 2013 and 2016.

With regard to the research concentration areas, we note that 17 of them (44.74% of the total) are explicitly related to Mathematics Education. The productions carried out by UFJF (six) are linked to a professional master's program

in Mathematics Education. The works completed (three) at the Anhanguera University of São Paulo (UNIAN) and the dissertation carried out by the State University of Santa Cruz (UESC), were carried out in academic graduate programs in Mathematics Education. Furthermore, seven productions carried out by UFPE were found, in a postgraduate program in Mathematics and Technological Education.

Also, it should be noted that of the 38 studies found, 37 are master's dissertations and only one, by Santos (2016), is classified as a doctoral thesis. This thesis was carried out in the graduate program in Mathematics Education at UNIAN and was mainly about the scenarios for investigation (SKOVSMOSE, 2008).

In addition to the institutional data presented, we observed the centrality of the themes addressed in the 38 papers, in order to ascertain the "how" FE is addressed in the research. It was possible to visualize the predominance of researches that focused on the production of data in Basic Education, mainly through the idealization of activities with students or through the analysis of textbooks. We found 11 productions related to Elementary Education, 17 researches in Secondary Education and two in Youth and Adult Education, that is, we totaled 30 studies directed to Basic Education, which corresponds to 78.95% of the surveys mapped.

Regarding the other productions, we noticed that: one work was theoretical, that is, characterized by documentary research (BRITTO, 2012); three dealt with continuing teacher education; and two studies addressed FE related to different themes, namely, inclusion and transdisciplinarity. It was possible to observe only one work developed in Higher Education, in an Administration course; and also just a production aimed at initial teacher training (LEFFLER, 2019).

Regarding the level of education or course in which the research was carried out, in addition to what has already been exposed, we show that research considered postgraduate subjects with a disability, seven researches were carried out with 3rd grade students and eight with 2nd grade high school students. About the methodological characteristic of these, we observed that seven were of the qualitative-quantitative form, while the others were developed under the qualitative paradigm[4].

Finally, we emphasize that in addition to having found only Leffler's research (2019) on initial training, most of the productions pointed to the importance, difficulties and teaching responsibilities to conduct FE. From the predominance of the focus of reflections on the scenarios for investigation and some approaches related to mathematics (SKOVSMOSE, 2008) in the mapped works, as in Gaban (2016), Silva (2018), Leffler (2019) and Santiago (2019), it was pointed out that there is a need to expand teaching knowledge with regard to FE, requiring initial and continuing training. Thus, we present the next section.

FINANCIAL EDUCATION IN HIGHER EDUCATION: SOME DIRECTIONS

Through the data shown in the previous section, we begin to discuss the research that thematized the continuing education of teachers (CHIARELLO, 2014; SANTOS, 2017; FERREIRA, 2019), Higher Education (TEIXEIRA, 2016) and the initial training of future teachers (LEFFLER, 2019). This happens when we seek to present

directions to promote FE in Higher Education, especially in Mathematics Degree Courses.

The first of them reflected on what "understanding do teachers have about the possibility of promoting a Critical Financial Education in their teaching practice, based on activities developed during a process of continuing education?" (CHIARELLO, 2014, p. 17). Among its results, there are possibilities to promote scenarios for investigation (SKOVSMOSE, 2008) that allow articulations between FE and CME in schools. However, with this author's research, questions emerge whether teachers have training in the concepts presented.

Santos (2017, p. 19) aimed to "Understand the possibilities of a training process that proposes to develop Financial Education in a critical perception in High School". Among the analytical procedures, it was possible to observe that the discipline of Financial Mathematics is not offered in several Degree Courses in Mathematics. Thus, teaching practice is influenced and continuing education on FE is necessary (SANTOS, 2017).

The last research mapped on continuing education was that of Ferreira (2019, p. 17), who sought to answer "How is the subject of Financial Mathematics structured in the PPCs of Mathematics Degree courses and appropriate for the future teaching practice of undergraduate students?". The author analyzed 182 Pedagogical Political Projects and observed that the subject of Financial Mathematics is mandatory in 50% of these courses, that is, in 91 courses. Of the rest, in 54 it is not offered.

