

**LITERATURE REVIEW OF BOURDIEU'S THEORETICAL PERSPECTIVE ON
MATHEMATICAL EDUCATION**

***REVISÃO BIBLIOGRÁFICA DA PERSPECTIVA TEÓRICA DE BOURDIEU NA
EDUCAÇÃO MATEMÁTICA***

***REVISIÓN BIBLIOGRÁFICA DE LA PERSPECTIVA TEÓRICA DE BOURDIEU EN
LA EDUCACIÓN MATEMÁTICA***

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ABSTRACT: Considering Bourdieu's importance to education, we intend to analyze how the author is approached in Mathematical Education e what are his possible implications and contributions to this subject, as well as narrow it down which of his main concepts (habitus, field, economic capital, cultural capital, symbolic capital and social capital) are used by researchers of Mathematical Education. The bibliographic survey was made through online searches on annals of this subject's main scientific events, Mathematical Education journals evaluated from A1 to B2 in teaching and education at Sucupira Platform in Journals Classification during the quadrennium 2013-2016. We concluded that Bourdieu's concepts are not used very much when it comes to Mathematical Education. This happens both for the lack of quantitative representativeness and for the even smaller number of researches that use his working mode.

KEYWORDS: Pierre Bourdieu. Math education. Literature review.

RESUMO: Considerando a importância de Bourdieu para a educação, analisamos como o autor é abordado na Educação Matemática e quais são suas possíveis implicações e contribuições para a área, bem como delimitamos quais de seus conceitos principais (habitus, campo, capital econômico, capital cultural, capital simbólico e capital social) são utilizados pelos pesquisadores de Educação Matemática. O levantamento bibliográfico foi realizado através de buscas online nos anais dos principais eventos científicos da área, nos sites dos periódicos de Educação Matemática avaliados de A1 a B2 nas áreas de ensino e de educação na Plataforma Sucupira na Classificações de Periódicos no quadriênio 2013-2016. É possível concluir que Bourdieu é pouco conhecido e adotado na área de Educação Matemática, tanto pela baixa representatividade quantitativa desses estudos quanto pelo número ainda menor de pesquisas que adotam seu modo de trabalho.

PALAVRAS-CHAVE: Pierre Bourdieu. Educação matemática. Revisão bibliográfica.

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RESUMEN: Considerando la importancia de Bourdieu para la educación, analizamos cómo se entra al autor en la Educación Matemática y cuáles son sus posibles implicaciones y aportes al área, así como delimitar cuáles de sus principales conceptos (*habitus, campo, capital económico, capital cultural, capital simbólico y capital social*) son utilizados por los investigadores en Educación Matemática. El levantamiento bibliográfico se realizó a través de búsquedas en línea en los anales de los principales eventos científicos del área, en los website de las revistas de Educación Matemática evaluadas de A1 a B2 en las áreas de enseñanza y educación en la Plataforma Sucupira en las Clasificaciones Periódicas en el cuatrienio 2013-2016. Es posible concluir que Bourdieu es poco conocido y adoptado en el área de la Educación Matemática, tanto por la baja representación cuantitativa de estos estudios como por el número aún menor de estudios que adoptan su forma de trabajar.

PALABRAS CLAVE: Pierre Bourdieu. Educación matemática. Revisión bibliográfica.

Introduction

The concern with effective teaching-learning belongs to the vast majority of teachers, including those in the area of mathematics who, among other things, need to deal with the social stigma created by the discipline as something extremely difficult, which only gifted people can manage.

According to D'Ambrósio (2004), there are concerns with the teaching of mathematics since antiquity, however, it is only after the Industrial Revolution, the American Revolution and the French Revolution that concerns with Mathematics Education begin to take shape. Also, according to the author, only in the transition from the 19th to the 20th century did Mathematics Education become a priority area in education. About the consolidation of Mathematics Education, he states that it happens with the foundation of the International Commission of Mathematics Instruction, in 1908.

Thus, we can see that, although the concern with the teaching and learning of mathematics goes back to antiquity, Mathematics Education is a recently created area. Some trends are presented in the Teaching of Mathematics to try to promote an education that moves away from the purely expository class, in which the teacher is the only holder of knowledge and learning takes place through the memorization of contents, such as ethnomathematics, mathematical modeling, problem solving, the use of software and new technologies in the classroom, among others.

