

TEACHING AGROECOLOGY IN BASIC EDUCATION: INTEGRATIVE REVIEW

LA ENSEÑANZA DE LA AGROECOLOGÍA EN LA EDUCACIÓN BÁSICA: REVISIÓN INTEGRATIVA

ENSINO DE AGROECOLOGIA NA EDUCAÇÃO BÁSICA: REVISÃO INTEGRATIVA

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Abstract

Agroecology is an interdisciplinary science that has been used as an important mechanism for socio-environmental education. A common practice in other forms of Brazilian education, the teaching of Agroecology has a transformative role in the current scenario of unsustainability of natural resources and needs to be expanded in basic education schools. The objective of this work is to understand, through an integrative review, how Agroecology is taught in basic education in Brazilian public schools based on the analysis of the articles cited and describe this process from this perspective. By searching for articles in indexed journals in the following databases: Google Scholar, Scopus, Web of Science and Scielo, 11 studies were selected that addressed the topic. From the analysis of the works, it was observed that the agroecological focus in basic education, as it presents an interdisciplinary perspective, can provide instruction on different topics, not only ecological and environmental, but also social and economic that affect the country's population, especially in the countryside. Among the most relevant school

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practices used in the reviewed works are interaction with agroecological communities and educational practices of plant and animal production, such as vegetable gardens and workshops.

Keywords: Socio-environmental education; Sustainability; Public school; Environmental practices; Community participation.

Resumen

La agroecología es una ciencia interdisciplinaria que ha sido utilizada como un mecanismo importante para la educación socioambiental. Práctica común en otras formas de educación brasileña, la enseñanza de la Agroecología tiene un papel transformador en el escenario actual de insostenibilidad de los recursos naturales y necesita ser ampliada en las escuelas de educación básica. El objetivo de este trabajo es comprender, por medio de una revisión integradora, cómo ocurre la enseñanza de Agroecología en la educación básica de las escuelas públicas brasileñas a partir de un análisis de los artículos citados y describir a partir de esa óptica tal proceso. Mediante la búsqueda de artículos en revistas indexadas en las siguientes bases de datos: Google Scholar, Scopus, Web of Science y Scielo, se seleccionaron 11 estudios que abordaron el tema. Del análisis de los trabajos se observó que el enfoque agroecológico en la educación básica, al presentar un sesgo interdisciplinario, puede brindar instrucción sobre diferentes temas, no sólo ecológicos y ambientales, sino también sociales y económicos que afectan a la población del país, especialmente en el campo. Entre las prácticas escolares más relevantes utilizadas en los trabajos revisados se encuentran la interacción con comunidades agroecológicas y prácticas educativas de producción vegetal y animal, como huertas y talleres.

Palabras clave: Educación socioambiental; Sostenibilidad; Escuela pública; Prácticas ambientales; Participación comunitaria.

Resumo

A Agroecologia é uma ciência interdisciplinar que vem sendo empregada como um importante mecanismo de educação socioambiental. Prática comum em outras modalidades da educação brasileira, o ensino de Agroecologia possui papel transformador do atual cenário de insustentabilidade dos recursos naturais e precisa ser ampliado nas escolas da educação básica. O objetivo deste trabalho é compreender, por meio de uma revisão integrativa, como ocorre o ensino de Agroecologia na educação básica das escolas públicas brasileiras a partir da análise dos artigos citados e descrever a partir dessa ótica tal processo. Por meio da busca de artigos em periódicos indexados nas bases de dados: Google Scholar, Scopus, Web of Science e Scielo foram selecionados 11 estudos que abordaram a temática. A partir da análise dos trabalhos observou-se que o enfoque agroecológico na educação básica, por apresentar um viés interdisciplinar, pode instruir sobre temas diversos, não apenas ecológicos e ambientais, mas também sociais e econômicos que acometem a população do país, sobretudo no campo. Dentre as práticas escolares mais pertinentes empregadas nos trabalhos revisados estão a interação com as comunidades agroecológicas e práticas educativas de produção vegetal e animal, como hortas e oficinas.

Palavras-chave: Educação socioambiental; Sustentabilidade; Escola pública; Práticas ambientais; Participação comunitária.

