

BEYOND BIOLOGY: ENVIRONMENTAL EDUCATION AS A CENTRAL ELEMENT IN THE PPCS OF THE BACHELOR'S DEGREE IN BIOLOGICAL SCIENCES <https://doi.org/10.63330/aurumpub.015-011>

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ABSTRACT

This article analyzes the inclusion of Environmental Education in the Pedagogical Course Projects (PPC) of undergraduate programs in Biological Sciences. This qualitative study used document analysis as the primary method to investigate how EE is approached and integrated into the curricula. The research focused on five courses offered at a public university, both in-person and hybrid formats. We sought to go "beyond Biology," understanding Environmental Education not only as a disciplinary subject but as a guiding principle that should permeate the entire training of future teachers. The results show that EE is included as a specific discipline or addressed in a transversal and interdisciplinary manner in Pedagogical Practice courses. The study demonstrated the importance of reformulating the PPCs, promoting EE as a transversal and central axis, capable of empowering undergraduates to act as agents of transformation, prepared to deal with the complex socio-environmental challenges of our time.

Keywords: Political pedagogical project; Public university; Environmental education.

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INTRODUCTION

Environmental Education (EE) transcends the mere status of a curricular subject, establishing itself as a fundamental and strategic pillar in the training of future teachers of Biological Sciences. The global ecological crisis—marked by climate change, accelerated biodiversity loss, and resource depletion—demands an educational response that is critical, transformative, and action-oriented. The Biological Sciences Teaching Degree, by its intrinsic nature linked to living systems and their ecosystems, constitutes a privileged *locus* for shaping the educator as an agent of transformation, capable of bringing environmental awareness into the classroom and society at large. The relevance of Environmental Education in teacher training also lies in preparing for pedagogical practice. Biology, due to its experimental and field-based nature, offers a wide range of opportunities for practical Environmental Education; however, higher education must provide the methodological framework to make effective use of these opportunities (SATO, 2002).

Environmental Education (EE) is a field of knowledge and practice that seeks to promote awareness and behavioral change regarding the environment. It is not limited to providing information about nature but encompasses political, social, and ethical dimensions aimed at transforming society.

Reigota (2011, p. 11) defines Environmental Education as “a continuous and permanent educational process for the formation of conscious, critical citizens capable of relating to the environment in a balanced and respectful manner.” In this sense, it seeks more than the transmission of data; it aims to form individuals capable of understanding the complex interactions among society, economy, and nature.

A critical approach to Environmental Education is essential to prevent it from becoming a mere tool of “greenwashing.” Layrargues (2017, p. 25) criticizes what he calls “the cynicism of environmental education,” manifested in attempts to present sustainability as a magical solution to the environmental crisis without questioning power structures and the prevailing development model.

In this context, EE must act as an instrument of emancipation, empowering individuals to question the *status quo* and seek alternatives for building a more just and sustainable society. As highlighted by Law No. 9.795/99, which establishes the National Environmental Education Policy, EE must be “an essential and permanent component of national education, to be developed at all levels and modalities of the educational process, in both formal and non-formal contexts.”

Environmental Education is, therefore, an educational process aimed at forming an “ecological subject” (SATO, 2002), that is, an individual who internalizes values of respect, responsibility, and solidarity toward the environment and perceives themselves as an integral part of nature rather than superior to it. In this sense, EE becomes a tool for building a more equitable and sustainable future for all.

Environmental Education should be addressed in a transversal and interdisciplinary manner within the Biology curriculum, as recommended by the National Curriculum Guidelines (BRASIL, 2012). This



means that, when studying Plant Physiology, the future teacher should be able to discuss the impact of deforestation and monocultures; when addressing Genetics, they should analyze the risks and ethical issues of biotechnologies and Genetically Modified Organisms (GMOs) in environmental contexts (REIGOTA, 2011).

Thus, this study analyzed the inclusion of Environmental Education in the Pedagogical Course Projects (PPC) of Biological Sciences Teaching Degrees, investigating how EE is addressed and integrated into curricula.