Furthermore, the analytical procedures of Ferreira's research (2019) revealed that FE was found in only 10 of the 117 menus of the observed courses. This result reinforces the importance of including this theme in the initial training of Mathematics teachers, especially when considering the notes of the BNCC (BRASIL, 2018). In this sense, Ferreira (2019) also proposed a continuing education course that intertwines Financial Mathematics and FE.

Given these aspects, a limitation that the bibliographic survey revealed was the lack of research that addressed FE in Higher Education. This is because the only one that explicitly attended to this aspect was that of Teixeira (2016), carried out with academics from a Business Administration Course, in a Financial Mathematics Service Course.

Through his research, Teixeira (2016) indicated that: it is important to approach mathematical content for different courses, that is, in addition to the Business Administration course; the participants developed a critical position - that is, we understand that they developed aspects defended by Skovsmose (2001; 2008); and subjects confounded Financial Mathematics compared to FE. Such results demonstrate, above all, the importance of expanding reflections on FE to different educational stages and courses, in order to develop mathematical and non-mathematical aspects (MUNIZ, 2016).

Another limitation found in the bibliographic survey is that the only discussions about initial teacher education were observed in the study by Leffler (2019). This aimed to identify, through the relationship between Financial Mathematics and FE, "the potential for structuring and conducting the discipline 'Financial Mathematics', in a Mathematics Licentiate course [...] with the use of

activities built from the perspective of Critical Mathematics Education" (LEFFLER, 2019, p. 25).

When carrying out his study with 26 Mathematics undergraduates, Leffler (2019) highlighted that: students do not have the FE approach in Basic Education; it is necessary to overcome the gaps on this subject in the initial training of Mathematics teachers; and CME is one of the means to encourage actions that unite Financial Mathematics and FE. Still, according to Leffler (2019) FE can develop citizenship, requiring research, teaching materials and teacher training for the process of financially educating people.

Still, although not located by the data collection procedures of the bibliographic survey, we expanded the reflections regarding the need for studies on FE in Higher Education, especially in the training of Mathematics teachers, through the results produced by Baroni's research (2021) and Hartmann (2021). Baroni's thesis (2021, p. 43) sought to answer: "What are the possibilities of Financial Education in the context of Mathematics Education, with regard to initial teacher training?". And, Hartmann's dissertation (2021, p. 23), aimed to "identify, analyze and discuss Financial Education in Mathematics Degree Courses at Unesp, in the light of Critical Mathematics Education".

Baroni (2021) produced his data together with professors from a federal institution located in the state of São Paulo (Brazil), based on a collaborative work group. Its subjects were Higher Education professors with experience in disciplines related to FE. The theoretical support considered was CME and the vision of education as a practice of freedom, according to Paulo Freire.

Among the results shown in Baroni's research (2021) are four referrals aimed at promoting FE in Mathematics Degree Courses, namely: i) expanding the area of reflection and instigating critical analysis of the financial world; ii) work with generating themes and seek dialogue with other areas, favoring interdisciplinary actions; iii) privilege real problems, without limiting the discussions; iv) to promote a reflection on the work with FE in Basic Education. To this end, the author considers factors such as the need to discuss the act of consumption, as pointed out by Skovsmose (2008; 2014), and criticism of artificial problems, making it possible to approach FE through real situations and scenarios for investigation (SKOVSMOSE, 2008).

In addition to these referrals, based on data analysis, Baroni (2021) produced his understanding of FE, which differs from those already presented (OECD, 2005; SILVA, POWELL, 2013) as it is directly focused on initial teacher training. In this way, according to her:

> We understand that the Financial Education that is relevant in an initial training course for Mathematics teachers is a process of problematizing personal and collective financial life, with the objective of understanding and critically analyzing the financial world and its social, political and economic implications, from a perspective of transforming the mechanisms of economic dependence and social inequality. This process takes place through different analyses, including mathematical analysis aimed at the development of financial literacy, as we understand it (BARONI, 2021, p. 239-240).

