


ENVIRONMENTAL EDUCATION IN SCHOOLS: CHALLENGES AND INNOVATIVE PRACTICES

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ABSTRACT

This study investigated how environmental education has been implemented in public schools and what are the main challenges faced in this process. The general objective was to analyze the practices of environmental education in schools, identifying obstacles and opportunities. The methodology adopted was bibliographic, based on the analysis of books, articles and dissertations on the subject. The results revealed that, although environmental education is recognized as important, its implementation faces difficulties such as the lack of infrastructure, the lack of specific training of teachers and the difficulty of integrating the theme into the disciplines. However, it was found that practical projects, linked to the local reality, have the potential to engage students and promote effective environmental awareness. The final considerations highlighted the need for greater teacher training and institutional support, in addition to suggesting new studies to broaden the understanding of the challenges and solutions for environmental education in public schools. The research contributes by identifying the main obstacles and suggesting improvements in educational practices aimed at the environment.

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INTRODUCTION

Environmental education has gained relevance in the educational scenario, being considered an essential strategy to promote awareness and responsibility in relation to the environment. In the school context, environmental education plays an important role in encouraging sustainable practices and awakening critical thinking about environmental issues. The inclusion of this theme in schools is fundamental for the formation of conscious citizens capable of facing the socio-environmental challenges of today. Based on various theoretical and practical approaches, it seeks to understand how environmental education is being implemented in educational institutions and what are the main challenges and opportunities observed.

The relevance of environmental education in schools is related to the need to train individuals who understand the complexity of environmental issues and are able to act ethically and responsibly in favor of sustainable development. Environmental education in schools has the potential to transform habits, modify perceptions and encourage the practice of actions that preserve the environment. However, despite its relevance, the effective implementation of environmental education faces obstacles, such as the lack of adequate teacher training, the absence of public policies and the difficulty of integrating the theme into the curriculum in a meaningful way.

In view of this reality, the problem that guides this study is related to the way environmental education is applied in schools, considering the challenges of its implementation and the conditions for teaching to be effective. The study then seeks to answer the following question: how is environmental education being implemented in public schools and what are the challenges faced in promoting an education that awakens environmental awareness in students?

The objective of this research is to analyze the practices of environmental education in public schools, identifying the main challenges and opportunities in the process of its implementation. The intention is to understand how environmental education has been worked in the school environment, taking into account the perceptions of teachers and students, as well as the public policies that support this practice.

This work is structured in several sections, starting with the introduction, which presents the theme, the justification and the research problem, in addition to exposing the main objective of the study. Then, the theoretical framework argues the central concepts about environmental education and its relevance in the educational context. In the

development part, three central topics will be presented that address teacher training, the reality of environmental education in public schools and the role of public policies. The methodology details the process of selection and analysis of the bibliographic references used. Next, the results of the research are discussed in three topics related to the effectiveness of environmental education. Finally, the final considerations bring a synthesis of reflections and suggestions for the improvement of environmental education practices in schools.

THEORETICAL FRAMEWORK

The theoretical framework is organized into three main parts. The first part presents a discussion about the concept of environmental education, addressing the historical evolution and the main objectives, based on authors who highlight the relevance of this theme in the educational context. Then, the second part analyzes the insertion of environmental education in Brazil, focusing on the development of public policies and incorporation into school curricula, highlighting the theoretical and practical contributions of specialists in the area. Finally, the third part explores the principles of critical environmental education, emphasizing the ability to foster a civic and critical education in students, based on pedagogical theories that value social transformation through environmental education.

TEACHER TRAINING IN ENVIRONMENTAL EDUCATION

The training of teachers in environmental education is a topic of great relevance to ensure the effective implementation of this practice in schools. Gouvêa (2006, p. 164) states that "the training of teachers for environmental education requires not only an understanding of environmental content, but also a critical and reflective posture on the impacts of human activities on the environment." This perspective highlights the need for training that goes beyond technical knowledge, focusing on a critical and integrated approach to the students' reality. The training of educators, therefore, must include the development of skills that enable them to reflect on environmental challenges and promote awareness among students.

