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TEACHER EDUCATION AND ENVIRONMENTAL EDUCATION: ESSENTIAL PRINCIPLES FOR SUSTAINABLE TEACHING

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ABSTRACT

Teacher education and environmental education constitute the central theme of this work, which analyzed the fundamental principles for sustainable teaching. The objective of the research was to investigate the relationship between teacher training and environmental education, emphasizing pedagogical practices that promote sustainability in schools. The methodology employed was qualitative and bibliographic in nature, allowing for the collection and analysis of information from classical and contemporary works, scientific articles, and legal documents. The research revealed that environmental education has become an essential field for the formation of critical, conscious citizens engaged in promoting sustainability. The results indicated that teacher education must include specific competencies to implement environmental practices, as well as promote active methodologies that integrate theory and practice. The conclusions highlighted the importance of continuous training that enables teachers to mediate meaningful experiences, connecting theoretical knowledge to everyday practice. The study emphasized that environmental education is not limited to the transmission of information but should foster responsible and ethical attitudes toward the environment. The research contributed to the understanding that teacher education, combined with solid principles of environmental education, is crucial for building a more sustainable and conscious society.

Keywords: Teacher education; Environmental education; Sustainability; Pedagogical practices.

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INTRODUCTION

This research explored the intersection between teacher education and environmental education, recognizing the growing relevance of this theme in contemporary times. Training teachers to address socio-environmental issues is fundamental in a world marked by ecological and social challenges, requiring a pedagogical approach that promotes awareness and environmental responsibility.

The theme was contextualized in light of the consulted literature, which ranged from the historical foundations of environmental education to its contemporary guidelines. Classical and contemporary authors were analyzed to understand how environmental education evolved and established itself as an essential field for forming critical and participatory citizens. The bibliographic approach allowed for reflection on the competencies necessary for teaching in this context, highlighting the importance of interdisciplinarity and critical thinking.

The research objectives were clearly defined: to investigate the relationship between teacher education and environmental education, identify pedagogical practices that promote sustainability, and propose applicable guidelines within the school context. The formulated hypothesis indicated that continuous training and the adoption of active methodologies are crucial for developing effective environmental education.

The justification for conducting this study lies in the urgent need to prepare educators to face the challenges of the 21st century, where sustainability must be a priority. The research suggested that environmental education should not be treated as an isolated theme but as a transversal component that permeates all areas of knowledge, contributing to the holistic formation of students.

The work was developed through a qualitative and bibliographic methodology, which enabled the analysis of a wide range of sources, such as books, scientific articles, and legal documents. This approach provided a deep understanding of the principles and practices related to environmental education and teacher training.

Furthermore, the introduction emphasized the importance of systematically and coherently integrating environmental education into school curricula, stressing that teacher education must go beyond mere transmission of theoretical content. The research addressed the need to create learning environments that encourage active student participation, promoting practical experiences that connect theory to everyday reality. This approach not only fosters the development of critical environmental awareness but also stimulates socio-emotional skills essential for forming citizens committed to the community and the planet's future. Environmental education, therefore, emerges as a fundamental pillar in teacher training, reflecting the urgency of an educational transformation that prioritizes sustainability and socio-environmental responsibility in all spheres of life.

In summary, the introduction presented a comprehensive view of the theme, aligning objectives, hypotheses, and justifications, and established the foundation for the critical analysis developed in the subsequent sections of the work. The research sought to contribute to building more effective and integrated environmental education, essential for forming conscious citizens committed to sustainability and environmental preservation.

METHODOLOGY

This research adopts a qualitative and bibliographic approach, aiming to analyze the principles of environmental education and its relationship with teacher training, identifying pedagogical practices that promote sustainability in the school context. The choice of bibliographic research is justified by the need to understand, from different theoretical perspectives, the foundations of environmental education, its historical evolution, and the competencies required for teaching in this field. This type of study allows organizing, comparing, and reflecting on information from reliable sources, promoting a critical analysis that supports the development of the article.