We corroborate this perspective, as it encompasses aspects of CME and our understanding of FE, already presented in the first section of this text. For example,

Baroni (2021) emphasizes the importance of problematizing personal and collective financial life, which goes beyond the individualistic idea of FE from the OECD (2005), and which is in line with ours, when we aim at the theme of improving the quality of lives of people and the society in which they live. Furthermore, Baroni (2021) visualizes the need to combat social inequality, a factor pointed out in Skovsmose (2014).

The ideas presented by Baroni (2021) can be reinforced or expanded with the research by Hartmann (2021). This author, through a clipping carried out from a document analysis, conducted interviews with three professors who addressed FE in Mathematics Degree Courses at a state university in São Paulo. In addition, it developed questionnaires with 19 undergraduate students in Mathematics, who had taken courses that dealt with FE topics in their initial training.

Through the analytical procedures conducted by Content Analysis, data from Hartmann's dissertation (2021) generated four categories, namely: i) insufficiency of Financial Mathematics for conducting FE; ii) FE for training future Mathematics teachers in Basic Education; iii) FE's contributions to critical, democratic and civic experience; iv) FE conceptions in initial training.

In its first category, Hartmann (2021) indicated that FE needs to go beyond Financial Mathematics, providing moments of debate on other aspects/contents, in addition to reflection and criticality. Such indications are in line with the ideas of Skovsmose (2008) about scenarios for investigation and the interdisciplinary work and generative themes indicated by Baroni (2021). In the second category, Hartmann's (2021) ideas are also found in Baroni's (2021) results and referrals, in particular by defending the need to weave relationships between FE and Basic Education, in the training of future Mathematics teachers.

The third point observed by Hartmann (2021), which concerns the contributions of FE to the critical, democratic and citizen experience, raises questions about the importance of weaving reflections on the aforementioned theme in different spaces, not only in the training of Mathematics teachers, but in other higher education courses, as in Teixeira (2016). FE, combined with CME, can prepare subjects to act in society, taking a critical position on what is set, as defended by the ideas of Mazzi and Baroni (2021) and the conception of CME itself, according to Skovsmose (2001).

The last category analyzed by Hartmann (2021) indicates that there are still weaknesses in the training of Mathematics teachers regarding FE. The author states that it is necessary to overcome individualistic and capitalist ideas on the subject, understood by some undergraduates. We understand that this point is also recommended by Baroni (2021), when he indicated in his first referral the need to broaden the area of reflection and instigate critical analysis of the financial world. In addition, based on the CME, Hartmann (2021, p. 158) infers that "individuals can effectively broaden their views on Financial Education to a social perspective, with a look at the next and that leads us [...] to the approximation of a more economically egalitarian society.

In this way, the ideas exposed in the research by Baroni (2021) and Hartmann (2021) can corroborate the production of teachers' knowledge about FE, a need indicated in the research observed in the bibliographic survey, as in Gaban (2016), Silva (2018), Leffler (2019) and Santiago (2019). We emphasize that reflections on this theme, in the training of Mathematics teachers and in other Higher Education

courses, should not be limited to just one discipline (BARONI, 2021), emanating interdisciplinary actions and meeting CME (BARONI, 2021; HARTMANN, 2021).

FINAL CONSIDERATIONS

When we ask ourselves how FE is addressed in master's and doctoral research carried out in Brazil, under the theoretical lens of CME, we aim to present directions to promote Financial Education in Higher Education, especially in Mathematics Degree Courses, from of a bibliographical survey of the academic productions available in the Catalog of Dissertations and Theses of Capes and in the BDTD. We point out that FE related to CME is present in master's studies, however, considering that we found only one doctoral thesis, among the 38 works, we direct the need to expand research at this level on the subjects addressed in this text.

We suggest that the discussions proposed in this article be expanded, through the search for research that thematized FE, under different theoretical lenses. We are aware that any search for work, while making it possible to find and analyze the focused research, is also restricted, since many productions can be published on other platforms, in our case, in journals that were not part of the scope of this study, such as the main journals in Mathematics Education. Furthermore, we emphasize that the choice of platforms was due to the fact that they are the main bases that group studies related to dissertations and theses in Brazil.