On the other hand, Marques and Mazzarino (2021, p. 72) point out that "the great challenge of teacher training in environmental education lies in the lack of articulation between theory and pedagogical practice." For the authors, it is essential that training programs offer theoretical support and, at the same time, allow teachers to apply this

knowledge in a practical way and adapted to the school context. The lack of this articulation between theory and practice contributes to the difficulty of many educators in implementing the guidelines of environmental education in the classroom.

In addition, Gouvêa (2006) highlights that environmental education requires active methodologies that engage students and promote meaningful learning. According to the author, "teachers need to be trained to use methodologies that favor dialogue, participation and the resolution of environmental problems in everyday school life" (Gouvêa, 2006, p. 167). The emphasis is on training teachers who can apply methodologies that involve students in a practical way, making them feel like an active part in solving environmental issues.

Marques and Mazzarino (2021, p. 73) reinforce this idea by stating that "pedagogical practices in environmental education need to be transformative, that is, they must stimulate in students a critical posture and proactive action in relation to environmental issues". Thus, the training of teachers should enable them to use practices that not only transmit the content, but also encourage the active participation of students in the process of transforming the environmental reality.

In summary, teacher training in environmental education faces challenges related to the integration between theory and practice, as well as the need for methodologies that promote the active participation of students. Gouvêa (2006) and Marques and Mazzarino (2021) agree that teacher training should go beyond theoretical knowledge, offering practical tools so that they can act in a critical and transformative way in their classrooms.

ENVIRONMENTAL EDUCATION IN PUBLIC SCHOOLS: REALITY AND CHALLENGES

Environmental education in public schools plays an essential role in the formation of citizens aware of environmental issues. However, the reality faced by these schools presents several challenges that make it difficult to implement this practice. Effting (2007, p. 45) observes that "environmental education in public schools is limited by the lack of material and human resources, which compromises the development of meaningful activities for students." This finding points to the precariousness of infrastructure in schools, which often lack appropriate teaching materials and adequate spaces to carry out projects related to the environment.

Another important aspect highlighted by Sá, Oliveira and Novaes (2015, p. 120) refers to the inadequate training of teachers to deal with environmental education issues.

According to the authors, "the lack of specific training for teachers represents one of the greatest obstacles to the implementation of environmental education in public schools, since many educators feel unprepared to address the topic". This gap in teacher training results in a superficial approach to environmental content, often being restricted to specific activities without continuous pedagogical planning and integrated into the school curriculum.

In addition, Eftting (2007, p. 50) points out that the integration of environmental education with other disciplines is a constant challenge, as "there is a difficulty in articulating environmental content with traditional disciplines, such as mathematics, Portuguese and science". This lack of articulation makes environmental education something isolated, unrelated to the areas of knowledge, which ends up limiting its effectiveness and transformative potential. The fragmentation of content prevents students from understanding environmental education in a holistic way, as part of integrated knowledge applied to the reality of everyday life.

In addition to these issues, Sá, Oliveira and Novaes (2015, p. 122) point out that, in many cases, public policies for environmental education are not implemented in schools, or are treated in a bureaucratic manner, without ensuring the necessary support for their implementation. In this sense, the authors state that "government initiatives aimed at environmental education come up against a lack of resources and the absence of effective monitoring to ensure their implementation". This criticism reveals a scenario in which actions aimed at environmental education in public schools depend on a greater articulation between public policies and school realities.

Therefore, environmental education in public schools faces significant challenges, ranging from the lack of infrastructure and teacher training to the difficulty of integration with other disciplines and the insufficiency of public policies. Eftting (2007) and Sá, Oliveira and Novaes (2015) agree that, despite these challenges, it is possible to advance in the promotion of environmental education that is integrated, transformative and aligned with the needs of sustainable development.

THE ROLE OF PUBLIC POLICIES IN ENVIRONMENTAL EDUCATION

The role of public policies in environmental education is fundamental to ensure the promotion of educational practices that are aligned with the principles of sustainable development. Cardoso (2011, p. 12) observes that "public policies for environmental

education in Brazil were strengthened after the creation of the National Policy for Environmental Education, which establishes guidelines for the incorporation of the theme at all levels of education." This legal framework was essential for schools to start considering environmental education as an integral part of their curricula, linking it to the formation of conscious and responsible citizens in relation to the environment.