However, most of the new forms of learning tend to disregard the sociocultural context in which students are educated and the influence that such context has on school success or failure. That is, there is a lack of sociological references in educational trends in the area of Mathematics Teaching.

Pierre Bourdieu (1930-2002) develops a sociological response to educational problems, in which he explains, according to Nogueira and Nogueira (2017), that school performance is due to the social origin of students, that is, there is a strong weight of social origins about school destination. The authors also state that education, in Bourdieu's theory, has lost its role as a transforming and democratizing agent of societies and has come to be seen as one of the main institutions that propagate and perpetuate social inequalities.

The sociologist is used as a reference in some articles that analyze the relationship between cultural capital and performance in mathematics, such as, for example, the article by Santos, Andrade and Cousin (2016) that analyzes this relationship in public schools in the municipality of Maringá, in Paraná, using the results of 9th grade students in the 2011 *Prova Brasil*. We also have the article by Nunes (2011), who also analyzes the relationship between math performance and cultural capital from the perspective of Bourdieu, but through the data the Programme for International Student Assessment (PISA) and the Basic Education Assessment System (SAEB, Portuguese initials).

Both researches deal with the concept of cultural capital and reach similar results, since they show that male and female students who have greater cultural capital generally obtain the best results in the Mathematics discipline, that is, cultural capital is strongly related to good discipline performance.

The fruitfulness of the works mentioned above and the influence of Bourdieu's concepts led us to question what the author's other contributions to Mathematics Education would be.

Thus, considering the already explained importance of Bourdieu for education, we intend to analyze how the author is approached in Mathematics Education and what are his possible implications and contributions to the area, as well as to delimit which of his main concepts (*habitus*, field, capital economic capital, cultural capital, symbolic capital and social capital) are used by Mathematics Education researchers. The article is divided into the following parts: initially we demonstrate our methodology, then we highlight the works of Bourdieu that were appropriated in the studied works, then we bring the appropriate concepts in the analyzed works, we group the works in thematic lines and, finally, the final considerations.

Research Methodology

We sought to identify the use of Pierre Bourdieu in Mathematics Education through a bibliographical survey, which was carried out through online searches in the annals of the main scientific events in the area, in the websites of Mathematics Education journals evaluated from A1 to B2 in the areas of *teaching* and of *education* on the Sucupira Platform in the Classifications of Journals in the four-year period 2013-2016. Only national works were considered and only journals whose scope addresses Mathematics Education were selected, especially those with the term “Mathematics Education” in their title.

Namely, the magazines analyzed, in July 2019, were: the *Boletim de Educação Matemática* (BOLEMA), the *Educação Matemática em Revista* (EMR), *Educação Matemática em Revista* (EMR) – RS, the *Magazine Mathematics Education Research* (EMP), the *Jornal Internacional de Estudos em Educação Matemática* (JIEEM), the *Revista Eletrônica de Educação Matemática* (REVEMAT), the *Boletim Online de Educação Matemática* (BOEM), *Em Teia: Revista de Educação Matemática e Tecnológica Iberoamericana*, the magazine *Perspectivas da Educação Matemática*, the *Revista Paranaense de Educação Matemática* (RPEM), the journal *Caminhos da Educação Médica em Revista*, the *Revista Internacional de Pesquisa em Educação Matemática* (RIPEM) and the *Revista Sergipana de Matemática e Educação Matemática*.

It is necessary to point out that the journal *Educação Matemática em Revista* (São Paulo) is linked to *Educação Matemática em Revista*. The same site shares both ISSNs. In addition to works published in journals, works made available in the annals of the National Meeting of Mathematics Education (ENEM) and the International Seminar on Research in Mathematics Education (SIPEM) were considered.