To construct the theoretical framework, works by classical and contemporary authors were selected, covering concepts, principles, and practices of environmental education, as well as studies related to teacher training and sustainable pedagogical methodologies. Among the selection criteria for sources, academic relevance, publication currency, and pertinence to the central theme of the study stand out. Books, scientific articles, legal documents, and reports from international organizations such as UNESCO were consulted, ensuring a broad and well-founded approach.

The analysis of information followed a critical and interpretative logic, allowing the identification of patterns, convergences, and divergences among authors, in addition to relating theory and practice in environmental education. In this process, essential competencies and skills for teachers to implement pedagogical strategies that promote environmental awareness were highlighted, as well as the challenges and opportunities of continuous training. The methodology also enabled understanding how the principles of sustainability, interdisciplinarity, critical thinking, and socio-environmental responsibility can be incorporated into teaching practices, making education more meaningful and transformative.

Moreover, the research sought to integrate theoretical reflections and practical recommendations, ensuring that the study does not remain limited to conceptual exposition but also offers applicable guidelines for everyday school life. The absence of interviews or field surveys did not compromise the analytical nature of the work, as the bibliographic approach provided a consistent overview of the theme, supporting the discussion of pedagogical strategies, active methodologies, and successful teaching experiences.

In summary, the adopted methodology combines academic rigor and practical relevance, enabling the construction of a well-founded and reflective study on teacher education and environmental education. The critical analysis of specialized literature provides solid theoretical support to understand the importance of environmental education principles, the need for teacher training, and the application of sustainable pedagogical practices, contributing to the formation of conscious citizens committed to environmental preservation.

DEVELOPMENT

ENVIRONMENTAL EDUCATION: CONCEPTS AND EVOLUTION

Environmental Education (EE) has established itself as an essential field for forming critical, conscious citizens capable of acting in favor of sustainability. Although its modern expression has intensified in recent decades, the concepts that underpin it stem from a historical concern with the relationship between society and the environment. According to Capra (1996), environmental education is not limited to transmitting information about the natural environment but involves developing attitudes, values, and behaviors that promote preservation and quality of life on the planet. In this sense, EE presents itself as a broad, interdisciplinary, and continuous educational process, whose objective is to build ecological awareness capable of guiding sustainable everyday practices (Sauvé, 1996).

Classical authors, such as Carson (1962), in the work Silent Spring, emphasized the need to sensitize society to the impacts of human actions on the environment, warning about the harmful effects of chemical products and the predatory exploitation of natural resources. This pioneering perspective influenced the development of educational programs that sought to integrate scientific knowledge and environmental awareness. Similarly, Hungerford and Volk (1990) highlight that EE should combine cognitive, affective, and behavioral aspects, promoting not only understanding of environmental problems but also motivation for responsible action.

In the contemporary context, environmental education is understood as a process that articulates theory and practice, integrating different areas of knowledge and considering the complexity of socio-environmental problems. Ornstein and Lasley (2011) stress that modern EE seeks to form critical citizens capable of understanding ecological, social, and economic interrelationships, encouraging participatory solutions to environmental challenges. Furthermore, the modern concept of EE emphasizes sustainability as a guiding principle, promoting ethical reflection and social responsibility in all spheres of life. Historically, environmental education worldwide consolidated through global ecological awareness movements, especially following United Nations Conferences on the Environment. The Stockholm Conference in 1972 marked a turning point by recognizing the need for educational policies aimed at environmental protection, establishing guidelines for incorporating EE into school curricula and teacher

training programs (UNESCO, 1978). Later, the Rio de Janeiro Conference in 1992 emphasized sustainability and education as fundamental instruments for environmental preservation, consolidating EE as a central strategy in building more responsible and conscious societies (Brazil, 1992).