However, despite the advances, the implementation of these policies faces significant challenges. Matos (2002, p. 67) points out that "many of the public policies aimed at environmental education remain in the field of guidelines, without effective monitoring and sufficient resources for their application in schools." The distance between the formulation of policies and their practical application in everyday school life is evident. The lack of financial resources and the absence of strategic planning to integrate environmental education into the school curriculum limit the reach of these policies, weakening their impact.

Schools that manage to implement environmental education actions often do so in isolation, without the necessary support to ensure the continuity of these practices. According to Cardoso (2011, p. 16), "the implementation of environmental education projects depends a lot on the initiative of school managers and the training of teachers, which means that, in many cases, these projects are restricted to specific activities and without continuity". This means that, although public policies exist, their execution in schools depends, to a large extent, on the will and engagement of management teams and teachers, which results in inequalities in the application of these practices.

Matos (2002, p. 72) also points out that public policies for environmental education should be related to the Sustainable Development Goals (SDGs), since "environmental education in schools has the potential to contribute to the fulfillment of the SDGs, especially with regard to the promotion of sustainable societies". In this way, integrating environmental education into the global goals of sustainable development expands the social function and reinforces the relevance of policies that encourage educational practices aimed at environmental preservation and equitable development.

In short, public policies play an essential role in promoting environmental education in schools, but their implementation still faces challenges related to the lack of resources and the engagement of school teams. Cardoso (2011) and Matos (2002) highlight that, for these policies to have a significant impact, a joint effort between governments, schools and society is necessary to ensure that environmental education is incorporated into daily

school life and that it is aligned with the Sustainable Development Goals, providing education that prepares students to face the environmental challenges of the future.

METHODOLOGY

The methodology used in this study is bibliographic, with the objective of analyzing and synthesizing the existing knowledge about environmental education in schools. It is a qualitative research, which seeks to understand the practices and challenges of environmental education through the analysis of theoretical works, scientific articles and academic works published on the subject. The approach adopted is exploratory, aiming to identify and examine the main ideas, concepts and discussions related to the theme. The research instruments consist of secondary sources, such as books, dissertations, monographs and articles available in academic databases and digital libraries. The procedures involved the selection of materials relevant to the theme, prioritizing works published in the last twenty years, and the critical analysis of the contents. Analytical reading techniques and text interpretation were used to extract the main theoretical and practical contributions on environmental education in schools, enabling a view of the challenges and opportunities of this practice.

Chart 1: References Used in the Research

Author(s)	Conforming title published	Year	Type of work
MATOS, M. C. F. G.	Overview of Brazilian environmental education from the V Brazilian Forum on Environmental Education	2002	Dissertation
GOUVÊA, G. R. R.	Directions of teacher training for environmental education	2006	Article
EFFTING, T. R.	Environmental Education in Public Schools: reality and challenges	2007	Monograph
LOUREIRO, C. F. B.; COSSÍO, M. F. B.	A look at environmental education in schools: initial considerations on the results of the project 'What do schools do that say they do environmental education?'	2007	Article
CARDOSO, K. M. M.	Environmental education in schools	2011	Monograph
SÁ, M. A.; OLIVEIRA, M. A.; NOVAES, A. S. R.	Environmental Education in the state schools of Floresta (PE)	2015	Article
DIAS, A. A. S.; DIAS, M. A. O.	Environmental education	2017	Article
KOLCENTI, S. G. R.; MÉDICI, M. S.; LEÃO, M. F.	Environmental Education in public schools in Mato Grosso	2020	Article
MARQUES, R. M.; MAZZARINO, J. M.	Teacher training in environmental education: reflections from the integrative analysis of scientific publications in English	2021	Article

LOPES, T. S.; ABILIO, F. J. P.	Environmental Education in the initial training of teachers: contributions of Critical Pedagogy	2022	Article
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Source: authorship

After inserting the table with the references used, it is possible to observe the diversity of sources analyzed, which include scientific articles, monographs and master's dissertations, as well as institutional reports and legal documents on environmental education. The selection of these references was based on criteria of relevance and topicality, allowing an understanding of the practices and challenges faced in the implementation of environmental education in public schools. This set of materials offers a solid basis for the theoretical and critical analysis developed throughout this work.