METHODOLOGICAL APPROACH

This work was developed based on Creswell's (2014) discussions on qualitative research, which he conceptualizes as research grounded in assumptions that address the meanings individuals or groups attribute to a social or human problem, including the researcher's reflection, a complex description, and interpretation of the problem, aiming to contribute to the literature or propose a call for change (CRESWELL, 2014, p. 49).

The present study is characterized by document analysis of the syllabi, curriculum matrix, and Pedagogical Course Project (PPC) of the Biological Sciences program at a public university located in the state of Piauí, offered in both in-person and hybrid modalities. The research initially developed through document analysis and discussion of the data obtained from the PPC, syllabi, and curriculum matrix. The PPCs were provided by the coordinators of the Teresina campus (in-person modality) and the campuses of Piripiri, Oeiras, Bom Jesus, and Simões (hybrid modality). As criteria for data analysis, we proceeded with reading and searching the PPCs, syllabi, curriculum matrix, and bibliographies using the keyword "Environmental Education" within the analyzed documents. These searches were conducted by observing the names of the courses, refining the search to identify where Environmental Education was present. We analyzed the content of syllabi that focused on Environmental Education, as well as the interdisciplinarity among the program's courses. For data analysis, we considered courses that included Environmental Education in their titles, topics, and/or bibliographies. All data were provided by the coordinators of the university's programs, which is a public institution. Therefore, for ethical reasons, the name of this institution was omitted to protect the identities of the participants and coordinators who did not wish to be identified.

RESULTS AND DISCUSSION

The analysis of the inclusion of Environmental Education (EE) in the Biological Sciences programs of a public university in the state of Piauí, offered in both in-person and hybrid modalities, was conducted through the review and verification of data obtained from the PPC, syllabi, and curriculum



matrices. The findings revealed that, in the hybrid modality, the Biological Sciences Teaching Degree includes Environmental Education as a mandatory course. The mandatory inclusion of EE as a subject in teacher education programs is highly relevant, as it equips future educators to disseminate sustainable knowledge and practices. Several authors and official documents address this issue, advocating for its inclusion as a means to ensure that biology teacher training aligns with contemporary socio-environmental needs.

In the analyzed PPC, this curricular component has a workload of 30 hours, offered in Block 2, with the following syllabus: History of Environmental Education; Main objectives and purposes of EE; Political, educational, and social organization of EE in Brazil; Trends and currents of EE; Methodologies and practices used in EE. Its objectives include:

- Understanding the historical development of Environmental Education nationally and internationally;
- Deepening knowledge of historical and regulatory aspects of EE in Brazil;
- Promoting reflection on the role of the biology educator in EE, focusing on humanistic values, knowledge, skills, attitudes, and competencies that contribute to building sustainable societies;
- Understanding different conceptions of EE and analyzing one's own perspective;
- Critically evaluating the main legal instruments of EE in Brazil (National Environmental Education Policy; National Environmental Education Program; National Curriculum Guidelines for EE);
- Carrying out practical activities and current discussions on the environment and the school setting, which can be replicated in schools;
- Exploring possibilities for interdisciplinary work on environmental themes in elementary and secondary education.

These competencies are to be developed through learning scenarios such as dialogued lectures, field classes, and seminar presentations.

Including EE as a mandatory subject is a fundamental step toward ensuring a more comprehensive education aligned with 21st-century demands, forming educators who can act as agents of transformation in their communities. According to Layrargues (2006), critical environmental education in teacher training is essential so that professional practice does not remain confined to the mere “biologization” of environmental issues but considers their complex socio-environmental dimensions (LAYRARGUES, 2006, p. 89).



Although Brazilian legislation, through the National Environmental Education Policy (Law No. 9.795/99), establishes that EE should not be mandatory as a separate subject, the law determines that EE must be a permanent and integrated component of Brazilian education:

“Environmental education is an essential and permanent component of national education and must be present, in an articulated manner, at all levels and modalities of the educational process, in both formal and non-formal contexts.” (BRASIL, 1999, art. 2)

Several authors emphasize the importance of EE as a social and political practice that goes beyond the mere transmission of information. Reigota (2007) argues that EE should promote critical reflection and active student participation. For this author, EE must be understood as a social and political practice capable of forming critical individuals engaged in seeking solutions to environmental problems. Jacobi (2003) discusses the need for EE in biology teacher training to be grounded in complexity and interdisciplinarity, incorporating EE as a fundamental and transversal dimension that considers the complexity of environmental problems. Layrargues (2006) further argues that a critical approach to EE in teacher education programs is essential to demystify the purely biological view of environmental issues and integrate social, political, and cultural dimensions.