Introduction

Since the 1950s, debates on the environmental impacts caused by the disharmonious relationship between humanity and nature have become an important guideline in societies around the world (Duda et al., 2020). In raising public awareness about environmental issues, education, through learning and questioning, plays a crucial role, encouraging and enabling students to develop critical thinking about the preservation of nature and sustainability (Figueroa; Santos; Silva, 2021). Likewise, the importance of the school in the process of social and environmental education is notorious (Narcizo, 2009). Menezes et al. (2020) affirms that Agroecology presents subsidies to reach a balance between nature and society. Thus, aiming at the formation of citizens who modify the environmental reality, it is necessary to include the teaching of this interdisciplinary science in basic education, an obligatory and free stage present in the lives of 46,668,401 Brazilians (INEP DATA, 2021).

The formation and articulation of local, regional and national agroecological experiences have been consolidated from the reconstruction of rural and indigenous territories that have contributed to the development of an educational-political plan (Barbosa; Rosset, 2017). Thus, the agroecological approach has been institutionalized in different ways, as disciplines in various courses, student groups, study nuclei, research and extension projects and training courses at different levels (Sousa, 2017).

In 2013, in Brazilian educational institutions, there were a total of 108 middle-level technical training programs, 24 graduate programs and 4 post-graduate programs in agroecology in the strict sense of the word (Balla; Massukado; Pimentel, 2014). However, agroecological knowledge, in general, is not a reality present in basic education, which includes pre-school from 4 to 6 years of age, elementary school from 6 to 14 years of age and middle school from 15 to 17 years of age (Brasil, 1996). According to Ribeiro et al. (2017) the Agroecology curriculum proposal for basic education schools should contribute to the formative process of the entire community and promote social justice, popular agrarian reform, food sovereignty and human emancipation in the countryside.

The National Curricular Parameters - PCN's (Brasil, 1999a, b) affirm that interdisciplinarity is essential to the development of topics related to the environment.

Thus, through agroecology, it is possible to demonstrate "the socio-environmental prejudices of agribusiness to society, how farmers face and carry out other forms of production and reproduction of life in their territories" (Silva; Vasconcelos, 2021, p. 220).

In this context, Altieri (2004) affirms that the agroecological model presents productive processes and development strategies capable of contributing to minimize the environmental impacts generated by conventional agriculture and, at the same time, suggest strategies that can be adopted for a more socially appropriate development, preserving biodiversity and socio-cultural diversity. For Caporal (2009), more than simply dealing with the ecologically responsible management of natural resources, Agroecology constitutes a field of scientific knowledge that, based on a holistic approach and a systemic approach, aims to contribute so that societies can redirect the altered course of social and ecological evolution.

Therefore, basic education is present in the lives of Brazilians and the insertion of the teaching of Agroecology is an important element in socio-environmental education. The objective of this work is to understand, by means of an integrative review, how the teaching of Agroecology occurs in basic education in Brazilian public schools, based on the analysis of the cited articles, and to describe the process from this perspective.

Methodology

The integrative literature review followed the main itens reported by Liberati et al. (2009) for the Preferred Report for Systematic and Meta-Analysis Reviews (PRISMA). According to Ercole, Melo and Alcoforado (2014) this method aims to synthesize results obtained in research on a topic or issue, in a systematic, orderly and comprehensive manner. It is called integrative because it provides broader information on a subject/problem, thus constituting a body of knowledge. Thus, the reviewer/researcher can elaborate an integrative review with different purposes, being able to be directed

to the definition of concepts, review of theories or methodological analysis of the studies included in a particular topic.

