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THE RELEVANCE OF TEXTBOOKS IN SCIENCE AND BIOLOGY EDUCATION

Lidia Andrade da Silva

Master in Education

Federal University of Uberlândia

Leilane Alves Chaves

PhD in Education

Federal University of Uberlândia

Nathália Martins Ferreira

Master in Education

Federal University of Uberlândia

Nathalia Silva Floriano

Graduated in Pedagogy

Federal University of Uberlândia

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INTRODUCTION

The way information is transmitted has changed drastically and rapidly in recent decades as a result of technological innovations, especially with the pandemic, in which the digital age has gained even more strength. This has also affected the relationship between students, teachers and teaching methods. Despite this new scenario, textbooks remain an essential tool for expanding knowledge, guiding the education process and democratizing access to reading (JABUR, 2023).

Textbooks have been used in education since ancient times in China, India, Persia, Greece and Rome, to teach various subjects (religion, literature, morality, philosophy, mythology, among others), reinforcing learning centred on memorization. Today, in addition to transferring knowledge through written language, the textbook has become a pedagogical tool that enables intellectualization and contributes to people's social and political formation (SOARES, 2009).

In the field of Brazilian educational policy, the PNLD is the oldest didactic works program for public school students and has become a benchmark for re-democratization in recent years and has achieved visible advances, such as the choice of books by teachers, evaluation criteria, the correction of errors, the restructuring of books with updated content, the release of titles that meet the proposed criteria, the suspension of the sale of failed titles and its evolution as a pedagogical apparatus; in addition to systematizing the objects of knowledge, it expands content worked on in the classroom as a way of deepening and complementing teaching. (BRAZIL, 2019). Data from the National Education Development Fund (FNDE) show that around 150 million textbooks are distributed to 140,000 Brazilian schools and benefit 30 million students (JABUR, 2023).

In education and schools, textbooks have a strong influence on Brazilian teaching practice. It is essential that teachers pay attention to its quality, coherence and any restrictions it may have in relation to the proposed educational objectives. In addition, it is important to consider that the textbook should not be the only material to be used, as it is the variety of sources of information that will help the student to have a broad view of knowledge (BRASIL, 1997). It is essential to build a classroom environment that represents teaching as a collective process between students and teachers.

The textbook emerged as a complement to the great classic books. Restricted to school use, it reproduced society's values, disseminating science and philosophy and reinforcing learning based on memorization. And for many years it fulfilled this mission. Today, the textbook has expanded its primary function. In addition to transferring oral knowledge into written language, it has become a pedagogical tool that enables the process of intellectualization and contributes to the social and political formation of the individual (SOARES, 2009, p.1).

The textbook essentially plays a facilitating role in the process of developing knowledge historically accumulated by man and in the early days of its creation. Nowadays, textbooks need to be thought about and rethought in every social context and in every role they play. The textbook is the main object of support and reference that students have access to, especially in public schools. It is interesting that the content of textbooks should be relevant to the reality of life (BIAVA, 2010; ZACHEU; CASTRO, 2015).

The production, distribution and content of textbooks in Brazil date back to imperial times. During the 1930s, the textbook was an essential tool for the implementation and ideological reproduction of the Estado Novo; it was used as an agent in tune with economic and political interests that lasted until

the end of the military dictatorship. In 1929, the National Textbook Program (PNLD) was created, initially aimed at primary education, and in 1930 the National Book Institute was created to expand textbook production in the country. In the 1980s, a new air of democracy began to blow over Brazil and, at that time, changes also entered the school field, following the path of a timid democracy on the rise (ZACHEU; CASTRO, 2015).

The National Textbook Program (PNLD) aims to improve the teaching and learning process in public schools of basic education, guarantee the quality standard of the material to support educational practice used in public schools of basic education, democratize access to sources of information and culture, encourage reading and the investigative attitude of students and support the autonomy and professional development of teachers (BRASIL, 2017).

The general aim of this text is to carry out a retrospective study of dissertations and theses involving textbooks and the teaching of science and biology.

METHODOLOGY

The formulation of activities in the textbooks must take into account the reality of the students and bring the pedagogical objectives closer together. It does not constitute the formation of individuals trained to repeat concepts, memorizing formulas and terms, without, however, recognizing possibilities of associating them with their daily lives (VASCONCELOS; SOUTO, 2003).

Textbooks undoubtedly need to contain tools that encourage discussion of the theoretical content and its conversion into useful and applicable knowledge. In agreement with various authors, we start from the premise that the textbook is a relevant instrument that offers support through the writing of texts and images, and is a source of knowledge, suggestions for activities, content, techniques,

methodologies and exercises. It is more than a simple transmitter of content and methodologies, it is a carrier of ideas and culture.

