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IMPLEMENTATION OF ORGANIC GARDENS IN BASIC EDUCATION INSTITUTIONS: A BIBLIOGRAPHIC ANALYSIS OF THE BENEFITS AND LEARNING IN ENVIRONMENTAL EDUCATION

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ABSTRACT

Educational projects that aim to raise students' awareness of the environmental impacts we cause and the importance of preserving the environment are extremely important. In this sense, the implementation of an organic garden in the school environment leads students to the development of critical thinking and environmental awareness and can lead them to a greater relationship of affinity with nature. This article aims to verify, through experience reports, how organic gardens are being applied and their contribution to the learning of concepts of Environmental Education and sustainability in the school environment. As it is a strictly bibliographic study, the works used were collected from database sites, such as the Brazilian Digital Library of Theses and Dissertations (BDTD), SciELO and Google Scholar. To this end, we qualitatively discussed the results presented in 18 works on the implementation of organic gardens in basic education schools in various regions of Brazil.

Keywords: Organic garden, Environmental Education, Learning, Educational institutions.

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INTRODUCTION

Brazil has been experiencing a series of events related to the ongoing climate crisis. According to the Humantas Institute – Unisinus, in 2023 alone, 12 extreme weather events were recorded in Brazil. Heat waves, heavy rains, floods, as observed in Rio Grande do Sul, and extratropical cyclone were just some of them. So the promotion of sensitivity to environmental issues is urgent. In this scenario, Environmental Education should act as a necessary tool for the agency of an ecological awareness.

It is worth remembering that Environmental Education is an extremely important process because it seeks to sensitize communities to the preservation of the environment and the promotion of sustainability. It is, first and foremost, an educational process, which acts on the development of values, attitudes, skills and behaviors that aim at the conservation and sustainability of the planet. Regarding this definition, Marcos Reiglota adds that environmental education should be understood as a political education, as it "claims and prepares citizens to demand and build a society with social justice, citizenship (national and planetary), self-management and ethics in social relations and with nature". (2017, p.09).

The National Policy for Environmental Education (PNEA), through Law No. 9,795 of April 27, 1999, provides that:

> "Art. 1 Environmental education is understood as the processes through which the individual and the community build social values, knowledge, skills, attitudes and competencies aimed at the conservation of the environment, a good for the common use of the people, essential to a healthy quality of life and its sustainability" (Brasil, 1999).

It is through this process that human beings build the values necessary for a good social and environmental coexistence with the planet. In this sense, environmental education and its concepts are fundamental in basic education, as it is at this stage that individuals form the principles inherent to being.

In Brazil, one of the main methodologies used in basic education to disseminate concepts of Environmental Education is the implementation of organic gardens. Several studies show that the construction of vegetable gardens in elementary schools provides better learning and interest of students in topics related to environmental education, such as the preservation of the environment, the importance of healthy eating, among others.

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Another strength of projects of this nature concerns its ability to mobilize professionals from different areas of knowledge, as it puts into practice the principles of cooperativism and agroecology, thus allowing for transdisciplinary education.

Gustavo Brandão points out that:

> "The introduction of vegetable gardens in schools brings satisfactory results, as it strengthens the relationship between man and the environment with an activity that involves the exercise of citizenship while providing the acquisition of knowledge in the areas of biology, ecology, geography, chemistry, etc." (Brandão, 2016, p. 39).

However, despite all the possibilities of using this tool, the implementation of vegetable gardens is not as common as it is assumed and fostering the execution of vegetable gardens in basic education schools can be a strategy to disseminate and integrate the main concepts of EE in the different contexts and realities of Brazilian schools. In other words, these projects can assist in the implementation of environmental education in schools in a transversal way and reverberate knowledge from different areas to the community inside and outside the school.

Therefore, this article aims to carry out a bibliographic review of the general and learning benefits in Environmental Education and sustainability with the implementation of organic gardens in the school environment.

