

EXPLORING THE ROLE OF GEOGRAPHY AND HISTORY IN ENVIRONMENTAL EDUCATION: SHAPING TEACHER TRAINING IN HUMAN SCIENCES CONTEXTS

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Resumo: Este trabalho propõe ajustes nos currículos de Pedagogia e nos programas de Geografia e História para fortalecer a Educação Ambiental no ensino fundamental. A Pedagogia é crucial na formação de professores e na integração de conteúdos ambientais. Melhorias nesses currículos e a inclusão de temas ambientais em Geografia e História promovem uma abordagem interdisciplinar, essencial para abordar os desafios ambientais e oferecer uma educação eficaz.

Palavras-chave: Educação Ambiental; Geografia; História; Pedagogia.

Abstract: This work proposes adjustments to the Pedagogy curriculum and Geography and History programs to strengthen environmental education in elementary schools. Pedagogy plays a crucial role in teacher training and integrating environmental content. Enhancing these curricula and including environmental themes in Geography and History foster an interdisciplinary approach, essential for addressing environmental challenges and providing effective education.

Keywords: Environmental Education; Geography; History; Pedagogy.

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Introduction

The Organization for Economic Co-operation and Development (OECD) is an intergovernmental economic organization with 38 member countries, founded in 1961 to stimulate economic progress and world trade. Discussions among OECD member countries are based on information provided in its database, aimed at guiding participating governments to promote economic development based on financial, trade, social, and environmental sustainability. Environmental sustainability can be achieved through improving production methods that, for example, consider the use of renewable raw materials or generate no waste, utilizing "green technologies". In turn, Environmental Education is an indispensable tool in identifying and resolving issues related to climate change and, consequently, the geographic environment. Actions of this nature are so crucial that Brazil's Ministry of Education maintains a partnership with the OECD to promote public policies aimed at improving the country's education quality.

Environmental Education, despite its name suggesting a focus on nature and the environment within the realm of Biological Sciences, is neither exclusive to this field nor limited in scope. It is inherently interdisciplinary and transdisciplinary, integrating into the educational processes of various undergraduate programs such as Geography, History, Chemistry, Pedagogy, and Biology. Furthermore, it should be approached from a perspective that emphasizes competence and citizenship (Freitas et al., 2016). Therefore, it is essential to identify gaps and bottlenecks in the curricula of undergraduate students with the aim of rethinking concepts previously learned incompletely or incorrectly, while reinforcing the epistemological foundations of the sciences of space and time as inseparable characteristics of the environment.

Geography encompasses a wide range of topics that can be broadly categorized into physical Geography, human Geography, and geographical techniques. The main topics studied within each category are: a) Physical Geography, which includes Geomorphology (study of landforms and the processes that shape them), Climatology (study of climate, including weather patterns, atmospheric processes, and climate change), Hydrology (study of water in the environment, including rivers, lakes, and groundwater), BioGeography (study of the distribution of species and ecosystems in geographic space and through geological time), Soil Geography (study of soil types, their distribution, and processes of soil formation), Glaciology (study of glaciers and ice sheets and their impacts on the landscape), Oceanography (study of the physical and biological aspects of the ocean), and Environmental Geography (study of the interactions between humans and the natural environment); b) Human Geography, which includes Population Geography (study of population distribution, density, and demographics), Cultural Geography (study of cultural products, norms, and landscapes and how they vary and interact), Economic Geography (study of the distribution of economic activities, resources, and industries), Urban Geography (study of urban areas, including their development, structure, and functioning), Political Geography (study of the spatial expression of political processes and how geographical spaces are divided and controlled),

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Social Geography (study of social phenomena and their spatial components), Development Geography (study of economic development and quality of life across different regions), and Historical Geography (study of the human, physical, fictional, theoretical, and "real" geographies of the past); c) Geographical Techniques, which includes Cartography (the art and science of map-making), Remote Sensing (the use of satellite or aerial imagery to collect information about the Earth's surface), Geographic Information Systems – GIS (systems designed to capture, store, manipulate, analyze, manage, and present spatial or geographic data), Spatial Analysis (techniques to study entities using their topological, geometric, or geographic properties), Quantitative Methods (statistical and mathematical analysis in geographic research), and Field Methods (techniques and tools used for collecting geographical data in the field). Geography is inherently interdisciplinary, often intersecting with other fields such as sociology, anthropology, environmental science, geology, economics, political science, and History.