Research involving the textbook as a field of investigation and methodological field has been widely developed in recent years. With regard to research on textbooks in the teaching of science and biology, we carried out a survey of the themes of papers published on the BDTD using the following descriptors: science teaching, biology teaching and textbooks. This is a bibliographical and descriptive survey of the themes of papers published in the last five years in the Digital Library of Theses and Dissertations (BDTD), which is open to the public and free of charge. Studies published in the last five years, studies in Portuguese and studies from other countries were excluded, as were studies that only presented abstracts and/or were not related to the theme.

After a preliminary reading of the abstracts, we found theses and dissertations on textbooks and the teaching of biology - 36 involving biology textbooks, 15 involving science textbooks and 6 involving science and biology textbooks, mostly master's dissertations.

RESULTS AND DISCUSSION

In research involving the teaching of biology and textbooks, the concept of science, the history and philosophy of science, biological evolution, the origin of life and biological progress were found. In environmental education, there were dissertations on the themes of science, technology, society, environment and pollution, sustainable development; botany, Brazilian biomes, entomology and health.

Conceptions of health are presented in the dissertation by Élcio S. Batista (2018); AIDS in Biology textbooks in the work by Lourdes Correia (2017); the contraceptive pill by Joelma R. Santana (2016) and the Human Papilloma Virus (HPV) in the dissertation by Luis R. Costa (2016). Santana (2016) and the

Human Papilloma Virus (HPV) in the dissertation by Luis R. Costa (2016). Work was also found on general cytology, the concept of the cell, cell transport, cell and plant respiration and cell metabolism, the concepts of genetics, cloning, genotype and phenotype, the discovery of DNA and its relationship with bacteria and blood groups. Experimental work was the focus of theses and dissertations.

Regarding science teaching and textbooks, the topic of health was widely discussed in the works found: The concept of health in the thesis by Paulo Henrique Nico Monteiro (2012); The health of black populations, nutrition and the human body in the dissertations by Débora Michele Sales de Lima (2017), Carolina Brígida Lemos (2009) and Hellen José Daiane Alves Reis (2017) respectively. Sexuality and health appear in the dissertations by Gustavo Piovezan (2010), Maracy Alves Silva (2019) and Zaida Barros Dias (2014); Quilombola communities and ethnic-racial relations are mentioned in the dissertation by Agnes Guardênia Passos Bispo (2018).

The history of cells and evolution, the life cycle of plants, the Pampa Biome and astronomy were also highlighted in research involving textbooks and science teaching. Leishmaniasis by Viviane Helena França (2011), accidents by venomous animals by Leila Alzira Fava Guimarães (2010), cognitive neuroscience by Taís Oliveira Martins (2018), animal welfare, genetics and ecology in science and biology textbooks.

From the works mentioned above, we can see that there is research that focuses on studying the body, health, science, the environment, etc. in the textbook, reinforcing that, despite the digital age, there is still a need to take the textbook and establish it as a compendium organized for purposes of school education, since the textbook is still an object that reflects the curriculum and as a pedagogical tool it becomes a support for teaching

the subject of Science, given its proximity to both the student and the educator. As an area of knowledge, the natural sciences are characterized by teaching a set of more in-depth cognitive processes that explore the themes and content historically constructed by humanity, enabling young people to connect and analyse knowledge from different fields of research (BRASIL, 2019).

The school environment is the place where these various dimensions converge, including the textbook. According to the PNLD 2020 and 2021 Science Guide, the textbook should be chosen carefully and clearly, in line with the political pedagogical project that the school adopts and defends as an educational path for the development of students. Scientific knowledge is in a continuous process of transformation. Science cannot be presented as a collection of dogmas and facts that must be memorized and reproduced mechanically. For this reason, the conceptual approach must be flexible and up-to-date, the information and concepts must be clear and made up of simple, accessible language.

Graphic designs must include different forms of illustrations (drawings, figures, graphs, photographs, etc.), which must be didactic, precise and appropriate to the purposes for which they were created. In addition, science books have a function that sets them apart from other books - the application of the scientific method, the analysis of phenomena, the testing of hypotheses and the formulation of conclusions. In addition, science books should provide students with a scientific, philosophical and aesthetic understanding of their reality (VASCONCELOS; SOUTO, 2003).

The textbook is a valuable pedagogical tool which, in addition to systematizing the objects of knowledge, expands on content worked on in the classroom, serves to deepen and complement teaching and, in many cases, is the only teaching support material available to students

and teachers. Once they have the teacher's manual, they have the opportunity to talk about plurality, democracy and equality, as well as reinforcing some points that are still weak, such as actions against discrimination, gender violence and prejudices in different areas.