METHODOLOGY

To conduct scientific research, it is critical to first establish the methods and steps that will lead to the heart of the study. Research aims to solve problems in a systematic and cohesive way and the method can be defined as the way to achieve a specific goal (Gil, 2002; Prodanov and Freitas 2013). Thus, every research must follow a methodological path to achieve the desired knowledge.

In this study, a basic research was carried out, whose objective is to produce new knowledge that is relevant to the progress of science, without necessarily having a defined practical application. This search involves discoveries related to universal truths and interests that transcend specific contexts. In addition, descriptive and exploratory characteristics were used. Descriptive research aims to describe the particularities of a specific population or phenomenon, or even to analyze the relationships between different variables; the exploratory study aims to gather additional information on the topic to be investigated, helping to clearly define and delineate the scope of the study. In addition, a

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qualitative approach was used with bibliographic review procedures, a type of research based on existing sources, which include books, magazines, scientific articles, newspapers, dissertations, theses, cartographic material and information available on the internet, the bibliographic review aims to provide the researcher with a comprehensive overview of the accumulated knowledge on the investigated topic (Prodanov and Freitas 2013).

As it is a strictly bibliographic study, the main source of discussion of the research was the information collected in databases. They are the websites: Brazilian Digital Library of Theses and Dissertations (BDTD), SciELO and Google Scholar, where works such as articles, dissertations and theses were prioritized, as shown in Chart 1.

Table 1. Search site for works used in this article and access links.

Search Sites	Link
Brazilian Digital Library of Theses and Dissertations (BDTD)	https://bdtd.ibict.br/vufind/
SciELO	https://www.scielo.br/
Google Scholar	https://scholar.google.com.br/

Source: Authorship, 2024.

The studies found were carried out in several locations in the country and projects with themes relevant to the objective of this article were selected through the search term: "School gardens and environmental education". Regarding the inclusion or exclusion criteria of the work to conduct it, the criteria presented in Chart 2 were adopted. The title and keywords of the works found were also read, so that this reading was important for the selection or not of the articles, dissertations and theses. After this selection stage, the abstracts were read as a way to filter the works found more precisely.

Table 2. Inclusion and exclusion criteria for searching the platforms.

Inclusion criteria	Exclusion criteria
Review, theoretical and practical studies that work on the installations of organic gardens in basic education schools and that elucidate the advantages of these implementations to work on environmental education.	Studies that do not work organic gardens in basic education schools in a theoretical or practical way and practical studies that do not relate organic gardens with environmental education.

Source: Authorship, 2024.

The data analysis was done qualitatively and were discussed based on the results presented by each study.

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REFLECTIONS ON EDUCATIONAL PRACTICES AND SUSTAINABLE DEVELOPMENT

Currently, several societies prioritize consumerism and, despite the reasonable amount of work on the subject, much still needs to be discussed about the environmental impacts generated by our consumption habits. Professor and Doctor in Philosophy Rosa Mechiço, in her article entitled "Consumer Society: Consumerism, Impacts and Sustainable Consumption", states that consumerism generates great impacts on the environment from which the raw material for the production of everything that is consumed is removed. For this author, in order for there to be sustainable development, it is necessary to promote values that favor the adoption of consumption patterns that meet ecological limits in the long term, with formal or non-formal education being the way to promote these values.

For Bhoum et al. (2017), changing this behavior in relation to the environment is urgent, as it is already possible to perceive the consequences of disrespect for natural resources when observing the climate imbalances caused by various anthropogenic actions. For this author, environmental education needs to be present in all environments that educate the individual. In this way, the educational sphere as a space for the construction and socialization of knowledge has the essential role of forming citizens committed to the problems of the world in which they live (Amaral et al., 2009).

Education and nature are inseparable and move the individual to an integral and critical formation, leading him to a particular look at sustainability (Rodrigues et al., 2018). To this end, Cancelier, Beling and Facco (2020) state that Environmental Education is the process by which individuals and the community build social values, knowledge and skills, such as: the construction and maintenance of vegetable gardens; encouraging awareness of environmental conservation; stimulation of skills aimed at the conservation of the environment, which is the good for the common use of the people, essential to the quality of life and its sustainability.