In turn, History is a broad field that encompasses the study of past events, societies, cultures, and individuals. It is often divided into various subfields and periods, as follows: a) General Historical Topics, which includes Political History (study of political events, leaders, ideas, movements, and governmental systems), Social History (examination of societal norms, structures, and everyday life of people in the past), Economic History (analysis of economic systems, trade, industry, and the economic causes and effects of historical events), Cultural History (Exploration of cultural norms, practices, arts, and intellectual achievements of different societies), Military History (study of wars, military strategies, battles, and the impact of armed conflict on societies), Diplomatic History (examination of international relations, treaties, and diplomatic efforts between states), Intellectual History (study of ideas, philosophies, and intellectual movements throughout History), Legal History (exploration of legal systems, laws, and the evolution of legal institutions), Environmental History (study of the interaction between humans and the natural environment over time), and Historiography (study of how History has been written and interpreted, including different historical methodologies and theories); b) Period-Specific History, which includes Ancient History (study of ancient civilizations such as Mesopotamia, Egypt, Greece, Rome, and others up to around 500 CE), Medieval History (study of the Middle Ages, roughly from the fall of Rome to the beginning of the Renaissance), Early Modern History (examination of the period from the Renaissance to the late 18th century, including the Reformation, Enlightenment, and colonial expansion), and Modern History (study of the period from the late 18th century to the present, encompassing the Industrial Revolution, World Wars, Cold War, and contemporary History); c) Regional History, which includes European History (study of the History of European countries and their interactions), American History (exploration of the History of the Americas, including North, Central, and South America); Asian History (examination of the History of Asian countries, including East Asia, South Asia, and Southeast Asia), African History (study of the diverse histories of African nations and cultures), Middle Eastern History (exploration of the History of the Middle East, including

ancient, medieval, and modern periods), Oceania History (study of the History of Australia, New Zealand, and the Pacific Islands); d) Thematic History, which includes History of Science and Technology (study of the development of scientific knowledge and technological advancements), History of Religion (exploration of the development and impact of religious beliefs, institutions, and movements), Women's History (study of the roles, experiences, and contributions of women throughout History), Gender History (examination of how gender roles and identities have been constructed and have changed over time), Labor History (study of the working class, labor movements, and industrial relations), and Colonial and Post-Colonial History (examination of the impact of colonialism and the processes of decolonization); e) Specialized Fields, which includes MicroHistory (focused study on a small unit of research, such as an event, community, individual, or institution), Oral History (collection and study of historical information using interviews with people having personal knowledge of past events), and Public History (application of historical methods to engage with the public, including museums, archives, and historical preservation). These topics often overlap and intersect, allowing historians to draw on multiple perspectives to understand the complexities of past human experiences.

Environmental education is inseparable from the teaching of History and Geography in the early years (Agar, 1973; Chang; Kidman, 2024; Lee, 2021; McKeown-Ice, 1994). The educator responsible for elementary education is the pedagogue, who should possess a theoretical-conceptual framework of History and Geography in order to effectively promote meaningful environmental education to students in their early stages of learning. While it is clear that pedagogues do not need to be experts in the entire scope of History and Geography, they should possess the skills to effectively facilitate the learning of fundamental principles in these subjects. This involves integrating new knowledge with students' prior experiences, making the content more relatable and understandable. Moreover, it is essential that a systemic perspective of the environment (Krasny et al., 2010a, 2010b, 2010c) be incorporated into the pedagogy curriculum. This perspective should include the study of social relationships with the environment over time, providing a comprehensive understanding of how historical and geographical factors influence human interactions with their surroundings.

To achieve this, educators should be trained in methods that promote meaningful learning, enabling students to make connections between historical events, geographical phenomena, and their own lives. This approach not only enhances students' comprehension but also fosters critical thinking skills. For example, when teaching about the Industrial Revolution in a History class, educators can link the topic to present-day environmental issues, highlighting the long-term impacts of industrialization on the environment.

In Geography, educators can use local examples to explain broader concepts such as climate change, urbanization, and resource management. By doing so, students can see the relevance of these topics in their own communities, which can motivate them to engage more deeply with the material.

Additionally, incorporating project-based learning and field trips can provide hands-on experiences that reinforce classroom instruction.

To achieve these goals, the methodology of this work consisted of: 1) analyzing the syllabi and program contents of curricular components related to geographical, historical, and environmental sciences in undergraduate teaching courses; 2) identifying gaps and bottlenecks suitable for reconstruction; 3) proposing curricular interventions based on Milton Santos' theories of space and time, David Ausubel's meaningful learning, and principles of sustainability and modern discussions on the environment (Agenda 2030, COP 2028, etc.); 4) developing methodologies for creating teaching materials for classroom use in basic education.

Methods

To comprehensively evaluate the integration of environmental concepts within the pedagogical training of future educators, we conducted a detailed analysis of the syllabi for courses related to the teaching of History, Geography, and science from four prominent Brazilian universities. These syllabi were accessed directly from the official websites of the respective institutions, ensuring the accuracy and currency of the course content being analyzed.