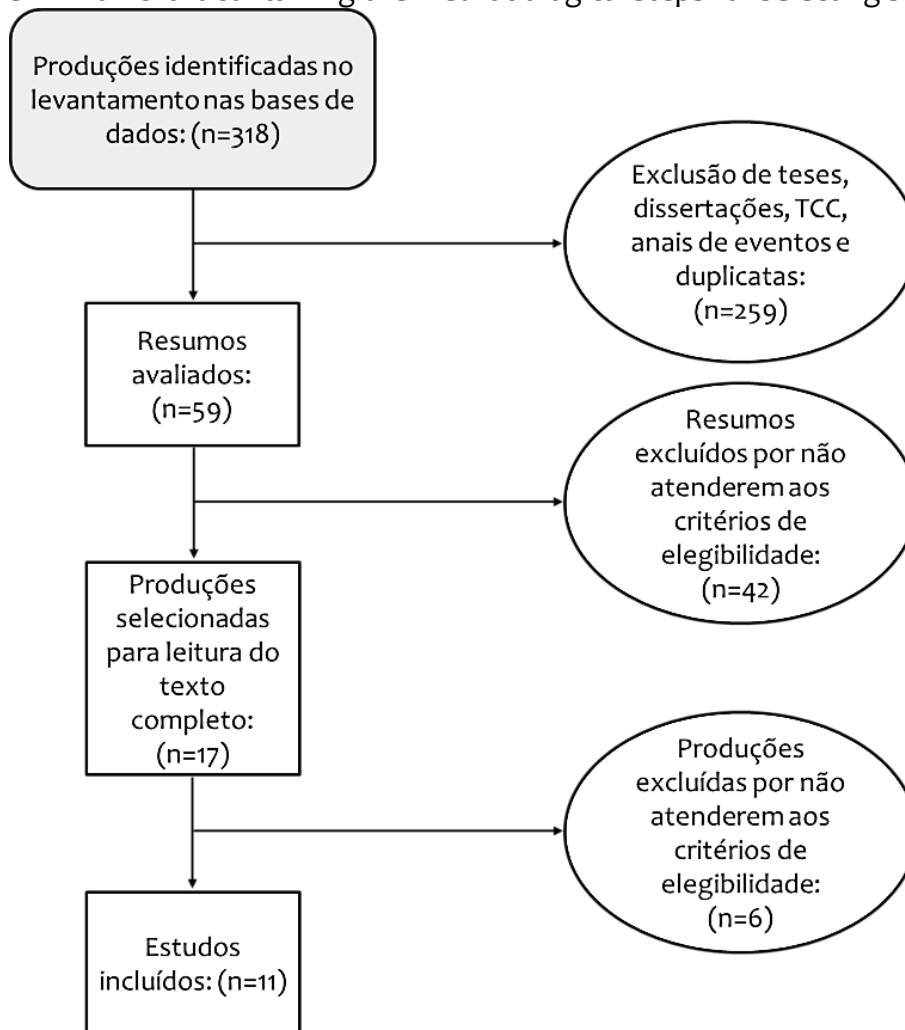
The search for articles was carried out in June and September 2023 in the following databases: Google Scholar, Scopus, Web of Science and Scielo. The following keywords were inserted: "educação agroecológica" OR "ensino de agroecologia" AND "Brasil". For all the databases, the same key words translated into English and Spanish were used.

Initially, theses, dissertations, course conclusion papers (CCT), papers published in event annals and duplicate files were excluded. After prior reading of the title and abstract, works that did not address the subject and texts that were not available in full in electronic format were excluded. As inclusion (eligibility) criteria, complete scientific articles published online in indexed journals and studies conducted with students from Brazilian public elementary schools were selected.

The time cut from 2011 to 2023 was due to the creation of Decree No. 7,794/2012, which instituted the National Policy for Agroecology and Organic Production (PNAPO), with the objective of "integrating, articulating and adapting policies, programs and actions that support the agroecological transition, organic and agroecological-based production" (Brasil, 2012).

For data analysis, the publications were organized in a table that includes: authors/year of publication, title, database, federal unit of the study, applicators, target audience, theoretical contents and methods of application. Figure 1 shows the flow chart including the stages of identification, selection and inclusion of studies.

Figure 1 – Flowchart containing the methodological steps for selecting studies.



Fonte: elaboração dos autores.

Results and Discussion

Initially, the database searches identified 304 papers in Google Scholar and 14 in Scielo. The searches in Scopus and Web of Science did not generate results or did not present any relationship with the research topic. The studies found were published between 2011 and 2022, all in Portuguese, with 05 of them carried out in schools in the Northeast region, 03 in the South region, 02 in the Midwest region and one in the Southeast region of the country. The implementation of these proposals involved university teachers and students (10 studies), school teachers (03), NGOs, agroecological projects and centers (03) and the local and family community (01).

In fundamental education, 05 of the 11 works found were carried out, 03 studies were conducted in schools that included fundamental and intermediate education, 01 study in intermediate education, and 01 took place in a pre-Enem course for children of family farmers. According to CNE/CP resolution No. 2, of 22 December 2017 fundamental education is important for the understanding of "scientific, technological, socioenvironmental and labor issues, as well as collaborating in the construction of a just, democratic and inclusive society" (Brasil, 2017). For secondary education, the Lei de Diretrizes e Bases da Educação Nacional (LDB) presents among some purposes "the deepening of the knowledge acquired in fundamental education, preparation for work and citizenship and enhancement of the student as a human being" (Brasil, 1996).