To better observe the use of the author in works in the area of Mathematics Education, a classification was necessary. For the classification, we based ourselves on the work of Catani, Catani and Pereira (2001), entitled *Apropriações da obra de Pierre Bourdieu no campo educacional brasileiro, através de periódicos da área* (Appropriations of the work of Pierre Bourdieu in the Brazilian educational field, through periodicals in the area). The work mentioned above aims to analyze how Bourdieu is mentioned in the Brazilian educational field. Catani, Catani and Pereira (2001, p. 65, our translation) divide Bourdieu's appropriations into three categories:

- 1) *Incidental appropriation* is the most frequent form of appropriation and is characterized by quick references to the author. In this type of appropriation, it is common for the sociologist to appear in the references and not appear in

the body of the text. It is not possible, in incidental appropriation, to relate the argument contained in the text with the reference;

2) *Topical conceptual appropriation* is characterized by presenting quotes and concepts elaborated by the author, but in a non-systematic way. The contributions elaborated by Bourdieu are used to reinforce the arguments or results obtained and developed; and

3) *Appropriation of the way of working* is characterized by the systematic appropriation of the author's concepts and notions, thus Bourdieu is the theoretical reference of the research and its development is based on Bourdian meanings.

The bibliographic review initially returned a total of 114 papers, after performing the exclusions for the reasons mentioned above, we obtained 51 papers that make up the research corpus. These 51 works were divided into three categories: incidental mention (10), topical conceptual mobilization (17) and appropriation of the way of working (24).

Bearing in mind that the works characterized by the categories of *incidental mention* and *topical conceptual mobilization* superficially express the concepts and contributions of Bourdieu's theories, we will adopt for the analysis and discussion only the works classified in the category *appropriation of the way of working*. Due to the considerably abundant amount of works classified in this category, we will discard theses and dissertations from the analysis and consider the other sources. Thus, 13 works were analyzed.

Works by Pierre Bourdieu present in the references of the works analyzed

In the study, we realized that some of Bourdieu's works are little referenced, being used by few works. This data may demonstrate that these works are not so well known by the scientific community in the area of Mathematics Education that they appropriate Bourdieu's concepts. The works *Reproduction in Education, Society and Culture* and *Symbolic Power* are the works that most appear in the references of the 13 works analyzed in the research. With this data, it can be inferred that they are the Bourdieusian works most commonly known by the scientific community in the area and are mainly associated with the sociology of education. The works considerably used, for 3 works, were *The Market of Symbolic Goods and the Scientific Field*.

Although the authors have referenced *Symbolic Power* and *The Market of Symbolic Goods* in full, these works do not have an immediate relationship with education. However, there are chapters contained in the works that can justify the frequency with which they are used as a reference. In *The Market of Symbolic Goods*, there is, for example, the chapter *Systems*

of *Teaching and Systems of Thinking*. In *Symbolic Power*, a chapter that can justify the references made is *The Genesis of the Concepts of Habitus and Field*.

Concepts appropriated by the works analyzed

Of the thirteen works analyzed, only four appropriate all of Pierre Bourdieu's main concepts. The most appropriate concept is that of *habitus* and *field*, which are present in nine works. The *capital* concept (economic capital, cultural capital, symbolic capital and social capital) is appropriated by eight works.

Other works appropriate isolated concepts from Bourdieu's theory. Bourdieu himself, in some of his works, explicitly mobilizes only one of his concepts, maintaining theoretical and methodological coherence with his general theory. The works by Farias and Vilela (2016), Aguilar and Ortigão (2018), Andrade and Santos (2014) and Pinheiro (2013) appropriate only one Bourdieusian concept. The work by Farias and Vilela (2016), although mentioning the concepts of *habitus* and capital, only appropriates the concept of field. The authors refer to two works by Bourdieu. The works by Aguilar and Ortigão (2018), Andrade and Santos (2014) and Pinheiro (2013) only appropriate the concept of capital and refer to only one work by Bourdieu. Aguilar and Ortigão (2018) and Pinheiro (2013) refer to *Reproduction*, while Andrade and Santos (2014) refer to *The three states of cultural capital*.

A closer reading of the articles considered seems to indicate initial contact with Bourdieu's work. This is because some works do not reference more than 3 of the author's works and it is common for Bourdieu to be used only as a background, in addition to being mobilized with other theoretical references. When reading the works, we also observed that there is no articulation of the data from the studies with Bourdieu's concepts.

Grenfell (2018) draws attention to how Bourdieu's contributions are received, interpreted and used. The author also mentions that Pierre Bourdieu warned about the dangers of the international circulation of ideas. “[...] what we have in Bourdieu is a single epistemological vision that the author spent the rest of his life articulating. It's one thing to see it in a 'flash', another to unwrap it over time” (GRENFELL. 2018, p. 198, our translation). For Grenfell (2018), people who use Bourdieu's theory and practice in a shallow way lose intellectual rigor and fall into instrumental utilitarianism and pragmatism.