The analysis focused on identifying how environmental themes and their intersections with geographical and historical perspectives were incorporated into the curriculum. This involved a systematic review of course descriptions, objectives, content outlines, and recommended readings. Particular attention was given to the presence and depth of discussions surrounding the environment, environmental resilience, and their correlations with historical and geographical contexts.

Our theoretical framework was built upon several foundational theories and concepts. Milton Santos' (2006) theories of space and time provided a critical lens for understanding the spatial-temporal dynamics of environmental interactions. Paulo Freire's (1972) principles of inclusive education informed our approach to evaluating how these courses addressed diverse learning needs and encouraged critical thinking about environmental issues.

David Ausubel's (1982) concept of meaningful learning was essential in assessing how well the courses facilitated the integration of new environmental knowledge with students' pre-existing cognitive structures. This was crucial in determining whether the pedagogical strategies employed were likely to result in deep, lasting understanding of environmental concepts.

Furthermore, we incorporated the extensive body of work on environmental resilience and education from scholars such as Fazey (2010), Krasny et al. (2010a, 2010b, 2010c), Leff (2003), and Reigota (2007). These works provided a comprehensive view of how environmental education can foster resilience and adaptability in both ecological and social systems. By applying these theories, we were able to evaluate the extent to which the courses

prepared future educators to teach about environmental issues in a way that promotes sustainability and resilience.

Overall, our methods combined a thorough document analysis with theoretical and qualitative approaches to evaluate the integration of environmental education within the pedagogical training of future History, Geography, and science educators. This comprehensive approach ensured a robust evaluation of the current state of environmental education in Brazilian universities and identified areas for potential improvement.

Results and Discussion

Environmental education is inherently interdisciplinary and transdisciplinary, integral to the development of young people and children across various formal educational contexts, especially in disciplines like Geography, History, Chemistry, and Biology. Despite this, it is not uncommon to find environmental topics limited to science/biology courses within Pedagogy curricula. For example, among the four Pedagogy courses evaluated in this study, some omit environmental content in the syllabi of their History and Geography teaching courses, while others include specific curricular components on Environmental Education (Table 1).

Table 1: Syllabi of History, Geography, Science, and Environmental Education Courses from Four Brazilian Universities.

University	History teaching	Geography teaching	Science teaching	Environmental education
A	Studies on issues of time and space, such as sociocultural productions inscribed within school cultures, will be explored in depth, considering the content of the early education grades.		Historical movements in Science Education in Brazil. Theoretical and methodological aspects of Science teaching: practical activities, problem-solving, prior conceptions, field studies, interdisciplinary approaches, resources, and teaching materials. Curriculum guidelines for Science in Elementary and Early Childhood Education. Language use in Science education. Relationships between Science, Technology, Society, and Environment. Production and dissemination of scientific knowledge. Scientific literacy and the school curriculum. Topics and educational content in Science teaching.	

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University	History teaching	Geography teaching	Science teaching	Environmental education
B	The course aims to discuss the role of History in our society within and beyond the school context. It will explore the relationships between the foundations of historiographical production and the History taught in schools. The trajectory of History as a school subject will be examined, along with current proposals for teaching History in early childhood education and the initial stages of elementary education. The course will also address educational practices in History teaching, the inclusion of History in the curriculum proposals for Elementary School I, and the impact of laws 10.639/03 and 11.645/08 on teaching African History, Afro-Brazilian History, and Indigenous History. Topics include the selection of content, analysis, organization, and creation of teaching materials, as well as evaluation in History education.	The course focuses on geographic education and contemporary Geography, considering its connections to the lives of educators and students. It explores various spatial interpretations based on different geographical theories, enabling a deeper understanding of the world through human spatiality. The course aims to analyze the current relationships between society and nature, promoting discussions on socio-environmental issues and their implications. The objective is to offer a broad understanding of geographic science that encompasses a variety of spatial interpretations, addressing their differences, divergences, and convergences. This includes practical applications and methodologies for teaching Geography in basic education, particularly in early childhood and the early years of elementary school.	Biological Sciences in Early Childhood Education and the Early Years of Elementary School: Historical Context, Social Function, Objectives, Basic Concepts: Exploration of the historical development, social role, goals, and fundamental concepts of biological sciences in early education settings. Learners' Conceptions of Basic Biology: Examination of students' understanding of fundamental biological concepts. Inquiry-Based Science Teaching: Discussion of teaching science through inquiry and related aspects, particularly the inseparability of content and methods in science education. Controversial Socio-Environmental Issues: Addressing complex socio-environmental issues and their implications. Critical Analysis of Curricular Proposals and Teaching Materials: Evaluation of curricular proposals and teaching materials for their effectiveness and alignment with educational goals. Planning and Producing Activities: Designing and creating activities aimed at teaching basic biological concepts in both school and non-school settings.	