In the in-person modality, EE was observed as a central theme, both as a specific subject and within courses such as Curricular Components – PCC and Extension Curricularization Activities – ACE, which are mandatory components of the program and serve as spaces for developing pedagogical practices.

In the PPC analyzed for the Teresina campus (in-person modality), this curricular component also has a 30-hour workload, developed theoretically, with a syllabus similar to that of the hybrid modality. It is scheduled for Block 7 and uses learning scenarios such as dialogued lectures, field classes, and seminar presentations to develop the desired competencies.

The activities in PCC and ACE courses allow future educators to articulate theory with classroom realities. In this context, EE ceases to be merely content and becomes a transformative teaching approach. These activities involve actions directed toward society, encompassing a diverse range of initiatives that enable students to extend the educational process beyond the university walls, encouraging them to act as agents in the production and dissemination of knowledge.

Carvalho (2012) argues that Pedagogical Practice is the ideal moment to deconstruct the traditional view of the teacher as a mere transmitter of knowledge. Instead, the discipline should promote an educational praxis aimed at solving concrete environmental problems:



“Pedagogical practice, by incorporating the environmental dimension, ceases to be merely the application of a method and becomes the praxis of an engaged educator who acts upon reality with the objective of transforming it.” (CARVALHO, 2012, p. 104)

Loureiro (2006) emphasizes the importance of teacher education going beyond content reproduction, encouraging the development of pedagogical projects that foster student participation and autonomy:

“Environmental education in teacher training must focus on building participatory pedagogical projects that develop the capacity for reflection and intervention of individuals in their realities.” (LOUREIRO, 2006, p. 67)

Similarly, Guimarães (2004) highlights that EE work within Pedagogical Practice must be interdisciplinary and contextualized, as environmental problems are complex and require an approach that integrates different areas of knowledge:

“Environmental education must be understood as an integrated educational process that permeates all curriculum subjects, and pedagogical practice is the privileged space for this integration to occur effectively.” (GUIMARÃES, 2004, p. 25)

The application of EE in PCC and ACE courses, developed as pedagogical practice, allows teaching degree students to design and implement EE projects addressing real environmental problems in the school or local community. This transforms theory into a meaningful learning experience, enabling the use of teaching methods that go beyond the traditional classroom and providing an ideal space for future teachers to plan actions that connect biology with other disciplines, demonstrating the complexity of environmental issues. Furthermore, by experiencing EE as a theme in PCC and ACE courses, students develop a more critical and engaged perspective, perceiving themselves as educators capable of contributing to social and environmental transformation.

FINAL CONSIDERATIONS

The document analysis of the Pedagogical Course Projects (PPCs) for the Biological Sciences Teaching Degree revealed a paradoxical reality: although Environmental Education (EE) is a theme intrinsically linked to the field, its inclusion in curricula remains fragmented and superficial. What should serve as a guiding principle—a course philosophy permeating all subjects and activities—often amounts to a few mentions in syllabi or the existence of a single, isolated EE course.

Our research demonstrated that the concept of EE in the analyzed documents is, for the most part, restricted to a content-based perspective. This approach fails to recognize the transformative potential of EE in shaping future educators. By confining it to a niche, PPCs miss the opportunity to prepare graduates



to face the complexity of socio-environmental crises, which demand interdisciplinary action and a critical stance.

To move beyond Biology, it is imperative that higher education institutions revise their Pedagogical Course Projects. We suggest that Environmental Education be elevated to a transversal and structuring axis of the program, influencing not only the curriculum but also teaching methodologies, extension activities, and research.

Training Biology teachers with a solid foundation in Environmental Education is crucial for building a more conscious and sustainable society. Therefore, our study is not merely a diagnosis; it is an invitation to reflection and action. We believe that the full integration of EE into PPCs is the path to forming educators who can truly act as agents of change, inspiring new generations to value and protect our planet.



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