It is very easy to *metaphorize* data; in other words, simply employing terms like *habitus*, *field* and *capital* to discuss research findings. Such use can lead to a weak form of constructivism, in which biographical incidents are

interpreted in terms of what is and is not valued in various contexts (GRENFELL, 2018, p. 199, our translation).

Catani, Catani and Pereira (2001) warn that Pierre Bourdieu's texts can be trapped in the “reproduction versus transformation” dichotomy and that the defenders of this dichotomy are often engaged in the formulation of pedagogical theories prone to politicization and militancy, which end up for delegitimizing Bourdieu's sociology. Still according to Catani, Catani and Pereira (2001), due to the dichotomies (which Bourdieu fought so hard in his works) created on top of Bourdieu's works, the author was transformed into a kind of reproductive pedagogue.

Thematic lines of the works considered

By reading the works, it was noticed that some shared similarities in terms of their respective objectives and results. With this, it was possible to carry out a subclassification, grouping them in thematic lines. The thematic lines created were based on the Working Groups of the Brazilian Society of Mathematics Education (SBEM, Portuguese initials). Some adaptations were made to better encompass the works analyzed.

The first thematic line, called School Performance, concentrates the works that aim to analyze the relationship between the capitals and sociocultural contexts in which students are inserted and the students' performance in Mathematics. The works that belong to this line may also aim to analyze the influence that the teacher's capital has on the student's proficiency.

The works belonging to the first thematic line are: an article from SIPEM (AGUILAR; ORTIGÃO, 2018), a journal article (ANDRADE; SANTOS, 2014) and three works from ENEM (PINHEIRO, 2013; COSTA *et al.*, 2013; MOGNON; ANDRADE; NEVES, 2013).

There are a total of five works belonging to the School Performance subcategory. Two of these works only use the concept of *capital* for the development of the research, two use the concept of capital and the concept of *habitus*; and only one - “*O educador matemático frente às ideias bourdieusianas*” (The mathematical educator facing Bourdieusian ideas) (COSTA *et al.*, 2013) - appropriates Bourdieu's three main concepts. Thus, it can be inferred that, in this thematic line, the authors mobilize the concept of *capital* and, generally, associate it with the concept of *habitus*.

Three of the five works grouped in this thematic line base their studies and analyzes on Prova Brasil (AGUILAR; ORTIGÃO, 2018; ANDRADE; SANTOS, 2014; MOGNON; ANDRADE; NEVES, 2013). Therefore, it is inferred that the *Prova Brasil* is an important data analysis tool that allows establishing relationships of factors that influence the academic

performance of students. Two works of this line (PINHEIRO, 2013; COSTA *et al.*, 2013) consider the teacher and his capital as a determining factor for a good academic performance of students. The concept of capital, especially cultural capital, is of fundamental relevance to works in this thematic line. The Bourdieusian concepts of the works considered here are mobilized to explain the factors that culminate in low or high school performance. All works in this line present the Bourdieusian theory linked to other references.

The second thematic line, called Teacher Formation, concentrates the works whose objective is to analyze how the formation or continuing education of teachers influence the teacher's teaching career, whether constituting a *habitus*, or with the determination of the field (Mathematics or Education; Academic Mathematics or School Mathematics) that predominates in Mathematics degree courses.

The works contained in the second thematic line are: two works from periodicals (COSTA; SILVA, 2014; VILELA, 2013) and four articles from ENEM (KESSLER, 2004; FARIAS; VILELA, 2016; RODRIGUES, 2019; FERNANDES; ROSA; OLIVEIRA, 2019).

The Teacher Training line contains a total of six works. Only the work “*Um ponto de vista sociológico do Profmat*” (A sociological point of view of Profmat) (FARIAS; VILELA, 2016) appropriates a single concept, that of the field. In this thematic line, most works associate the concept of *habitus* and the field. Only the works “*As atividades acadêmico-científico-culturais e a formação dos professores de matemática*” (Academic-scientific-cultural activities and the training of mathematics teachers) (RODRIGUES, 2019) and “*Tendência Profissionalizante da Universidade: o caso da licenciatura em matemática da UFSCar*” (Professionalizing Trends at the University: the case of the degree in mathematics at UFSCar) (VILELA, 2013) appropriate all the main concepts. All works in this line use the field concept.