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University	History teaching	Geography teaching	Science teaching	Environmental education
C	History and Historiographical Approaches: Key Concepts: Historical time, historical-social subject, historical knowledge, memory, heritage education, and primary and secondary sources. Approaches to Teaching History: Examination of methods and strategies for teaching History in Early Childhood Education and the early years of Elementary School. Organization and Teaching Practice: Exploration of the organization and practice of teaching, including the social and political responsibilities of History teachers.	Approaches to the Study of Geography: Understanding Concepts: Geographic space, landscape, nature, territorial reference base, human labor, industrialization process, environmental issues, and cartographic language. Didactics of Teaching Geography: Methods and strategies for teaching Geography in Early Childhood Education and the early years of Elementary School.	The Relationships Between Scientific Knowledge, Everyday Knowledge, and Teaching Activities for Early Elementary School Years: Concepts, Procedures, and Attitudes: Understanding and applying concepts related to Earth and the Universe; Life and the Environment; Human Beings and Health; Technology and Society. Teaching Plans and Science Projects: Developing teaching plans and projects aimed at engaging students with scientific content and fostering an integrated approach to science education.	This course unit aims to study the relationships between humans and the environment in its biological, social, and psychological dimensions. Each dimension is not considered in isolation from the others but rather integrated through a holistic perspective.

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University	History teaching	Geography teaching	Science teaching	Environmental education
D	Study of Socio-Cognitive Processes in the Space-Time Relationship: Theoretical and Methodological Foundations: Examination of the theoretical and methodological foundations of teaching and learning History and Geography, and their implications for teacher training. Understanding and Representation: Analysis of different types of landscapes, territories, and places, and their historical and temporal relationships. Interdisciplinary Connections: Exploration of the interface between historical/geographical concepts and other fields of knowledge. Project-Based Pedagogy: Use of project-based pedagogy as a strategy for teaching History and Geography.		Reflections on Teaching Natural Sciences in the Early Years of Basic Education: Teacher Training and Role: Reflections on the formation and role of the teacher in facing modern challenges in natural sciences education. Science in Schools: Considerations on the role of science within the school setting, including the integration of Science, Technology, Society, and Environment (STSE) perspectives. Practical Integration: Discussions on the practical aspects of teaching natural sciences in the early years of basic education, and how teachers can address contemporary challenges in their practice.	Culture and Sustainability: Knowledge, Science, and Technology. Concepts and Conceptions in Environmental Education: Exploration of key concepts and ideas in environmental education. History and Social Groups: Examination of the History, social actors/groups, principles, and objectives of Environmental Education. Legislation and Public Policies: Analysis of legislation and public policies from the perspective of socio-environmental sustainability. Curriculum, Environment, and Environmental Education: Integration of environmental education within the curriculum and its relationship with the environment. Formal Education in Environmental Education: Objectives, content, and methodologies for environmental education within formal education settings. Environmental Education in Other Contexts: Consideration of environmental education in informal and non-formal contexts. Integration of Educational Environments: Experiences and strategies for integrating formal and non-formal educational environments. Socio-Environmental Communication: Relevant areas and themes in agroecology and environmental education. Practical Activities and Engagements: Research, development, and analysis of projects in environmental education and agroecology, including field visits and practical experiences.

This inclusion is beneficial as it demonstrates care for environmental issues, but it also highlights a disconnection from other relevant disciplines. In turn, environmental considerations are explicitly integrated into the science teaching syllabus. University A's curriculum does not explicitly include environmental topics, focusing instead on sociocultural aspects related to time and space. University B integrates environmental considerations primarily within its Geography teaching curriculum through discussions on socio-environmental issues. However, the History curriculum does not explicitly address

environmental topics. University C provides a comprehensive geography curriculum that addresses environmental issues and the relationship between humans and the environment. However, the history curriculum lacks explicit mention of environmental topics, focusing more on traditional historiographical approaches. University D integrates environmental education within curriculum through interdisciplinary connections and project-based pedagogy, implicitly including environmental topics.

As Santos (2006) noted, space transforms over time, and this transformation, whether natural or anthropogenic, is largely due to changes in the natural landscape and environment. Educating students on how to manage these changes, grounded in the principles of environmental resilience, is the responsibility of educators across various subjects related to environmental themes. Therefore, future educators should be aware of the relationship between the environment and the teaching of History and Geography, ensuring that students understand the interconnectedness of these subjects and their impact on the world.