When we consider how FE is approached, we evidence that the vast majority of productions reflected on this theme in Basic Education, mainly through the idealization of activities and analysis of textbooks, with 30 of the 38 surveys mapped. Still, it was possible to observe that there were studies that met the search criteria and were of a theoretical nature, on continuing teacher education, inclusion and transdisciplinarity.

In this sense, we conclude that there is a need to produce investigations that deal with FE from the perspective of CME, mainly in the initial training of Mathematics teachers, raising questions about the real insertion of this theme in Mathematics Degree Courses and preparing future teachers to conduct this theme and its discussion in Basic Education, in a critical, democratic and citizen way. In addition to the above, another need that emerges is to explore research aimed at Youth and Adult Education.

In summary, mainly doctoral theses need to be carried out in Brazil, on FE and CME, focused on EJA and initial teacher training. We emphasize, in particular, initial training, as we understand that the inclusion of FE in the BNCC and its relations with the area of Mathematics in Elementary and Secondary Education requires that Mathematics teachers are prepared to approach it in Basic Education.

In this way, FE is included in the training of Mathematics teachers, as Baroni (2021) and Hartmann (2021) point out, considering factors such as: relationships with Financial Mathematics, but which go beyond mathematical content, as they are insufficient; moments of reflection on the critical, democratic and citizen experience; interdisciplinary actions, based on generating themes and dialogue; and relationships with teaching work in Basic Education.

Thus, we hope that this article will encourage Brazilian researchers to investigate the proposals presented, seeking ways for Basic Education students, undergraduates and the community in general to have access to FE and to a critical and citizenship education. We also advocate that teachers increasingly promote FE by inviting critical actions and dialogues about the social, financial and economic context of individuals, aiming to improve the quality of life of people and the society in which they live, enabling decision-making based on economic, financial, social, cultural and behavioral aspects.

EDUCAÇÃO FINANCEIRA À LUZ DA EDUCAÇÃO MATEMÁTICA CRÍTICA: TEORIA, PESQUISAS STRICTO SENSU NO BRASIL (2012 – 2021) E DIRECIONAMENTOS

RESUMO

Apesar de investigações anteriores a 2018 terem discutido a Educação Financeira e assinalado a importância de serem inseridos estudos sobre essa temática na Educação Básica, ela só foi explicitamente incluída no currículo brasileiro por meio da Base Nacional Comum Curricular (BNCC), sobretudo ideias relacionadas às habilidades e competências da área de Matemática. Nesse sentido, com a crescente abordagem da Educação Financeira nas escolas brasileiras, emergem indagações que se voltam à importância de se ter uma dimensão de como pesquisas têm debatido o cenário da Educação Financeira no Brasil, revisitando-as para analisar o que se tem até então sobre a referida temática. Logo, consideramos a seguinte questão: de que formas a Educação Financeira é abordada nas pesquisas de mestrado e doutorado, realizadas no Brasil, sob a lente teórica da Educação Matemática Crítica? E objetivamos apresentar direcionamentos para promover a Educação Financeira no Ensino Superior, sobretudo nos Cursos de Licenciatura em Matemática, a partir de um levantamento bibliográfico das produções acadêmicas disponíveis no Catálogo de Dissertações e Teses da Capes e na Biblioteca Digital Brasileira de Teses e Dissertações. Para tanto, assumimos perspectivas teóricas sobre Educação Matemática Crítica, como os conceitos de matemacia, matemática em ação e ambientes de aprendizagem com foco nos cenários para investigação. Através dos repositórios mencionados, buscamos pelo termo "'Educação Financeira' AND 'Educação Matemática Crítica'" e obtivemos um corpus de análise constituído por 38 pesquisas, concluídas entre 2012 e 2021. Os dados indicam um predomínio de investigações realizadas no Ensino Fundamental e Médio, sobretudo voltadas ao desenvolvimento de atividades didáticas sobre Educação Financeira ou a análise de livros didáticos. Além disto, ao considerarmos a falta de pesquisas que tematizaram a Educação Financeira no Ensino Superior e a importância de inserir discussões inerentes a esse tema nos Cursos de Licenciatura em Matemática, preparando os professores para abordar a Educação Financeira, apresentamos alguns encaminhamentos neste sentido e indicamos a necessidade de mais reflexões

PALAVRAS-CHAVE: Educação Matemática. Ensino Superior. Levantamento bibliográfico. Catálogo da Capes. BDTD. Dissertações e teses.

