PRÁTICAS EDUCATIVAS, MEMÓRIAS E ORALIDADES

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Reflections on the silencing of black women's works in natural science textbooks

ARTICLE

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Abstract
This study was based on the following questions: how does academic literature discuss the silencing of black women's contributions in natural sciences textbooks and how does this silencing manifest itself in a specific analysis of a science textbook? Our general objective is to identify possible perspectives for studies focused on the theme of the invisibility of black women's contributions in science textbooks. Specifically, our objectives are: a) to evaluate the possible impacts of this absence on the construction of science education; b) to examine the possible epistemological reasons that contribute to this silencing. The results of these movements indicate that it is essential that science education be guided by an approach that breaks with stereotypical views and the structural logic that privileges the heteronormative and white perspective, as discussed by Kilomba (2020), Fanon (2008), Sueli Carneiro (2011), Almeida (2019) and Pinheiro (2019).
Keywords: Science Teaching. Teaching Materials. Black Women. Racial Inequality.

Reflexões acerca do silenciamento das produções de mulheres negras nos livros didáticos de Ciências

Resumo
Este trabalho partiu das seguintes questões: como a literatura acadêmica discute o silenciamento das contribuições de mulheres negras nos livros didáticos de Ciências da Natureza e de que forma esse silenciamento se manifesta em uma análise específica de um livro didático de Ciências? Objetivamos, de modo geral, identificar as possíveis perspectivas dos estudos voltados à temática da invisibilidade das contribuições de mulheres negras nos livros didáticos de Ciências. De modo específico, nossos objetivos são: a) avaliar os possíveis impactos dessa ausência para a construção do ensino de Ciências; b) examinar as possíveis razões epistemológicas que contribuem para esse silenciamento. Os resultados desses movimentos apontam que é essencial que a educação científica seja pautada em uma abordagem que rompa com visões estereotipadas e com a lógica estrutural que privilegia a perspectiva heteronormativa e branca, como discutem Kilomba (2020), Fanon (2008), Sueli Carneiro (2011), Almeida (2019) e Pinheiro (2019).

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Palavras-chave: Ensino de Ciências. Material Didático. Mulheres Negras. Desigualdade Racial.

1 Introduction

Throughout our experiences as students of natural sciences courses in the early years of Elementary School, or in physics, chemistry and biology courses in High School in Brazil, we are often not introduced to black characters or authors. Although Law No. 10.639 (Brasil, 2003), which has been in force since 2003, stipulates that the teaching of African and Afro-Brazilian history and culture should be covered in all curricular components of basic education, the debate on the presence and protagonism of black women in the various areas of the natural sciences has been very incipient on the national scene.

Studies such as those by Pinheiro (2019), Level *et al*. (2023) and Oliveira *et al*. (2023) have alerted the community of researchers in the field of science teaching to the demand for investigations that elucidate this object of study and point to possibilities for overcoming the issue. Since these are still very recent studies, we see the need for a systematization of scientific productions that have discussed the silencing of black women's productions in natural sciences textbooks in Brazil, as well as analyses of textbooks on the subject.

Thus, this work was based on the following questions: how does academic literature discuss the silencing of the contributions of black women in natural sciences textbooks and how does this silencing manifest itself in a specific analysis of a science textbook?

Our general aim is to identify the possible perspectives of studies on the invisibility of black women's contributions in science textbooks. Specifically, our objectives are: a) to assess the possible impacts of this absence on the construction of science teaching; b) examine the possible epistemological reasons that contribute to this silencing; and c) analyze the issue from an Elementary School science textbook.

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The results of the moves made to pursue these objectives are set out in the following sections. Section 2 discusses the lack of visibility of black women's productions in the curricula of natural sciences courses. Section 3 focuses on the debate about the presence of black women in natural sciences textbooks. In section 4, we present an analysis of a natural sciences textbook. Finally, in section 5, we present our conclusions.

2 Lack of visibility for the productions of black women in the curricula of natural sciences courses

The invisibilization of the theoretical contributions of black women in the natural sciences is the result of an ongoing process characterized by a brutal regime of exclusion. In the productions of this subject field, not only are the bodies of these women made invisible, but also their theoretical and scientific contributions, which continue to be marginalized and neglected (Santos, 2015).