Why teach environmental conservation in the context of History and Geography? While the connection between ecology, a branch of the biological sciences, and the environment is evident, History and Geography are fundamentally the sciences of time and space. It is essential to define these terms first to grasp the relationship between the environment, Geography, and History. Understanding the environment through the lens of a socio-ecological system, as proposed by Fazey (2010), provides a rich framework for exploring the intricate interconnections that define our relationship with the natural world. This perspective moves beyond simplistic views of the environment as a backdrop for human activities or as a set of resources to be exploited, instead recognizing it as a complex web of ecological, social, cultural, and economic relationships. In a socio-ecological system, humans are not external agents but integral components whose actions influence and are influenced by the environment. This understanding is crucial in environmental education, where the goal is to cultivate a holistic perspective that acknowledges the dynamic interdependencies between human societies and the ecosystems they inhabit.

Environmental education plays a pivotal role in shifting paradigms from reductionist views of the environment to embracing its inherent complexity (Leff, 2003). By integrating concepts from environmental science, sociology, ecology, and economics, educators can help students appreciate the multifaceted nature of environmental issues. This includes understanding how ecological processes function, how human activities impact these processes, and how societal values and behaviors shape environmental outcomes. Moreover, environmental education fosters critical thinking skills necessary for analyzing environmental problems from multiple perspectives and developing innovative solutions rooted in sustainability principles.

Central to the socio-ecological approach is the recognition that environmental issues are inherently interdisciplinary. Geography, as the study of

spatial relationships and interactions between societies and their environments, provides a crucial framework for exploring these complexities. Geography examines how physical landscapes and human societies co-evolve over time, shaping each other's development and sustainability. The work of Milton Santos (2006) is instrumental in this regard, emphasizing the spatial dynamics of environmental processes and the historical contexts that influence spatial transformations. Santos's perspective highlights that spaces are not merely geographical entities but are socially constructed through human activities, policies, and cultural practices, thereby influencing environmental patterns and impacts.

Geography as a discipline encompasses various subfields that contribute to understanding the environment. Physical Geography delves into the natural processes and phenomena that shape Earth's surface, including climatology, geomorphology, hydrology, and biogeography. These studies provide insights into how natural systems function and respond to human activities such as urbanization, deforestation, and climate change. Human Geography, on the other hand, explores the spatial organization of societies, including aspects such as population distribution, economic activities, cultural practices, and political structures. By examining how human societies use and transform landscapes, Human Geography illuminates the socio-economic drivers of environmental change and the unequal distribution of environmental impacts.

Within Geography, environmental issues are approached through a spatial lens, examining how different geographical contexts influence environmental perceptions, policies, and practices. This spatial perspective is crucial in addressing environmental challenges such as resource management, urban development, and environmental justice. For instance, Geographic Information Systems (GIS) and remote sensing technologies enable geographers to analyze spatial data and visualize environmental patterns, facilitating informed decision-making and sustainable planning. By integrating geographical knowledge with environmental education, educators can empower students to understand the spatial dimensions of environmental issues and explore solutions that consider both local contexts and global interdependencies.

History, as the study of the past, provides essential insights into how human societies have interacted with their environments over time. Historical analysis reveals patterns of environmental change driven by technological advancements, economic activities, political decisions, and cultural practices. For example, the transition from hunter-gatherer societies to agricultural civilizations marked a significant shift in human-environment relationships, leading to landscape modifications, soil erosion, and biodiversity loss. Similarly, the Industrial Revolution accelerated environmental transformations through increased energy consumption, urbanization, industrial pollution, and global resource exploitation.

Studying environmental history allows students to trace the long-term impacts of human actions on ecosystems and understand the cumulative effects

of historical decisions on contemporary environmental challenges. Case studies from environmental history, such as the Dust Bowl in the United States during the 1930s or the ecological consequences of colonialism in Africa, Asia, and the Americas, illustrate how past environmental changes continue to shape socio-economic inequalities and environmental vulnerabilities today. By analyzing historical narratives and primary sources, students develop critical thinking skills to evaluate complex environmental issues and recognize the interconnectedness of historical processes with present-day environmental challenges.

Moreover, environmental history emphasizes the importance of context in understanding environmental changes and responses. Historical research reveals diverse cultural perspectives on nature and environmental stewardship, demonstrating how different societies have valued and managed natural resources over time. For instance, indigenous ecological knowledge systems offer sustainable practices and management strategies that promote biodiversity conservation and resilience to environmental change. By integrating indigenous perspectives into environmental education, educators enrich students' understanding of diverse environmental philosophies and cultivate respect for traditional ecological knowledge.

The integration of environmental education, Geography, and History fosters a comprehensive understanding of environmental issues through an interdisciplinary lens. This approach encourages students to explore the complex relationships between human societies, natural environments, and historical processes. By examining environmental challenges from multiple disciplinary perspectives, students gain insights into the social, economic, political, and cultural dimensions of sustainability. They develop analytical skills to evaluate environmental policies and practices critically and engage in informed decision-making to address global environmental challenges effectively.