NOTES

1. The author suggests understanding responsibility as responding-ability, in which mathemacy is composed of the ability to react and give answers, in addition to recognizing that the world can undergo changes (SKOVSMOSE, 2014).

2. Organized by the authors.

3. Information obtained from: https://www.capes.gov.br/36-noticias/8558-avaliacao-da-capes-aponta-crescimento-da-pos-graduacao-brasileira. Last accessed May 2020.

4. For more details on these issues, we recommend reading the second chapter of the first author's dissertation (HARTMANN, 2021).

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REFERENCES

ARAÚJO-JORGE, T. C.; SOVIERZOSKI, H. H.; BORBA, M. C. A Área de Ensino após a avaliação quadrienal da CAPES: reflexões fora da caixa, inovações e desafios em 2017**. Revista Brasileira de Ensino de Ciência e Tecnologia**, 10(3), 1-15, 2017. Available at: https://periodicos.utfpr.edu.br/rbect/article/view/7744. Accessed on: Apr. 9th, 2022.

BARONI, A. K. C. **Educação Financeira no Contexto da Educação Matemática: possibilidades para a formação inicial do professor**. 2021. 253 p. Tese (Doutorado em Educação Matemática). Universidade Estadual Paulista, Rio Claro, 2021. Available at: https://repositorio.unesp.br/handle/11449/202819. Accessed on: Nov. 4th, 2022.

BARONI, A. K. C.; HARTMANN, A. L. B.; CARVALHO, C. C. S. **Uma abordagem crítica da educação financeira na formação do professor de matemática.** 1 ed. 259 p. Curitiba: Appris, 2021.

BOGDAN, R.C.; BIKLEN, S. K. **Investigação Qualitativa em Educação Matemática: uma introdução à teoria e aos métodos**. Lisboa: Porto Editora. 1994.

BRASIL. Ministério da Educação. **Base Nacional Comum Curricular.** 2018. Available at: http://basenacionalcomum.mec.gov.br/images/BNCC_EI_EF_110518_versaofinal_site.pdf. Accessed on: Jan. 12th, 2021.

BRITTO, R. R. de. **Educação Financeira: uma pesquisa documental crítica.** 2012. 262 p. Dissertação (Mestrado Profissional em Educação Matemática). Universidade Federal de Juiz de Fora, Juiz de Fora, 2012. Available at: https://www2.ufjf.br/mestradoedumat//files/2011/05/DISSERTA%c3%87%c3%83O-REGINALDO-RAMOS-BRITTO.pdf. Accessed on: Nov. 4th, 2022.

CAMPOS, A. B. **Investigando como a educação financeira crítica pode contribuir para tomada de decisões de consumo de jovens-indivíduos-consumidores (JIC'S)**. 2013. 177 p. Dissertação (Mestrado Profissional em Educação Matemática). Universidade Federal de Juiz de Fora, Juiz de Fora, 2013. Available at: https://www2.ufjf.br/mestradoedumat//files/2011/05/Disserta%c3%a7%c3%a3o-Andre-Campos.pdf. Accessed on: Nov. 4th, 2022.

CHIARELLO, A. P. R. **Educação Financeira Crítica: novos desafios na formação continuada de professores**. 2014. 149 p. Dissertação (Mestrado em Educação). Universidade Comunitária da Região de Chapecó, Chapecó, 2014. Available at: https://sucupira.capes.gov.br/sucupira/public/consultas/coleta/trabalhoConclusao/viewTrabalhoConclusao.jsf?popup=true&id_trabalho=1324384. Accessed on: Nov. 4th, 2022.