Currently, EE emerges as a need in today's societies, as issues related to the preservation of the natural environment are constantly under discussion. Environmental education is applied in different scenarios and actions. It takes place within the spaces of formal and non-formal education. It is important to highlight that there are different forms and educational practices concerned with sustainable development. Among the various possibilities of these practices, we can highlight: recycling programs, education projects on renewable energy, water conservation, reforestation projects, food sustainability, sustainable technologies, among others.

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In the present work we will highlight Environmental Education in a formal environment, because we understand, as for Cajaíba (2013), that the school is an important space for the formation of responsible individuals dedicated to collaborating with social issues linked to the environment in which they live. And within this environment, the application of organic gardens imposes itself as the focus of this reflection.

In the pedagogical literature, school gardens have great relevance because they are practices that can enrich classes in the most diverse disciplines (Araújo et al., 2017), providing the development of principles that guide sustainable practices despite the culture of consumerism and unbridled production of solid waste, for example.

In line with this thought, Santos et al. (2022) state that:

> "[...] Raising environmental awareness and implementing healthy and ecological lifestyle habits should be among the main concerns of schools, so that it is possible to form adults who are more aware and concerned about these aspects." (Santos et al., 2022).

In addition to habits, other skills can be developed with the implementation of vegetable gardens in the school environment. To this end, Santos et al. (2022) realized that among the skills developed during the execution of a live garden, there is the stimulation of learning and increased socialization among students. In this sense, Santos et al. (2022) state that the construction of school gardens can promote environmental awareness, encourage healthy habits, and provide unique experiences in the lives of students. Carvalho and Silva (2014) demonstrated that the implementation of a vegetable garden in the school environment also becomes a great ally in the learning of students enrolled in Youth and Adult Education (EJA) and with intellectual disabilities.

ORGANIC GARDENS AND ENVIRONMENTAL EDUCATION

The implementation of organic gardens can be a great ally in the transversal and practical teaching of EA. One of the many benefits of organic gardens in schools is the intervention in the food culture, in the nutrition of children and young people in a community and this knowledge can be transmitted to the environment outside the school (LIMA et al., 2016). Freitas et al. (2013) summarize that the benefits of an agroecological school garden are: the reflection of the school community on environmental problems, quality of life and nutrition.

Bhoum et al. (2017) wrote that:

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> "Environmental education is a relevant topic that should be worked on with students of different age groups. Unfortunately, little is discussed about this subject, as it involves concepts of ecology, politics, ethics and citizenship. In this context, it is necessary to train teachers trained to work effectively with environmental education." (Bhoum et al., 2017).

The school garden allows the relationship between environmental education and food education and social values, making it possible for individuals related to this activity to participate, developing a sustainable society (Oliveira; Pear tree; Pereira Junior, 2018). Gardens can be considered as a kind of "living laboratories" and can be spaces used to encourage healthy eating habits and provide unique experiences in the learning and lives of students (Anschau et al., 2018).

With the hustle and bustle of daily life, human beings are increasingly looking for a quick diet and this habit can lead to a large consumption of industrialized foods. Children and adolescents who live in urban environments may have great difficulty in recognizing the origin of the food on their table (Cancelier; Beling; Facco, 2020). In this sense, these authors observed that the students who participated in the implementation of organic gardens began to have greater contact with the planted and harvested vegetables, making them know more about the origin of their food and encouraging these students to experiment and consume vegetables harvested through their own effort.

CASE STUDIES: EXAMPLES OF GOOD PRACTICE AND SUCCESSFUL INITIATIVES

Due to the critical scenario described above and the potential use of organic gardens in schools, we observed a series of initiatives throughout the national territory that aim to carry out projects of this nature. Unfortunately, we know that not all projects result in the publication of academic papers, which is one of the limitations of this research, since we work here only with those experiences that published results in different ways.