Educators play a crucial role in facilitating interdisciplinary learning experiences that connect environmental science with Geography and History. By designing curriculum frameworks that integrate environmental themes across disciplines, educators can foster a holistic understanding of environmental issues from local to global scales. Project-based learning, field studies, and community engagement initiatives provide opportunities for students to apply theoretical knowledge to real-world environmental challenges. These experiential learning approaches not only deepen students' understanding of environmental concepts but also empower them to become active participants in environmental stewardship and sustainability initiatives.

Furthermore, addressing environmental issues requires collaboration across disciplines and sectors, emphasizing the importance of interdisciplinary education. By promoting dialogue and collaboration between environmental scientists, geographers, historians, policymakers, and community stakeholders, educators prepare students to navigate complex environmental challenges collaboratively. Interdisciplinary approaches encourage innovative thinking and creative problem-solving to address interconnected environmental, social, and

economic issues. By cultivating interdisciplinary competencies, educators equip students with the skills and knowledge needed to contribute to sustainable development and resilience in a rapidly changing world.

The comprehensive education of teachers requires at least a basic understanding of biological sciences, Geography, and History, though not in great depth, as they are not specialists. However, to teach these subjects effectively, environmental topics must be integrated into all these disciplines with appropriate emphases: ecological aspects in biology, space transformation in Geography, and temporal effects in History.

According to Ausubel (1982), meaningful learning happens when new information is substantively connected to prior knowledge, leading to deeper understanding and retention. Similarly, Freire (2017) emphasizes that education is democratic and learning is enduring when the teaching process is meaningful to the learner. To achieve this, educators use advance organizers – subsuming concepts – drawn from previous knowledge to anchor new learning. Therefore, considering the current discussions on environmental aspects such as in the Agenda 2030 and COP 2028, and particularly addressing the importance of Geography and History in disseminating content on environmental conservation, the following curricular interventions are proposed.

History Teaching:

1. **Integrate Environmental Milestones:** Incorporate significant environmental events and milestones into the History curriculum, such as the Industrial Revolution's impact on the environment, the origins and development of the environmental movement, and key environmental policies and treaties.
2. **Case Studies of Environmental Change:** Use case studies to illustrate how human activities have historically impacted the environment. Examples could include deforestation in ancient civilizations and the effects of colonialism on indigenous lands.
3. **Historical Analysis of Environmental Policies:** Encourage students to analyze the evolution of environmental policies over time, assessing their effectiveness and the socio-political contexts in which they were developed.
4. **Role of Individuals and Movements:** Highlight the contributions of key figures and movements in environmental History, such as Rachel Carson's influence on the modern environmental movement and the establishment of Earth Day.
5. **Interdisciplinary Projects:** Facilitate interdisciplinary projects that connect historical events with geographical and environmental studies, allowing students to explore the complex interplay between human actions and environmental changes.

Geography Teaching:

1. **Spatial Analysis of Environmental Issues:** Teach students to use spatial analysis tools such as Geographic Information Systems (GIS) to study contemporary environmental issues like deforestation, urban sprawl, and climate change.
2. **Human-Environment Interaction:** Emphasize the relationship between human societies and their environments, exploring how geographical features influence human activities and vice versa.
3. **Sustainable Development Goals (SDGs):** Integrate the United Nations Sustainable Development Goals (SDGs) into the Geography curriculum, discussing how these global objectives relate to local and regional environmental challenges.
4. **Fieldwork and Practical Experiences:** Encourage fieldwork and practical experiences that allow students to observe and analyze environmental processes and issues firsthand, fostering a deeper connection to the subject matter.
5. **Mapping and Visualization:** Utilize mapping and visualization techniques to help students understand the distribution and impact of environmental phenomena, such as climate zones, biodiversity hotspots, and pollution patterns.

By incorporating these interventions, environmental education can be seamlessly integrated into History and Geography teaching, fostering a more holistic and impactful learning experience that equips students with the knowledge and skills to address environmental challenges.

To support theoretical discussions on addressing environmental issues in History and Geography education for pedagogy students, the following contents and aspects are proposed:

Meaningful Learning by David Ausubel (1982)

David Ausubel's theory of meaningful learning focuses on the integration of new knowledge with existing cognitive structures. Ausubel argues that learning is more effective when new information is related to what learners already know, making it more relevant and easier to understand. By applying Ausubel's principles, pedagogy courses can design environmental education programs that build on students' prior knowledge and experiences. This approach can enhance the retention and application of environmental concepts, making learning more engaging and impactful.

Democratic Education by Paulo Freire (2017)

Paulo Freire's principles of democratic education stress the importance of critical thinking, dialogue, and participation in the learning process. Freire advocates for an inclusive education system that empowers learners to question and transform their reality. By incorporating Freire's approach, pedagogy courses

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can ensure that environmental education is not just about imparting knowledge but also about engaging students in meaningful discussions about their role in environmental stewardship. This democratic approach can cultivate a generation of educators who are not only knowledgeable about environmental issues but also committed to fostering environmental awareness and action among their students.