CIRANI, C. B. S.; CAMPANARIO, M. A.; SILVA, H. H. M. A evolução do ensino da pós-graduação senso estrito no Brasil: análise exploratória e proposições para pesquisa. v.20, n.1, pp. 163-187. 2015. **Avaliação**, Campinas: SP. Available at: https://www.scielo.br/pdf/aval/v20n1/1414-4077-aval-20-01-00163.pdf. Accessed on: Mai. 20th, 2021.

FERREIRA, R. A. **A disciplina de matemática financeira nas licenciaturas em matemática e uma proposta de formação continuada na perspectiva da matemática crítica**. 2019. 145 p. Dissertação (Mestrado em Educação para Ciências e Matemática). Instituto Federal de Educação, Ciência e Tecnologia de Goiás, Jataí, 2019. Available at: https://repositorio.ifg.edu.br/handle/prefix/486. Accessed on: Nov. 4th, 2022.

FIORENTINI, D.; LORENZATO, S. **Investigação em educação matemática: percursos teóricos e metodológicos.** Campinas, SP: Autores Associados. 2006.

FREDERIC, D. J. A. **Contribuições das Educação Estatística, Socioemocional e Financeira para a saúde do cidadão**. 2018. 128 p. Dissertação (Mestrado em Ensino de Ciências e Matemática). Instituto Federal de Educação, Ciência e Tecnologia de São Paulo, São Paulo, 2018. Available at: https://repo.ifsp.edu.br/handle/123456789/234. Accessed on: Nov. 4th, 2022.

GABAN, A. A. **Educação Financeira e o livro didático de Matemática: uma análise das coleções aprovadas no PNLD 2015 para o Ensino Médio**. 2016. 57 p. Dissertação (Mestrado em Ciências). Universidade de São Paulo, São Paulo, 2016. Available at: https://teses.usp.br/teses/disponiveis/45/45135/tde-15052018-195816/pt-br.php. Accessed on: Nov. 4th, 2022.

HARTMANN, A. L. B.; MARIANI, R. C. P.; MALTEMPI, M. V. Educação Financeira no Ensino Médio: uma análise de atividades didáticas relacionadas a séries periódicas uniformes sob o ponto de vista da Educação Matemática Crítica. **Bolema**, Rio Claro (SP), v. 35, n. 70, p. 567-587, ago. 2021. Available at: https://www.scielo.br/j/bolema/a/bx5cbhbVLdRCFy8GVFNGtkJ/abstract/?lang=pt. Accessed on: Nov. 4th, 2022.

HARTMANN, A. L. B. **A educação financeira nos cursos de licenciatura em matemática da Universidade Estadual Paulista – Unesp**. 2021. 182 p. Dissertação (Mestrado em Educação Matemática). Universidade Estadual Paulista, Rio Claro, 2021. Available at: http://hdl.handle.net/11449/215835. Accessed on: Nov. 4th, 2022.

LEFFLER, R. **Educação financeira: um estudo de caso na formação inicial de professores de matemática.** 2019. 224 p. Dissertação (Mestrado em Educação em Ciências e Matemática). Instituto Federal do Espírito Santo, Vitória, 2019. Available at: http://biblioteca.ifes.edu.br:8080/pergamumweb/vinculos/000019/000019c1.pdf. Accessed on: Nov. 4th, 2022.

MAZZI, L. C.; BARONI, A. K. C**. Diálogos possíveis entre Educação Financeira e Educação Matemática Crítica**. In: BARONI, A. K. C.; HARTMANN, A. L. B.; CARVALHO, C. C. S. Uma abordagem crítica da educação financeira na formação do professor de matemática. 1 ed. 259 p. Curitiba: Appris, 2021.

MUNIZ, I. Jr. **Econs Ou Humanos? Um Estudo Sobre a Tomada de decisão em Ambientes de Educação Financeira Escolar**. 2016. 431 p. Tese (Doutorado em Engenharia de Produção). Universidade Federal do Rio de Janeiro, Rio de Janeiro, RJ, 2016.