The theoretical contributions of the textbook, combined with the use of more active methodologies that consider respect and appreciation of diversity, the strengthening of self-esteem and the construction of students' life plans can be configured as essential elements of a meaningful curriculum, as well as being a period marked by intense changes related to physical, cognitive and socio-emotional development in adolescence.

The works must be free from stereotypes of socioeconomic status, region, ethnicity, race, gender, sexual orientation, age, language, religion and disability, and must not induce any form of discrimination, violence or violation of human rights. They must also be free of religious, political or ideological indoctrination, respecting the secular and autonomous character of public education [...]. The political, economic, social and cultural differences of peoples and countries must be taken into account and behaviors aimed at the sustainability of the planet, citizenship and respect for differences must be promoted (BRASIL, 2019).

In the PNLD 2020 guide for Science, for example, there is an emphasis on the role of women, considering their participation in different jobs, professions and spaces of power, valuing their visibility and social relevance, which favors dialogue on the equal rights and duties of men and women in different aspects and affirms the educational commitment to the agenda of non-violence against women.

In this context, knowing that school plays a fundamental role and being a place that involves the formation of identities, it becomes essential to include women as historical subjects, as well as Indians, blacks and quilombolas and others who, throughout history, have been invisibilized or passively reported in the textbook.

On the subject of women and health, a quick tour of the PNLD 2020 and 2019 collections will reveal approaches that enable teachers to work with young people on the recommendations of science on women's health care during pregnancy, dignified and respectful medical care, the best choice of delivery route, the urgent need to reduce the number of caesarean sections, the causes of maternal mortality, the right to be born on time, STI prevention, sexual health, breast and cervical cancer prevention, female mutilation, menopause *and bullying*.

The right to knowledge through textbooks in basic education is guaranteed in educational legislation. The exercise of citizenship with freedom, autonomy, critical awareness and responsibility in argumentation based on facts, data and reliable information, formulation and defense of ideas that respect and promote human rights, socio-environmental awareness at local, regional and global levels with ethics in relation to caring for oneself, others, nature and the planet, in addition to using the approach proper to the sciences, including investigation, reflection, critical analysis and imagination to investigate causes, develop and test hypotheses.

Exercising empathy, dialogue, conflict resolution and cooperation, respecting and promoting respect for others and human rights, welcoming and valuing the diversity of individuals and social groups, their knowledge, identities, cultures, potential and without prejudice of any kind (BRASIL, 2017).

The approaches to these issues in textbooks support teachers in using this tool to teach science and biology. For students, textbooks provide opportunities to learn about experiences, taking into account training and strengthening student leadership in building specific skills that involve knowledge about the human body and its relationship with the environment, health, social problems and other objects of knowledge and skills from the initial, final and high school years of the BNCC (BRASIL, 2019).