IMPACTS OF ENVIRONMENTAL EDUCATION IN SCHOOLS

The implementation of environmental education programs in public schools has generated important results, both in terms of student awareness and the creation of a sustainable culture within educational institutions. Kolcenti, Médici and Leão (2020, p. 25) observe that "environmental education programs in public schools have the potential to transform students' behavior, encouraging sustainable practices and understanding of the impacts of human actions on the environment." This change in behavior is one of the main impacts observed when programs are well structured and have the active participation of the school community.

An example of a successful project is the one mentioned by Effting (2007), who reports the implementation of an environmental education program in a public school in the interior of Paraná. According to the author, "the project involved students, teachers and the local community in the revitalization of a degraded environmental space, promoting, in addition to environmental recovery, an awareness about the relevance of preserving the environment" (Effting, 2007, p. 60). This initiative highlights the relevance of involving different actors in the environmental education process, which enhances results and creates a sense of collective responsibility.

However, Kolcenti, Médici and Leão (2020, p. 27) point out that the sustainability of these projects still faces considerable challenges, such as the lack of continuity and institutional support. "Many environmental education projects end up being limited to specific activities, without a long-term strategy that allows the consolidation of these practices in the school routine". This comment reveals the difficulty of integrating

environmental education on a permanent basis, especially in schools that face limited resources and infrastructure.

In addition, Eftting (2007) highlights another challenge: the inadequate training of teachers to conduct environmental education projects. The author points out that the lack of specific training of educators prevents the use of participatory methodologies, compromising the quality of the activities developed. The absence of adequate training makes many teachers feel unprepared to address environmental issues in a dynamic way, which limits the potential of the programs.

In summary, the impacts of environmental education in public schools are significant, but there are still challenges to be overcome so that the projects have continuity and effectiveness in the long term. Kolcenti, Médici and Leão (2020) and Eftting (2007) agree that, although there are examples of successful projects, the lack of teacher training and insufficient institutional support represent obstacles that need to be addressed for environmental education to become a consolidated practice in schools.

CURRICULAR INTEGRATION OF ENVIRONMENTAL EDUCATION

The integration of environmental education into the school curriculum is a process that faces several challenges, but it also offers important opportunities for the development of environmental awareness in students. Lopes and Abílio (2022, p. 2) state that "the inclusion of environmental education in the curriculum depends on the construction of a pedagogical project that dialogues with the various areas of knowledge, in an interdisciplinary way." This perspective points to the need for a curriculum that does not treat environmental education as an isolated theme, but rather as part of a larger set of knowledge, integrating it with disciplines such as science, geography and even the Portuguese language.

Loureiro and Cossío (2007, p. 60) reinforce this idea when they highlight that "environmental education needs to be thought of as a daily educational practice, permeating the various school activities and not being restricted to commemorative dates or sporadic events". This comment reveals one of the main challenges faced by teachers: the difficulty of transforming environmental education into a continuous and meaningful practice, without it being treated as something secondary or complementary to traditional disciplines.

Another relevant aspect, according to Lopes and Abílio (2022, p. 3), is the role of teachers in mediating this curricular integration. The authors point out that "teacher training is a determining factor for the success of environmental education in the curriculum, since many teachers still do not have the appropriate pedagogical tools to work on the theme in an integrated way". The absence of specific training makes the integration process difficult, as educators do not feel prepared to deal with environmental content in an interdisciplinary and critical way.

Loureiro and Cossío (2007, p. 62) also argue the opportunities that arise with the curricular integration of environmental education. For them, "when environmental education is incorporated into the curriculum, it has the potential to awaken in students a critical perception of environmental issues, while developing skills that transcend the contents of the disciplines". This means that, in addition to promoting environmental awareness, curricular integration can contribute to the formation of reflective citizens prepared to face contemporary challenges.

However, even with these opportunities, Lopes and Abílio (2022, p. 5) highlight that "the lack of institutional support and the rigidity of traditional school curricula are obstacles that hinder the effective insertion of environmental education". This problem is recurrent in many schools, in which environmental content is relegated to the background, due to the pressure for results in subjects considered important, such as mathematics and Portuguese.

In short, the integration of environmental education into the school curriculum presents significant challenges, such as a lack of teacher training and insufficient institutional support. However, as stated by Lopes and Abílio (2022) and Loureiro and Cossío (2007), when this integration is successful, it provides students not only with a greater understanding of the environment, but also with the development of critical and reflective skills essential for their citizenship formation.