Environmental Complexity by Enrique Leff (2003)

Enrique Leff's concept of environmental complexity emphasizes the intricate interdependencies within environmental systems. Leff argues that understanding environmental issues requires a holistic approach that considers the multifaceted interactions between natural and social systems. Including Leff's perspective in the pedagogy curriculum can help future educators grasp the complexity of environmental problems, moving beyond reductionist views to appreciate the broader socio-ecological context. This understanding is crucial for developing comprehensive solutions that address the root causes of environmental degradation.

Resilience Thinking by Ioan Fazey (2010)

Fazey's resilience thinking highlights the capacity of social-ecological systems to absorb disturbances and reorganize while undergoing change. Resilience is a key concept in understanding how communities can adapt to environmental changes and recover from disruptions. By integrating resilience thinking into the pedagogy curriculum, educators can teach students about the importance of building resilient communities that can withstand environmental shocks and stresses. This perspective encourages proactive measures to enhance the adaptability and sustainability of social-ecological systems.

Social-Ecological Systems by Marianne Krasny (2010a, 2010b, 2010c)

Krasny's work on social-ecological systems underscores the interdependence between human societies and natural ecosystems. This concept is crucial for understanding how human activities impact the environment and how environmental changes, in turn, affect human well-being. Incorporating the social-ecological systems framework into the pedagogy curriculum can help future educators recognize the importance of integrated approaches to environmental management. This understanding can inform teaching strategies that promote sustainable practices and foster a sense of responsibility towards the environment.

Concepts of Time and Space by Milton Santos (2006)

Milton Santos' theories on time and space offer a vital framework for understanding environmental issues in a historical and geographical context. Santos emphasizes the interconnectedness of global processes and local realities, highlighting how historical events and geographical changes are influenced by and influence environmental conditions. Integrating Santos' concepts into the pedagogy curriculum can help future educators appreciate the spatial-temporal dynamics that shape environmental issues, fostering a deeper

understanding of how historical and geographical factors contribute to current environmental challenges.

Interrelationship of Contents and Disciplines

The integration of environmental topics within the syllabi of History and Geography teaching requires an interdisciplinary approach that acknowledges the interrelationship of different content areas. Environmental issues are inherently cross-cutting, involving aspects of science, economics, politics, and culture. By promoting interdisciplinary learning, pedagogy courses can prepare future educators to teach environmental topics in a holistic and interconnected manner. This approach can help students see the broader context of environmental issues and understand the multiple dimensions that need to be considered in addressing them.

Case Studies and Practical Applications

To illustrate the importance of integrating environmental topics in History and Geography teaching, this paper includes case studies from various educational programs that have successfully incorporated these themes. These case studies highlight the positive outcomes of interdisciplinary and integrated approaches to environmental education, demonstrating how they can enhance students' understanding and engagement with environmental issues. Practical applications, such as project-based learning and community involvement, are also discussed as effective strategies for bringing environmental education to life in the classroom.

In summary, the key findings and recommendations are as follows:

Key Findings

1. **Meaningful Learning:** David Ausubel's theory supports the integration of new environmental knowledge with students' existing cognitive structures, enhancing learning outcomes.
2. **Democratic Education:** Paulo Freire's approach to inclusive and participatory education fosters critical thinking and engagement with environmental topics.
3. **Environmental Complexity:** Enrique Leff's concept emphasizes the need for holistic and integrated approaches to understanding and addressing environmental challenges.
4. **Resilience Thinking:** Fazey's framework highlights the importance of building resilient social-ecological systems that can adapt to and recover from environmental changes.
5. **Social-Ecological Systems:** Krasny's work underscores the interdependence between human societies and natural ecosystems, promoting integrated environmental management.

6. **Spatial-Temporal Dynamics:** Milton Santos' theories on space and time offer critical insights into the interconnectedness of historical and geographical factors with environmental issues.
7. **Interdisciplinary Approach:** The interrelationship of content areas and disciplines is crucial for a comprehensive understanding of environmental issues.

Recommendations

1. **Curriculum Development:** Pedagogy courses should incorporate interdisciplinary and integrated approaches to environmental education, drawing on the theories and concepts discussed in this paper.
2. **Teacher Training:** Future educators should be trained to use inclusive, participatory, and meaningful learning strategies to engage students with environmental topics.
3. **Practical Applications:** Incorporating case studies, project-based learning, and community involvement can enhance the practical relevance and impact of environmental education.
4. **Ongoing Research:** Further research is needed to explore the most effective methods for integrating environmental topics into the pedagogy curriculum and to evaluate the long-term outcomes of these approaches.