When we look at the curricula of natural sciences courses, we can see that the scientific productions of these women are invisibilized. The absence of black references in education as a whole reinforces the idea that the production of knowledge cannot emerge from these bodies (Gomes, 2006). In Brazil, since 1996, we have graduated more female doctors than male doctors; even so, the protagonists in the sciences are men, and white men, as the Center for Strategic Studies and Management points out (CGEE, 2024).

Recently, in 2018, we had the first black woman to reach level 1A of the CNPq productivity grant, which was created in 1951. From this perspective, it can be said that there are women who are producers of scientific knowledge, but there are no spaces to recognize their leading roles. These women fight for recognition on a daily basis. A very relevant example is Experimental Physics professor Sônia Guimarães, who, according to CNN (2023), is the only black woman professor at the ITA (Technological Institute of Aeronautics).

Grada Kilomba (2020), in *Memórias da Plantação*, defines this phenomenon as a brutal regime of silencing, just like the iron masks used to censor enslaved black people

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during the slavery period. Throughout the book, the author shows how these masks symbolized sadistic policies of conquest and domination, establishing a regime of repression imposed by the colonizer. This marginalization, according to Kilomba, was not limited to the physical impediment of speech, but structured a logic of exclusion that determined, from the point of view of the white man and colonist, who had the right to speak and who should be omitted. Those who were not read as Europeans were subjected to this violence and, if they tried to speak, faced severe punishment.

Despite this reality, we still live in a constant state of silence. In fact, if we understand that the various social exclusions are the result of historical processes, we must recognize the current curricular proposals as a direct product of these processes of social exclusion.

Black people have been deprived of their ontological condition of existence since the colonial period. Stripped of their human condition, they were enslaved and trafficked from Africa to Brazil and until at least 1888 they were socially read and formally recognized by the state as property and not as subjects. From the colonizer's perspective, the black man is not a human being, but an object among objects (Fanon, 2008). After the formal abolition of slavery, there were no public reparation policies in favor of black people that would put those freed from the shackles in a position to compete for the most dignified jobs on an equal footing with the children of their former owners. Lélia Gonzalez (2020), in *Por um Feminismo Afro-Latino-Americano*, discusses this issue, pointing out that the false abolition kept black people without any mechanism to minimally guarantee their social ascension.

For the children of former slaves, it wasn't possible to dream of becoming a doctor, teacher, banker, engineer, lawyer or any other profession that was socially perceived as a white profession. This phenomenon is analyzed by Sueli Carneiro (2011) in *Racismo, Sexismo e Desigualdade no Brasil*, in which she points out how structural racism in Brazil, especially in the post-abolition period, resulted in the exclusion of better working conditions and access to professions considered ideal and worthy of respect.

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If we consider that less than 150 years have passed since 1888, we must recognize that the presence of black people in prominent positions in this society is the result of much struggle by the organized black movement. These displacements are fundamental to the construction of spaces of resistance and affirmation of black identity and the conquest of the presence of blacks in prominent spaces (Carneiro, 2011). In this sense, the lack of visibility of black women in the fields of physics, chemistry and biology is the result of the historical continuity of colonialism (Elias; Pereira, 2021). In this case, there is a double problem. In addition to racism, which was the main driver of colonialism and is one of the main drivers of coloniality, which according to Quijano (2000) is an essential concept for understanding the power relations established in the colonial period, these women also deal with sexism and male chauvinism, which also structure this society. This coloniality of power not only organizes racial domination, but also subjugates women, especially black women (Quijano, 2000).

With regard to the power relations that exist in society, we can point out that racism, sexism and male chauvinism all contribute to this phenomenon. In this respect, it can be observed that:

> Racism is a systematic form of discrimination based on race, which manifests itself through conscious or unconscious practices that lead to disadvantages or privileges, depending on the racial group to which they belong. Although the concepts are related, racism differs from racial prejudice and racial discrimination. Racial prejudice is a judgement based on stereotypes about individuals belonging to a particular racialized group, which may or may not result in discriminatory practices (Almeida, 2019, p. 25).

On the importance of breaking away from these Eurocentric views in science teaching, Pinheiro (2019) discusses how important it is to point out new ways of valuing and recognizing knowledge that is not reduced to the single, universal references of Eurocentrism:

> We need to educate young people by showing them diverse and decolonial narratives of the different civilizational frameworks that have constituted us. Enough of a Eurocentric historical narrative that reduces the ancestral existence of other

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> peoples to the abyss of oblivion and places Europe at the top of progress and civilizations (Pinheiro, 2019, p. 332).