Given the above-mentioned premises, essential in student education, Agroecology emerges as an important science to be included in the curriculum of basic education schools. Thus, the contents and practices addressed in the works reviewed include topics ranging from conventional and agroecological crop practices, to discussions on the conservation of the environment and its biodiversity, to important socio-environmental discussions such as waste production, the use and impact of pesticides, food security, social movements and the economy in the countryside. Table 1 presents the 11 selected studies that responded to the research objective.

Table 1 – Publications and variables analyzed in the review.

Authors/year of publication	Title	Data bases	Federal Unit	Applicators	Public	Theoretical background	Application methods
1. Borges; Carvalho; Steil (2015)	A juçara vai à escola: aprendizagem entre pessoas, coisas e instituições	Scielo	RS	Group of Ambiental Teachers (ONG)	Elementary school students (6 to 14 years old)	Biodiversity defense; Family agriculture; Healthy and agroecological food	Introduction of açai from the Atlantic Rainforest (<i>Euterpe edulis</i>) in school snacks
2. Brito et al. (2022)	Processo de criação de uma horta comunitária orgânica em espaço subutilizado de uma creche: relato de experiência do projeto Calanguinho	Google Scholar	BA	University researchers, school Community and family members	Early childhood education students (0 to 3 years)	Agroecological, sustainable and food education	Community and small-scale organic vegetable garden

3. Figueroa; Santos; Silva (2021)	Educação ambiental e o uso das TIC's: uma abordagem através da horta orgânica escolar	Google Scholar	CE	University researchers	Fundamental education students II (11 to 14 years)	Technologies in Agroecology: importance of a healthy food	Theoretical classrooms, school timetable and TDIC
4. Freitas et al. (2013)	Produção agroecológica integrada e sustentável – país: experiência vivenciada por alunos da escola municipal Gustavo Adolfo Cândido Alves Campina Grande/PB	Google Scholar	PB	University researchers and PAIS project	Elementary school students (6 to 14 years)	Agroecological farming practices; Healthy nutrition	PAIS System
5. Melzer; Dahmer (2020)	O trabalho com etnopedologia, educação sobre solos e ensino de ciências da natureza no PIBID Educação do Campo da UFPR Litoral	Google Scholar	PR	University researchers, PIBID scholarships and school teachers	Elementary and middle school students (6 to 18 years old)	Concepts of Chemistry, Physics and Biology; Importance of solos; Ethnopedology; Food safety; Agro-ecology	Theoretical classrooms, offices and lecture halls
6. Nascimento et al. (2022)	Jardim sensorial do Espaço de Convivência com o Ambiente Semiárido (e-CASA) como ferramenta para o ensino de Botânica no ensino fundamental	Google Scholar	PI	University researchers	Fundamental education students II (11 to 14 years)	Botany; Plant diversity; Medicinal plants; Botanical diversity	Theoretical lectures, guided tour (sensory garden) and questionnaire
7. Okonoski; Nabozny (2011)	Agroecología no ensino da Geografia: relato... estágio supervisionado, práticas	Google Scholar	PR	University researchers	Elementary and middle school students (6 to 18 years old)	Agroecology vs. conventional agriculture; Agroecology and environmental conservation	Theoretical classrooms, field classrooms and games
8. Santos; Macêdo; Bertazzo (2021)	Geografia e educação socioambiental: práticas e experiências com alunos do ensino básico em Catalão (GO)	Google Scholar	GO	University researchers and NEPEA	Elementary school students (6 to 14 years old)	Socio-environmental education; Agroecological education; Solid domestic waste and Agrotoxics	Theoretical classrooms, offices and games
9. Silva; Vasconcelos (2021)	Agroecologia nas escolas do campo: um processo em construção	Google Scholar	BA	Field education professors, university researchers and MSTs	Elementary and middle school students (6 to 18 years old)	Relationship between subject/society and nature; Totality, movement and contradiction; Relationship between school, work and production; Epistemological subjects: subjects of field education.	Theoretical classrooms, research and practical work for plant and animal production in natura

10. Teixeira; Lopes (2013)	Tecendo Sonhos – cursinho pré-enem de educação popular do campo em Espera Feliz: agroecologia, acesso, permanência na universidade e emancipação social	Google Scholar	MG	University researchers, PIBex scholarships and volunteer professors	Daughters and sons of familiar agricultors (17 to 24 years)	Correlation between the contents of the ENEM and rural education (agroecology)	Theoretical classrooms and community visits
11. Trenkel et al. (2022)	A percepção dos estudantes sobre agrotóxicos em uma escola da zona rural no município de Aral Moreira (MS)	Google Scholar	MS	University researchers	Middle school students (15 to 18 years)	Use and impact of pesticides	On-line questionnaire (Google forms)

Source: Authors.