For works in this line, the concept of capital is not very relevant, since it is mobilized in only two works (VILELA, 2013; RODRIGUES, 2019) and is not the most mobilized concept in any work. Thus, it is inferred that the works that address teacher formation pay attention to analyzes of the field of mathematics and the disputes present within it; and analyzes of a possible *habitus* constituted through training and continuing education of teachers. It is possible to notice that there is a work (FERNANDES; ROSA; OLIVEIRA, 2019) that mobilizes the field concept more, although the *habitus* concept is more relevant for the development of research and work.

The third thematic line, called Mathematical Knowledge, concentrate works that aim to analyze the cultural context in which some mathematical knowledge, formalized and non-

formalized, develops and changes. This thematic line has the following works: a work by SIPEM (MACHADO, 2015) and a journal article (VAZ; SILVA, 2017).

The Mathematical Knowledge line has two works, one focused on the informal mathematics of the rural producer and the other focused on the modifications carried out in the Design Department of a university. The work “*Referências sobre desenho: um estudo das obras que fundamentam o ensino da expressão gráfica na UFPR*” (References on drawing: a study of the works that underlie the teaching of graphic expression at UFPR) (VAZ; SILVA, 2017) appropriates the three main concepts of Bourdieu's theory; the work “*Saberes e Fazeres Matemáticos Integrados ao Cotidiano do Produtor Rural*” (Knowledge and Mathematical Actions Integrated into the Daily Life of the Rural Producer) (MACHADO, 2015) uses the concepts of *habitus* and field.

It is possible to note that the works in this line address the specific mathematics of a certain group – such as, for example, the rural producer – or the mathematics present in the Graphic Expression disciplines. The capital concept appears topically in only one of the works (VAZ; SILVA, 2017). Therefore, it is concluded that it is not an important concept for the line of research, while the *habitus* and field concepts are the most commonly appropriate and relevant for the development of the work.

Final considerations

The School Performance line has five works. In this thematic line, it is possible to infer that the authors mobilize the concept of capital and, generally, associate it with the concept of *habitus*. Thus, the Bourdieusian concepts of the works considered are mobilized to explain the factors that determine school performance. This line tends to link Bourdieu with other references.

The Teacher Formation line contains six works. In it, most works associate the concept of *habitus* and the field - and all of them use at least the concept of field. For these works, the concept of capital is not very relevant. Thus, it is inferred that the works that address teacher formation pay attention to the analysis of the field of mathematics, the disputes present within it and the analyzes of a possible *habitus* constituted through teacher formation.

Finally, the Mathematical Knowledge line has two works. It is possible to note that the works in this line address a specific mathematics of a certain group, be it the rural producer or the mathematics present in the Graphic Expression disciplines. It is concluded that the concept

of capital is not important for this line of research, for which the concepts of *habitus* and field are more relevant for the development of the works.

We conclude that Bourdieu is very little known and adopted in the area of Mathematics Education, both due to the low quantitative representation of these studies and the even smaller number of studies that adopt his way of working. On the other hand, we noticed that the studies that adopt Bourdieu's way of working are very diverse and explore fundamental themes in the area of Mathematics Education.

Although we considered only the works classified as “appropriation of the way of working”, the works that constituted the object of the research, in general, appropriated other authors to support their research, that is, the Bourdieusian concepts were appropriated together to other theoretical references. This fact may indicate a possible need, felt by the authors, to associate other authors with Bourdieu to better analyze the context of Mathematics Education in Brazil.

It is necessary to point out that the presented results were obtained through the analysis of works from events and periodicals, that is, shorter works and, therefore, less systematic. Furthermore, due to time, this research failed to analyze the theses and dissertations, which have great relevance for a deeper analysis of the use of Bourdieu in Mathematics Education. With the theses and dissertations, we would obtain a broader panorama on the use of Bourdieu in Mathematics Education, since, due to its extension and systematization of content, they can be considered more complete. Therefore, the present research has theoretical limitations with regard to the complete and satisfactory analysis of the data.

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