In this topic we intend to analyze the different reports of experiences on the application of vegetable gardens in schools. It is noteworthy that, despite the limitations of the research, in the analysis of projects implemented in different contexts, it is possible to identify effective strategies and replicable models that can serve as inspiration for other educators and managers. Thus, this topic, therefore, seeks not only to celebrate the success of these initiatives, but also to provide a base of knowledge and practical experiences that can be applied in different educational contexts.

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To filter works that were more related to the objective of this one, we used a general term that addressed the main aspects of the theme: "School gardens and environmental education". To this end, 107 works were found in the Brazilian Digital Bank of Theses and Dissertations (BDTD). On the SciELO website, the general term did not generate results with published works, so we fragmented the general term into "School gardens" and "environmental education" where 6 and approximately 520 publications were found, respectively. On Google Scholar, the general term resulted in approximately 16,000 publications, including books, review articles, case study articles, papers published in congresses, theses and dissertations. A significant number of works were found on the Google Scholar website, however, here only those that associated the search terms were considered, namely: "School gardens" and "Environmental education". The others were not addressed in this research because they only contemplated "school gardens" related to other aspects or "environmental education" related to other aspects. Only the works that associated these terms were adequate to the objectives of this work.

In Brazil, the application of organic gardens proves to be an excellent way to work with content related to environmental education in a practical, effective and transversal way. Several studies by the states of the country prove, with significant qualitative and quantitative results, the advantages of the implementation of school gardens for the process of teaching and learning content related to EE (Freitas et al., 2013; Araújo et al., 2017; Rodrigues et al., 2018). In this sense, the aforementioned authors were able to observe that the implementation of vegetable gardens in the school environment directs students and teachers to a closer and more dynamic relationship with each other and with the environment.

In a practical way, Araújo et al. (2017) implemented an organic garden in a public school in the city of Rio de Janeiro-RJ, where they found that during the implementation it was possible to develop activities that directly associate Education and Health, assisting in the teaching and learning process of this relationship and allowing greater interaction between students and teachers. Corroborating this experience, Fetter, Muller and Silva (2006) also emphasize that the garden at school is an instrument of interactions and discoveries. In the same way, Freitas et al. (2013) demonstrated that the implementation of a vegetable garden leads to discoveries and new experiences. These authors, when expanding an existing organic garden in a daycare center in Petrolina-PE, realized that,

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contrary to what the teachers imagined, the vast majority of children allowed themselves to experiment with cultivated vegetables and showed that they liked the fruits made available.

In the works consulted, another positive aspect of the implementation of vegetable gardens in schools concerns interdisciplinarity. The work produced by Rodrigues et al. (2018) demonstrates that the implementation of school gardens transcends the natural sciences in schools and brings light to an effective interdisciplinarity, because when working on the concepts of science in the garden, students produce mathematical data regarding the growth of vegetables and are still able to describe situations, that is, reports on the progress of the garden and can still answer discursive questions related to the cultivation of vegetables, encouraging students in textual production and assisting in the development of logical-rational and critical thinking.

In the study carried out by Oliveira, Pereira and Pereira Junior (2018), in Nova Ipixuna-PA, it was observed that students showed great interest in the disciplines of Science and Portuguese Language, as students observed the particularities and species of the garden and wrote down their observations, as well as took notes in the form of a questionnaire. Siqueira et al. (2016), in their studies on the implementation of organic gardens at school in Várzea Grande-MT, noticed in students the great ability to respond to questions related to the environment and sustainability during the process of installing the gardens.

Vegetable gardens can awaken environmental awareness. Rodrigues et al. (2018) realized that the union between the classroom and the vegetable garden makes students feel more interested in issues involving the environment. To this end, these authors consider that this methodology stimulates critical thinking in a playful and challenging way. In line with these results, Freitas et al. (2013) also emphasize that school gardens provide greater use of curricular content, the incorporation and experience of new values. Araújo et al. (2017), in turn, demonstrated that projects with well-developed organic gardens reap good acceptance and engagement from students and school employees, as occurred in the Educational Unit in Rio de Janeiro where their work was carried out.