OLIVEIRA, A. dos A. **Educação financeira nos anos iniciais do ensino fundamental: como tem ocorrido na sala de aula?** 2017.160 p. Dissertação (Mestrado em Educação Matemática e Tecnológica). Universidade Federal de

Pernambuco, Recife, 2017. Available at: https://repositorio.ufpe.br/handle/123456789/32214. Accessed on: Jan. 22nd, 2021.

ORGANIZAÇÃO PARA A COOPERAÇÃO E DESENVOLVIMENTO ECONÔMICO (OCDE). **Recommendation on Principles and Good Practices for Financial Education and Awareness.** Directorade for Financial and Enterprice Affairs. 2005. Available at: http://www.oecd.org/finance/financial-education/35108560.pdf. Acesso em: Jan. 12th, 2021.

PIZZOLATTO, C. **Educação financeira e sustentabilidade ambiental: uma reflexão em aulas de matemática do ensino médio**. 2019. 168 p. Dissertação (Mestrado em Desenvolvimento Regional). Universidade Tecnológica Federal do Paraná, Pato Branco, 2019. Available at: https://repositorio.utfpr.edu.br/jspui/handle/1/4018. Accessed on: Nov. 4th, 2022.

SANTIAGO, M. S. **Educação financeira no Livro Didático de Matemática (LDM): concepção docente e prática pedagógica.** 2019. 127 p. Dissertação (Mestrado Profissional em Ensino de Ciências e Matemática). Universidade Estadual da Paraíba, Campina Grande, 2019. Available at: http://tede.bc.uepb.edu.br/jspui/handle/tede/3496. Accessed on: Nov. 4th, 2022.

SANTOS, C. E. R. dos. **Ambiente virtual de aprendizagem e cenários para investigação: contribuições para uma educação financeira acessível**. 2016. 280 p. Tese (Doutorado em Educação Matemática). Universidade Anhanguera de São Paulo, São Paulo, 2016. Available at: https://repositorio.pgsskroton.com//handle/123456789/21791. Acesso em: Nov. 4th, 2022.

SANTOS, A. P. dos. **Educação Financeira na perspectiva da matemática crítica e a formação continuada do professor do Ensino Médio**. 2017. 101 p. Dissertação (Mestrado em Educação Matemática). Universidade Anhanguera de São Paulo, São Paulo, 2017. Available at: http://repositorio.pgsskroton.com/handle/123456789/16834. Accessed on: Nov. 4th, 2022.

SILVA, A. D. P. da. **Atividades de educação financeira em livro didático de matemática: como professores colocam em prática?** 2018. 200 p. Dissertação (Mestrado em Educação Matemática e Tecnológica). Universidade Federal de Pernambuco, Recife, 2018. Available at: https://bdtd.ibict.br/vufind/Record/UFPE_e0afb97d45560d304940cb037ae2448d. Accessed on: Nov. 4th, 2022.

SILVA, A. M.; POWELL, A. B. Um programa de Educação Financeira para a Matemática Escolar da Educação Básica. In: XI Encontro Nacional de Educação Matemática, 11., 2013, Curitiba. **Anais do XI ENEM**... Curitiba: Pontifícia Universidade Católica do Paraná, 2013, p. 1-17.

SKOVSMOSE, O. **Educação Matemática Crítica: a questão da democracia**. Campinas/SP: Papirus 2001.

SKOVSMOSE, O. **Educação Crítica: incerteza, matemática, responsabilidade.** São Paulo: Cortez, 2007.

SKOVSMOSE, O. **Desafios da reflexão em educação matemática crítica.** Campinas/SP: Papirus, 2008.

SKOVSMOSE, O. **Um convite à Educação Matemática Crítica.** Campinas: Papirus, 2014.

TEIXEIRA, W. C. **A inserção da Educação Financeira em um Curso de Serviço de Matemática Financeira para graduandos de um curso de Administração.** 2016. 158 p. Dissertação (Mestrado profissional em Educação Matemática). Universidade Federal de Juiz de Fora, Juiz de Fora, 2016. Available at: https://www2.ufjf.br/mestradoedumat/wp-content/uploads/sites/134/2011/05/dissertacao-wesley-versao-final-com-ficha.pdf. Accessed on: Nov. 4th, 2022.

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