By adopting these recommendations, pedagogy programs can play a pivotal role in fostering a generation of educators who are well-equipped to teach and inspire environmental stewardship and sustainability in their students.

Conclusions

In summary, this study has examined the integration of environmental education within the curricula of Pedagogy, particularly in the Geography and History teaching disciplines across four prominent Brazilian universities. Our analysis revealed varying degrees of integration across disciplines, highlighting both strengths and areas for improvement in current pedagogical practices.

Pedagogy emerges as a critical discipline in preparing future educators to effectively impart environmental knowledge to elementary school students. It serves as the foundational training ground where educators acquire theoretical insights and practical skills necessary for integrating environmental themes across subjects. However, our findings indicate a need for more cohesive and interdisciplinary approaches that span Geography, History, and Sciences teaching syllabi. This includes revising existing curricula to explicitly incorporate environmental topics, updating course content to reflect contemporary socio-environmental issues, and enhancing pedagogical training to promote meaningful learning and critical thinking about environmental sustainability.

The recommendations stemming from this study emphasize the importance of curricular revisions, interdisciplinary collaboration among academic

departments, and the development of inclusive education practices within teacher training programs. By adopting these recommendations, universities can foster a generation of environmentally conscious educators capable of addressing global sustainability challenges through informed teaching practices. This not only enhances educational outcomes but also contributes to broader societal goals of environmental stewardship and sustainable development.

Furthermore, aligning with global educational agendas such as Agenda 2030 and the Sustainable Development Goals (SDGs), particularly SDG 4 (Quality Education), underscores the significance of integrating environmental literacy into formal education. By promoting quality education that incorporates environmental education, universities can play a pivotal role in achieving sustainable development targets at national and international levels. This involves fostering partnerships with governmental agencies, non-governmental organizations, and community stakeholders to support the implementation of robust environmental education initiatives.

In conclusion, the integration of environmental education within Pedagogy in the Geography and History teaching courses is essential for preparing educators to nurture environmentally responsible citizens capable of contributing to a sustainable future. By enhancing curricular frameworks, fostering interdisciplinary collaboration, and prioritizing pedagogical training, universities can empower educators to instill a deep appreciation for environmental sustainability among students. This holistic approach not only enriches educational experiences but also ensures that environmental education remains integral to global efforts towards creating a more sustainable and equitable society.

Expanding on these findings, it becomes evident that fostering a culture of environmental stewardship within educational institutions requires concerted efforts across multiple fronts. First and foremost, there is a pressing need to revise existing curricula to better reflect contemporary environmental challenges and integrate interdisciplinary perspectives. This revision should not only incorporate environmental content into core courses but also encourage cross-disciplinary collaboration among educators from different departments.

Moreover, enhancing pedagogical training is crucial to equipping future educators with the skills and knowledge necessary to effectively teach environmental concepts. This includes promoting innovative teaching methodologies that engage students in active learning and critical thinking about sustainability issues. By integrating practical field experiences, case studies, and project-based learning into teacher training programs, universities can prepare educators to address real-world environmental problems and inspire their students to become proactive agents of change.

Interdisciplinary collaboration emerges as a cornerstone of effective environmental education. By fostering partnerships between Geography, History, and Science departments, universities can create interdisciplinary courses that explore complex environmental issues from multiple perspectives. These courses

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can emphasize the interconnectedness of ecological, social, economic, and cultural factors shaping environmental sustainability, providing students with a comprehensive understanding of the challenges and opportunities associated with sustainable development.

Furthermore, universities can leverage their institutional resources to promote environmental literacy beyond the classroom. This includes establishing research centers, organizing workshops and conferences, and supporting community outreach initiatives that promote environmental awareness and advocacy. By engaging with governmental agencies, non-governmental organizations, and community stakeholders, universities can catalyze collaborative efforts to address local and global environmental challenges and contribute to the achievement of SDG 4.

In alignment with global educational agendas such as Agenda 2030, universities have a unique opportunity to lead by example in integrating environmental education into their institutional frameworks. This involves developing sustainability policies, implementing green campus initiatives, and embedding environmental stewardship principles into campus operations. By demonstrating a commitment to sustainability through their own practices, universities can inspire students, faculty, and staff to adopt environmentally responsible behaviors and become champions of sustainability in their respective fields and communities.

In conclusion, the integration of environmental education within Pedagogy, Geography, and History teaching courses is not merely a pedagogical imperative but a moral and ethical responsibility. By preparing future educators to teach environmental literacy and instill values of environmental stewardship, universities can empower students to become informed and active participants in creating a sustainable future. This comprehensive approach ensures that environmental education remains at the forefront of educational priorities, contributing to the development of environmentally conscious citizens who are committed to safeguarding our planet for future generations.

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