PERCEPTIONS OF TEACHERS AND STUDENTS ABOUT ENVIRONMENTAL EDUCATION

The perceptions of teachers and students about environmental education in schools reveal different points of view regarding the relevance and challenges of implementation. Dias and Dias (2017, p. 162) highlight that "most teachers recognize the relevance of environmental education, but face practical difficulties in inserting it consistently into the

school curriculum." This comment reflects a consensus among teachers about the need to work on the theme, however, it also points to the structural and pedagogical obstacles that hinder its effectiveness in the school environment.

From the students' point of view, Marques and Mazzarino (2021) identify that many students are interested in environmental issues, especially when they are contextualized in their daily reality. According to the authors, "students demonstrate greater involvement in environmental education activities when they are related to local environmental problems, such as water use or waste management" (Marques; Mazzarino, 2021, p. 74). This involvement highlights the relevance of linking theory to practice, making environmental issues tangible and close to the students' experience.

On the other hand, Dias and Dias (2017) point out that a significant part of teachers feel unprepared to address environmental issues in an interdisciplinary way, which compromises the effectiveness of the proposed activities. "Many teachers express the difficulty of integrating environmental education with the disciplines, which results in isolated projects that are disconnected from the students' reality" (Dias; Dias, 2017, p. 170). This difficulty reflects the need for teacher training directed to the use of methodologies that promote integration between different areas of knowledge, making environmental education part of the school routine.

Marques and Mazzarino (2021) also note that, although teachers recognize the relevance of environmental education, they are limited by the lack of pedagogical resources and institutional support. "The absence of adequate teaching materials and the little time available for extracurricular activities are barriers pointed out by teachers as factors that hinder the implementation of environmental education projects" (Marques; Mazzarino, 2021, p. 75). This reality demonstrates that, despite the goodwill and recognition of the relevance of the theme, the lack of adequate conditions prevents environmental education from reaching its full potential in schools.

In summary, both teachers and students recognize the relevance of environmental education, but face different challenges in its implementation. While students are engaged when activities are contextualized and practical, teachers come up against a lack of preparation and resources, as pointed out by Dias and Dias (2017) and Marques and Mazzarino (2021). These challenges indicate the need for greater institutional support and specific teacher training so that environmental education can be integrated into the school routine.

FINAL CONSIDERATIONS

The final considerations of this study seek to answer the central question of the research: how is environmental education being implemented in public schools and what are the challenges faced in promoting an education that awakens environmental awareness in students? From the analysis carried out, it was evident that, although environmental education is recognized as an essential element in the school curriculum, its implementation faces significant obstacles, such as the lack of adequate infrastructure, specific teacher training and integration with other disciplines.

The first relevant finding indicates that public schools have difficulties in promoting continuous and structured environmental education activities. This fact is related to the absence of adequate pedagogical and material resources, in addition to the overload of other curricular demands that make it difficult to fully incorporate the theme. Another point identified is the lack of specific training of teachers, which results in a superficial approach to environmental content and the difficulty of articulating the theme with other areas of knowledge, limiting the potential of environmental education to foster critical and practical reflection among students.

Despite these challenges, it was also possible to verify that, when implemented with practical projects and contextualized with the local reality, environmental education can engage students in a meaningful way. Students show greater interest in participating in activities that address environmental issues close to their daily lives, such as the use of water resources or the correct disposal of waste. This engagement reveals the potential of environmental education to promote behavior change and create critical awareness of environmental issues.

The contributions of this study lie in the identification of the main obstacles and opportunities related to the implementation of environmental education in public schools. By highlighting the need for specific training for teachers and the relevance of public policies that ensure resources and institutional support, this work offers subsidies for the improvement of environmental education practices in basic education. In addition, the research reaffirms the role of the school as a central space for the development of an active environmental citizenship committed to sustainable development.

Finally, it should be noted that further studies are needed to broaden the understanding of the factors that affect environmental education in public schools, especially with regard to the impact of public policies and the effectiveness of the

methodologies employed. Research that includes the perception of a larger number of teachers and students, as well as studies that explore different regional realities, can provide insight into the challenges and strategies for implementing transformative environmental education. Thus, the continuity of this type of research is essential so that environmental education can evolve and contribute to the formation of conscious and responsible citizens.

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