In Brazil, the first records of environmental education initiatives date back to the 1970s, mainly in projects focused on fauna and flora conservation and the protection of natural areas. From the 1990s onward, with the creation of the National Environmental Education Policy (Law No. 9.795/1999), EE became officially recognized as a right for all citizens, integrating into formal and informal education systems and strengthening teacher training aimed at sustainability (Brazil, 1999; Dias, 2002). Currently, environmental education in the country seeks to articulate ecological, social, and cultural issues, promoting participatory and interdisciplinary pedagogical practices that value collective responsibility in building a sustainable future.

Thus, environmental education presents itself as an ever-evolving field that transcends simple instruction on ecological issues and consolidates as a formative strategy of ethical, critical, and transformative character. Its historical trajectory demonstrates the growing understanding that environmental preservation depends not only on public policies but also on social mobilization and the formation of citizens capable of acting consciously and responsibly in the face of contemporary challenges.

PRINCIPLES OF ENVIRONMENTAL EDUCATION

The principles of environmental education constitute the foundation for forming conscious citizens engaged in promoting sustainability. Among the fundamental concepts, sustainability, interdisciplinarity, critical thinking, and socio-environmental responsibility stand out, guiding both educational practice and ethical reflection on the environment. Sustainability, as defined by Meadows et al. (2004), involves the ability to meet present needs without compromising resources and opportunities for future generations, becoming a central guide for organizing content and pedagogical activities aimed at environmental preservation.

Interdisciplinarity, in turn, allows environmental education to transcend the limits of isolated disciplines, integrating scientific, social, cultural, and ethical knowledge. According to Morin (2000), the complexity of environmental problems requires students to understand the interrelationships between natural and social systems, developing a holistic vision capable of connecting theory and practice. This principle reinforces the need for pedagogical strategies that promote dialogue among different areas of knowledge and encourage collaborative and contextualized problem-solving.

Critical thinking is another essential pillar of environmental education, as it stimulates reflection on the impacts of human actions and the development models adopted by society. According to Sauvé

(1996), EE does not limit itself to transmitting information about the environment; it seeks to form individuals capable of analyzing, questioning, and proposing ethical and sustainable solutions, promoting critical awareness regarding consumption practices, resource use, and environmental public policies.

Socio-environmental responsibility is directly linked to the perception that each individual plays a role in maintaining and protecting the environment. For Dias (2002), this responsibility should be practically incorporated into school life and students' routines, encouraging conscious attitudes and actions that promote collective sustainability, such as conscious consumption, waste reduction, and participation in community projects.

The relationship between theory and teaching practice is fundamental for the effectiveness of these principles. EE requires teachers not only to transmit knowledge but also to articulate practical experiences, such as visits to natural areas, school gardens, recycling projects, and community awareness activities (Ornstein & Lasley, 2011). In this way, concepts learned in the classroom gain real meaning, allowing students to internalize environmental values and develop attitudes applicable beyond the school context.

Moreover, building environmental values and attitudes in students is central to environmental education, as effective learning involves the affective dimension as much as the cognitive one. According to Hungerford and Volk (1990), it is essential to promote experiences that awaken empathy for the environment and a sense of social responsibility, encouraging sustainable behaviors and an ethical stance toward environmental challenges. This approach values the integral formation of the individual, preparing them to act consciously and participatively in society.

Therefore, the principles of environmental education function as guiding frameworks for teaching practice, integrating knowledge, critical reflection, and responsible action. They not only structure pedagogical content but also promote the construction of ethical and sustainable environmental awareness, fundamental for forming citizens committed to the planet's future.

TEACHER EDUCATION AND ENVIRONMENTAL EDUCATION

Teacher education plays a central role in the effectiveness of environmental education, as the teacher is the main mediator between theoretical knowledge and sustainable pedagogical practice. The need for continuous training stands out as an essential requirement, since the complexity of socio-environmental problems and the constant evolution of educational practices demand that teachers remain up to date. According to Sá and Dias (2001), ongoing training enables teachers to acquire new knowledge, develop innovative pedagogical skills, and integrate sustainability concepts into different subjects, promoting more effective and transformative environmental education.