REFERENCES

- BATISTA, Elcio Silva. **Os conteúdos sobre saúde no ENEM e sua abordagem no livro didático de Biologia**. 2018. 194f. Dissertação (Programa de Pós-Graduação em Ensino de Ciências e Educação Matemática - PPGECEM) - Universidade Estadual da Paraíba, Campina Grande, 2018.
- BIAVA, Gislayne R. **Abordagem CTSA e poluição em livros didáticos de Biologia do ensino médio**. 2010, 108p. Dissertação de Mestrado (Programa de Pós-Graduação em Educação para a Ciência e a Matemática), Maringá, 2010.
- BISPO, Agnes Gardênia P. **Contextualização, escola quilombola, relações étnico-raciais: aproximações e distanciamentos no livro didático de ciências**. 2018. 120 f. Dissertação (Mestrado em Ensino de Ciências e Matemática) - Universidade Federal de Sergipe, São Cristóvão, SE, 2018.
- BRASIL. Ministério da Educação. **PNLD 2020: ciências – guia de livros didáticos**. Secretaria de Educação Básica – Fundo Nacional de Desenvolvimento da Educação. Brasília, DF: Ministério da Educação, Secretaria de Educação Básica, 2019.
- BRASIL. Ministério da Educação. **PNLD 2020: ciências – guia de livros didáticos**. Secretaria de Educação Básica – Fundo Nacional de Desenvolvimento da Educação. Brasília, DF: Ministério da Educação, Secretaria de Educação Básica, 2019.
- BRASIL. **Base Nacional Comum Curricular (BNCC)**. Educação é a base. Brasília, MEC/CONSED/UNDIME, 2017.
- BRASIL. Secretaria de Educação Fundamental. **Parâmetros curriculares nacionais: introdução aos parâmetros curriculares nacionais**. Brasília: MEC/SEF, 1997. 126p.
- CORRÊA, Lourdes Maria Campos. **AIDS nos livros didáticos de Biologia: PNLEM 2007, PNLD 2012 e 2015**. 2017.196 f. Tese (Doutorado em Educação) - Universidade Federal de Uberlândia, Uberlândia, 2017.
- DIAS, Zaida Barros. **Ensino de ciências naturais, livros didáticos e imagens: investigando representações de gênero**. 2014. 189 f. Dissertação (Mestrado em Ciências Sociais) - Pontifícia Universidade Católica de São Paulo, São Paulo, 2014.
- FRANÇA, Viviane Helena. **As leishmanioses em escolas do ensino básico de Divinópolis: análise de livros didáticos de ciência e biologia e representações sociais de professores sobre o tema**. 2011. 199 f. Dissertação (Mestrado em Ciências)- Centro de Pesquisas René Rachou, Fundação Oswaldo Cruz, Belo Horizonte, 2011.
- GUIMARÃES, Leila Alzira F. **Acidentes por animais peçonhentos: identificação dos erros conceituais contidos nos livros didáticos dos ensinos fundamental e médio**. 2010. 65 f. Dissertação (Mestrado em Biologia Animal)-Universidade de Brasília, Brasília, 2010.
- JABUR, Gabriel. **Livros didáticos são fundamentais para democratizar o acesso à leitura**, 2023. Disponível em: <https://cnte.org.br/noticias/livros-didaticos-sao-fundamentais-para-democratizar-o-acesso-a-leitura-d107>. Acesso em 20/12/24.
- LE MOS, Carolina Brígida. **Análise de conteúdos de nutrição em livros didáticos do ensino fundamental**. 2009. 216p. Dissertação de Mestrado (Programa de Pós-Graduação em Educação), Faculdade de Educação da Universidade de São Paulo, 2009.
- LIMA, Débora Michele S. de. **Os livros de ciências: saúde e doenças prevalentes da população negra em uma possível articulação com a Lei 10.639/2003**. 2017. 140 f. Dissertação (Mestrado em Educação) - Universidade Federal da Paraíba, João Pessoa, 2017.
- MARTINS, Taís Oliveira. **Relações entre a epistemologia genética e as neurociências cognitivas: o construtivismo neuronal e suas abordagens em educação em ciências**. 2018. 117p. Dissertação (Programa de Pós-Graduação em Educação), Universidade Federal do Rio Grande do Sul, Porto Alegre/RS, 2019b.
- MONTEIRO, Paulo Henrique N. **A saúde nos livros didáticos no Brasil: concepções e tendências nos anos iniciais do Ensino Fundamental**. 2012. 210p. Tese (Doutorado – Programa de Pós-Graduação em Educação. Área de Concentração: Ensino de Ciências e Matemática), Faculdade de Educação da Universidade de São Paulo, 2012.

PIOVEZAN, Gustavo. **Determinismo biológico e educação sexual: análise retórica da concepção da sexualidade em livros didáticos**. 2010, 78p. Dissertação (Programa de Pós-Graduação em Educação para a Ciência e Matemática), Universidade Estadual de Maringá, 2010.

REIS, Hellen José Daiane A. **“O corpo humano é...”: discursos sobre o corpo em livros didáticos de ciências do ensino fundamental de escolas municipais de São Luís – MA**. 2017. 209 f. Dissertação (Programa de Pós-Graduação em Ensino de Ciências e Matemática/CCET) - Universidade Federal do Maranhão, São Luís, 2017.

SANTANA, Joelma R. **Difusão da pílula anticoncepcional no Brasil, 1962-1972: a mídia e os livros didáticos**. 2016. 101 f. Dissertação (Mestrado em História da Ciência) - Pontifícia Universidade Católica de São Paulo, São Paulo, 2016.

SILVA, Luciano Neves da. **Conceitos de espécie em livros didáticos de Biologia. 2019**. 170 f. Dissertação (Programa de Pós-Graduação em Educação em Ciências e Educação Matemática) - Universidade Estadual do Oeste do Paraná, Cascavel – PR, 2019.

SOARES, Wander. **O livro didático e a educação**. Associação brasileira de editores de livros, 04 nov. 2009. Disponível em: <https://abrelivros.org.br/site/o-livro-didatico-e-a-educacao/>. Acesso em 20/05/23.

VASCONCELOS, Simão D.; SOUTO, E. O livro didático de ciências no ensino fundamental – proposta de critérios para análise do conteúdo zoológico. **Ciência & Educação**, v. 9, n. 1, p. 93-104, 2003.

ZACHEU, Aline Aparecida P.; CASTRO, Laura Laís de O. Dos tempos imperiais ao PNLD: a problemática do livro didático no Brasil, **UNESP/BAURU**, p. 1-12, 2015.