In the same way, sexism can also manifest itself in science textbooks. Either through the under-representation of theoretical contributions by black women, or through their total absence, as exemplified in the aforementioned analysis. This perpetuates a prejudiced/stereotypical view of the intellectual capacity of black women to contribute to the field of science. It is therefore urgent to deconstruct the Eurocentric and exclusionary narratives in science textbooks, opening up space for new reflections, a point that will be discussed in the next section.

3 The presence of black women in natural sciences textbooks

The absence of black women's contributions in textbooks, whether in basic education or in teacher training, is a direct reflection of the colonial oppressions that marginalized certain bodies in the past and continue to do so today. The social representation of scientists in teaching materials still focuses on the figure of the white man, reinforcing the idea of a science historically constructed and legitimized mostly by him:

> It is because of gender and racial oppression that black women are not easily identified as authors in the pages of textbooks for natural sciences courses, whether in basic education or teacher training. The social representation of a scientist is that of a white man; the science we study is that produced by white men (Chassot, 2004, p. 9).

Fernandes and Costa (2024) analyzed 9th grade science textbooks from three major Brazilian publishers (Saraiva, Moderna, Ática/Scipione), focusing on the period from 1980 to 2022. The research counted images and direct/indirect quotes focusing on women, to explore the possibilities of representations in these materials. One of the reflections raised was that "modern science was historically established as a masculine activity, a conception maintained until the 20th century, despite the growing participation of women in scientific activities" (Fernandes; Costa, 2024, p. 1).

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According to Fernandes and Costa (2024), with regard to the presence of white women, only Marie Curie was mentioned in the materials analyzed. As for the presence of black women, only one black scientist was mentioned: biochemist Mae Jemison. Thus, "the erasure of black women in scientific activity becomes explicit, which calls for the need for the ethnic-racial component to be explicitly included in future investigations" (Fernandes; Costa, 2024, p. 22).

This low rate of representation contributes significantly to the proliferation of the idea that science is an exclusively male and white activity, based on a Eurocentric vision, which keeps the importance of the group in question invisible. In this sense, it is necessary to encourage discussion on the implementation of Law No. 10.639/03, which made it compulsory to include Afro-Brazilian history and culture in the country's schools (Level *et al*., 2023), with the aim of valuing and recognizing the importance of this culture within the school environment. However, for this appreciation to be effective, it is essential to broaden the discussion about its applicability, as these contributions are often silenced in teaching materials.

The curricular decolonization of knowledge in the field of science teaching represents a crucial issue for the Brazilian educational context. The importance of an anti-racist curriculum can be seen in different aspects. First of all, students should have access to a diversified education model that reflects on the importance of the multicultural reality present in their daily lives. In addition, there is the contribution to deconstructing stereotypes and prejudices, focusing on promoting respect and appreciation for cultural differences/diversities. Based on this assumption, Santana (2020) discusses this perspective assertively when defending the importance of an anti-racist curriculum.

> An anti-racist curriculum allows children to learn about other perspectives on culture and the development of humanity, both in terms of knowledge production and social, cultural and economic structure. It shifts the socially constructed axis that blackness is all about servitude and slumming and presents black children with a range of possibilities for constituting identities and reducing inequalities. Placing the various groups on an equal footing, presenting the plurality of perspectives on being and knowing (Santana, 2020, p. 3).

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In this way, by bringing this discussion into the classroom, we are promoting the construction of new paths for the field of teaching natural sciences, in such a way as to be an indispensable movement for the development of a collective and individual socio-cultural awareness of what the true model of social reproduction of the productions of black people should be (Oliveira *et al*., 2023). The invisibility of black women in textbooks is a clear reflection of the Eurocentric perspectives that still predominate in the curricula and teaching materials used in the classroom. In order to deepen this reflection, in the next section we will present an analysis of an Elementary School nature science textbook, with the aim of identifying and discussing the implications of this exclusion in the educational process.

4 Analysis of possible representations of black women in an Elementary School natural sciences textbook

When we analyzed the composition of the 2023 science textbook from the "A conquista" collection by author Geslie Coelho, published by FTD Educação and offered by the 2023 PNLD, we noticed that, in her representations, the author had to follow the curriculum guidelines, which are still predominantly Eurocentric and male, but even in the face of this obstacle, Coelho showed her concern to bring female representation into the composition of her book. The following is a box showing the analysis of this textbook.