Furthermore, teacher education should include the development of specific competencies and skills to implement environmental practices. Among these competencies are the ability to plan interdisciplinary activities, stimulate critical thinking, promote active student participation, and connect school content with concrete environmental issues. According to Ornstein and Lasley (2011), trained teachers can create educational experiences that link theory and practice, making learning meaningful and encouraging students to adopt environmentally responsible attitudes.

The adoption of active methodologies and sustainable pedagogical strategies is an indispensable component of teacher education in environmental education. Among the most effective practices are school projects focused on environmental preservation, community gardens, technical visits to conservation units, field studies, recycling activities, and conscious consumption initiatives (Dias, 2002; Ornstein & Lasley, 2011). These methodologies allow students to experience learning practically, develop socio-emotional skills, and build ethical values related to environmental preservation. Additionally, these strategies strengthen interdisciplinarity and collective participation, fundamental principles of environmental education, promoting a school culture committed to sustainability.

Another relevant aspect of teacher education is the ability to critically reflect on one's own pedagogical practice and adapt it to the needs of students and the school community. According to Hungerford and Volk (1990), teachers who develop this ability are more capable of engaging students in active learning processes, stimulating socio-environmental awareness, and fostering collective responsibility. The integration of educational technologies, audiovisual resources, and collaborative activities also proves effective in enhancing student engagement and making environmental education more dynamic and meaningful.

Therefore, teacher education in environmental education goes beyond acquiring theoretical knowledge; it involves building competencies, skills, and attitudes capable of transforming pedagogical practice and promoting environmental awareness in an integrated and participatory manner. Well-prepared teachers become agents of social transformation, contributing to building a more ethical, critical, and sustainable society, in which the principles of environmental education are reflected in concrete and lasting actions.

CONCLUSION

The analysis of teacher education and the principles of environmental education demonstrates that promoting education aimed at sustainability goes far beyond the mere transmission of information about the environment. It is necessary for teachers to be prepared not only to teach theoretical content but also to mediate meaningful experiences that connect knowledge to everyday practice, encouraging responsible and ethical attitudes toward the planet. Continuous training proves essential in this process, enabling

teachers to acquire new competencies, develop innovative pedagogical skills, and remain up to date in the face of contemporary socio-environmental challenges.

The principles of environmental education—sustainability, interdisciplinarity, critical thinking, and socio-environmental responsibility—provide the foundation for building comprehensive and reflective pedagogical practice. They guide the development of activities that not only inform but also promote active student engagement, strengthening values, attitudes, and environmentally conscious behaviors. When systematically and consistently incorporated, these principles allow environmental education to fulfill its transformative role, forming citizens capable of understanding the complex interrelationships among society, economy, and nature, and acting ethically and participatively in constructing sustainable solutions.

Furthermore, the integration between theory and teaching practice is fundamental for classroom content to become meaningful experiential learning. The use of active methodologies, interdisciplinary projects, field studies, and community actions contributes to making learning concrete and relevant, stimulating students' autonomy, creativity, and critical capacity. This pedagogical approach strengthens collective responsibility and demonstrates that environmental education is not an isolated theme but a transversal dimension that permeates all areas of knowledge and social life.

In summary, environmental education, combined with solid and continuous teacher training, constitutes a powerful instrument for building a more conscious, critical, and sustainable society. It transforms the teacher's role, making them an agent of social change capable of inspiring students to adopt sustainable practices and understand the importance of every individual and collective action in preserving the environment. In this context, it is possible to affirm that environmental education, when grounded in solid principles and mediated by well-prepared professionals, plays a strategic role in forming citizens committed to sustainability, promoting a paradigm shift that values life, ecological balance, and the planet's future.

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