During the searches for works carried out in Maranhão, only 5 works produced and published in the state were found, among which only 3 start from implementation projects themselves and 1 with research on the possibility of working EE with school gardens[8]. Also

[8] Among the 5 works produced in Maranhão, one of them, not mentioned in the text, consists of a bibliographic review entitled "Research on organic gardens and applicability in the school environment", where

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in the state of Maranhão, several schools produce organic school gardens for the most diverse objectives, such as for the integration of students into the contents worked in the classroom, to encourage the interaction of students with each other and with the teaching staff of the schools, work on content related to environmental education, implement content in a more transversal way, among other purposes.

Of the studies found, all authors agree on the importance of vegetable gardens to work on EE, however Sousa and Arouche (2013) and Maia et al. (2021) demonstrated several problems that can make the functional implementation of organic gardens in schools unfeasible, such as the lack of preparation and search for work that leads to effective practice, the lack of disciplines related to EE in undergraduate courses, and the scarcity of continuing education for teachers who wish to work as an EA working in the public school system. Another problem in the implementation of these projects concerns the difficulty in integrating the entire school community from the beginning of their development to their conclusion.

In an experience report, Sousa and Arouche (2020) did not demonstrate good results in the implementation of an organic garden in a school in the city of São Luís/MA. The authors highlighted as one of the main difficulties for the execution of the project, the lack of preparation of monitors in training in the Biological Sciences course, which led to a low adherence and engagement of the school community for the implementation of the organic garden.

Nezilina Maia et al. (2021), in a study with the application of a questionnaire in a public school in Caxias-MA, identified that, although vegetable gardens are widely known as an important tool to work on concepts of sustainability and EE, teachers use little of this resource to apply the basic principles of EE.

Of the successful experiences in Maranhão, we highlight the studies carried out in Codó/MA and Grajaú/MA, which demonstrated changes on the part of the students in the perception of plant foods, where the students understood the need and importance of consuming more healthy and fresh foods (Felix; Silva; Silva, 2022; Lima et al., 2024). Therefore, accordingly, these authors emphasize that the school garden has the potential to improve eating habits, promote EE learning and promote the evolution towards a more critical thinking of students about their relationship with the environment and sustainability.

the authors searched for works carried out in various locations in Brazil and that dealt with themes related to their objective (SANTOS; BRITO; BRITO, 2020).

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FINAL CONSIDERATIONS

In view of the above, it is important to stop seeing Environmental Education as a theme to be worked on in a punctual way and understand it as a daily pedagogical practice. In this context, the organic garden comprises the school environment as a valuable tool that is integrated into the teaching and learning process, promoting more engaging pedagogical practices. This "living laboratory" allows the development of various activities in Environmental Education, uniting theory and practice in a contextual way.

Among the main advantages of the implementation of the garden in the school environment demonstrated in the consulted files, we can highlight:

- inserts Environmental Education for the entire school community in a practical way;
- promotes the approximation of the student with the environment;
- it provides the formation of critical thinking about our actions with nature;
- it raises awareness of the need to consume organic food;
- promotes a more dynamic approximation of students to each other, to teachers and to other school employees;
- it integrates all disciplines, uniting theory and practice;
- It stimulates the improvement in eating habits.

From the works consulted, it was possible to identify the main benefits that the implementation of an organic garden in the school environment offers. They demonstrated that every well-presented and executed initiative generates good learning results. Despite the problems pointed out in the execution of the projects, such as the low training in EE in undergraduate courses, which has an impact on basic education, the general evaluation is very positive, especially, as already mentioned, for the skills and competencies that organic gardens provide.

In the state of Maranhão, the main advantage cited in the analyzed studies is the formation of a more organic and healthy food awareness. However, few projects with the implementation of organic gardens have been published in the state, demonstrating a lack of work of this nature and a need to encourage the execution of more projects as well as the publication of reports of these experiences, because as seen, organic gardens are important tools that can transform the reality of an entire community.

Works like this, of review and elucidation, have their importance for teachers/educators who aim to work on Environmental Education in a practical,

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contextualized and transversal way, as it provides sources of research for the implementation of organic gardens in the school environment and guides pedagogical practice.

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