Through the analysis of the selected texts, it was found that agroecological education can be used in any age group of basic education, using different methodologies. The work carried out by Brito et al. (2022), for example, showed how agroecology combined with activities in school gardens can awaken in children from 0 to 3 years old, knowledge, values and attitudes related to the conservation of nature.

The school garden is a space for growing plants, vegetables, fruits and herbs, as a pedagogical resource the student learns about agriculture, sustainability, healthy food and the environment in a practical and interactive way. This method is considered interdisciplinary, since it provides broad knowledge and skills that allow several people to produce and consume healthy food, as well as encouraging them to practice agroecological education by integrating different school disciplines and educational experiences, in order to achieve a more comprehensive vision of the environment in the promotion of ethical, economic and cultural values (Figueroa; Santos; Silva, 2021).

A common practice in the teaching of agroecology, present in five studies analyzed, was the interaction with agroecological communities, given that, in many cases, the teaching of this subject occurs in rural schools. Sousa (2017) affirms that culture plays an important role in the process (ecosystem-agroecosystem), because the work system of the farmers is close to sustainability. By depending on the

maintenance of this ecological capital, the farmers build their beliefs and knowledge in a direct relationship with nature. According to Silva and Vasconcelos (2021, p. 220):

Agroecology as a systematized science represents the consolidation of a scientific body, which in the academic field, studies and research have expanded to new fields of knowledge and approaches in interaction with different disciplines and traditional knowledge, which contributes to the establishment of concepts and methodologies with a greater possibility of carrying out actions in agroecosystems, taking into account a multiplicity of social, economic, political, ecological, cultural and ethnic factors.

Freitas et al. (2013) used in their research the technique called Integrated and Sustainable Agroecological Production (PAIS system), in which there is coexistence between animals and plants, the chicken farmer is in the center, around it is the vegetable garden, next to it are the water tank and the agroecological quintal. In this way, it generates healthy and diversified food, improving the quality of life of producers and consumers.

The sensory garden was the technique used by Nascimento et al. (2022) for teaching botany and agroecology. Hussein (2012) states that this technique emerged in the 1970s for therapeutic purposes, initially practiced in hospitals and rehabilitation centers, and later adopted in schools for inclusive education and horticulture.

The work on the Atlantic Forest juçara used a methodology of materiality, the species *Euterpe edulis* Mart., threatened with extinction by the exploration of the heart of palm, began to have its fruits used in local food and was implanted in school lunches through the consumption of juices, jellies, bolos and açaí. The practice led students to raise awareness about biodiversity conservation and agroecology in municipalities of Rio Grande do Sul (Borges; Carvalho; Steil, 2015).

Games and Digital Information and Communication Technologies (DICT) were used in four interventions. The use of new technologies in environmental education represents a progress between the integration of informatics and multimedia tools, which raises awareness of environmental knowledge and its related problems. Thus, the virtual vision represents new alternatives in the formation and aggregation of environmental knowledge, inducing students to become aware of environmental care (Figueroa; Santos; Silva, 2021).

Final considerations

This review indicates how Agroecology in basic education schools is important for the debate on the socio-environmental issues that have affected the planet. Through this science it is possible to teach contents such as Brazilian biodiversity, agrobiodiversity, more sustainable agricultural practices, care for the soil, food security and food sovereignty, in addition to the social and economic problems facing populations around the world, many of which are related to the forms of agribusiness production.

The use of different teaching methodologies can also be noted in the selected works, theoretical and practical classrooms, offices, research and school gardens were cited as activities. However, it is worth noting that in the agroecological context the practices involving the traditional knowledge of those who make the school are very relevant in the teaching of Agroecology.

Thus, because it deals with several important issues in today's society, and because of its capacity to go beyond several disciplines of knowledge, Agroecology has an interdisciplinary character and a great capacity for socio-environmental transformation, which is why it is necessary to include this science in the lives of students in basic education in Brazil. However, the number of works carried out shows that the teaching of this science, the use of practices and the creation of educational materials in the context of basic education are scarce.

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