Box 1 – Extracts from the unit: Com os olhos voltados para o céu

A CONQUISTA – SCIENCE – 5TH GRADE
Description of units
Unit 1: Com os olhos voltados para o céu [With eyes turned to the sky]
Unit theme: Exploring astronomical phenomena.
Initial structure: Diagnostic assessment with eight open questions to determine the students' prior knowledge.

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Theoretical approach: Reasoning with an objective approach to scientific concepts; it focuses on discussing phenomena related to astronomy. Right from the start, the presentation of this unit consists of an initial diagnostic assessment.
Predominance of references: The main names cited: Galileo Galilei and Isaac Newton.
Attempt at inclusion: The curiosities section mentions the astronomer Vera Rubin, highlighting her fight against sexism. In this way, the importance of the author's selection of a woman as a theoretical reference for an area of science that rarely highlights the contribution of women to this area of knowledge is clear. The author's effort represents an important step towards transforming the field of science teaching, by seeking to promote a more equitable representation and broaden the historical perspectives offered to students. For the prospective scenarios, it is also worth analyzing how much this scenario is still developing today, in 2025, by analyzing more textbooks. Although the author has made an effort to introduce the importance of women in science, this approach is still limited because it does not take into account the diversity of women's contributions, especially black women. Despite these limitations, the author's effort represents an important step towards transforming the field of science teaching, by seeking to promote a more equitable representation and broaden the historical perspectives offered to students.

Source: Authors (2025).

We emphasize the importance of the textbook as an essential resource in the teaching of natural sciences, especially in public schools, where, according to Núñez (2003), it is still the material most used by teachers. However, in order for this tool not to reinforce a narrow, Eurocentric vision, it is necessary to break with these perspectives and rescue the contributions of historically invisible bodies. In this sense, Farias and Silva (2023, p. 4) emphasize that guaranteeing the representation of these women in textbooks is a fundamental action to deconstruct symbolic erasure:

> If we assume that a decolonial science and mathematics education is essential, and that combating the epistemic pillage and epistemicide historically perpetrated against black women is equally essential for this, then we must assume that a genuinely inclusive education requires rescuing the epistemic legacy of these intellectuals. In doing so, it is possible to help raise the self-esteem and representativeness of black girls by identifying their sisters of color in teaching materials, but no longer as commodities, no longer as enslaved people. It is possible to produce this identification from now on because they will see that black women are also producers of scientific knowledge and revolutionary scientific-technological inventions in everyday life (Farias; Silva, 2023, p. 4).

It is therefore essential that science education is based on an approach that breaks with stereotypical views and the structural logic that favors the heteronormative and white perspective. Science teaching must take into account the diversity present in society. It is

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therefore essential that teaching practices incorporate the contributions of numerous studies, not only to meet the guidelines of Law No. 10.639/2003, but also to promote a more inclusive and representative education. This means valuing the knowledge produced by different social groups, broadening the scientific and cultural references in teaching materials and in the classroom.

5 Conclusions

We defend the need to move forward in incorporating this discussion into the context of textbooks and the classroom. It is therefore necessary to make a commitment to overcoming a colonized and colonizing teaching of natural sciences, promoting reflections on the construction of a more egalitarian society. To this end, it is essential that new perspectives on the teaching materials used in schools come to light. It is essential that all of them, without exception, undergo a more critical analysis to identify whether, in fact, what is being reproduced and illustrated promotes the valorization of diversity and not the proliferation of Eurocentric ideals.

In addition, it is necessary to stimulate new pedagogical practices that give voice and protagonism to historically marginalized subjects, ensuring that their contributions are recognized and valued in science teaching. “In view of this, there is an urgent need for science teaching that makes it possible to reflect on an egalitarian society, in which marginalized and subalternized students can recognize themselves in their humanity.” (Paz *et al*., 2022, p. 2). In this process, guaranteeing the representation of different bodies in teaching materials is essential so that everyone can recognize their humanity and feel an active part in the production of knowledge. This work is still in its early stages. For the prospective scenarios, the prospects for future studies point to the expansion of research, with new analyses of the textbook mentioned previously, as well as the inclusion of other textbooks, in order to deepen the discussion on representativeness and diversity in the sciences.

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