

**ENVIRONMENTAL EDUCATION IN EARLY CHILDHOOD EDUCATION AS A TOOL FOR
RAISING AWARENESS FOR THE PRESERVATION OF THE CERRADO BIOME IN
TOCANTINS**

**EDUCAÇÃO AMBIENTAL NA EDUCAÇÃO INFANTIL COMO INSTRUMENTO DE
SENSIBILIZAÇÃO PARA A PRESERVAÇÃO DO CERRADO TOCANTINENSE**

**LA EDUCACIÓN AMBIENTAL EN LA EDUCACIÓN INFANTIL COMO HERRAMIENTA DE
CONCIETIZACIÓN PARA LA PRESERVACIÓN DEL BIOMA CERRADO EN
TOCANTINS**



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ABSTRACT

The intensification of the socio-environmental crisis and the increasing anthropogenic pressures on the Brazilian Cerrado, especially in the state of Tocantins, highlight the need for educational strategies capable of fostering environmental awareness from the earliest stages of schooling. Environmental Education (EE), when integrated into Early Childhood Education, emerges as a structuring, for shaping values, attitudes, and affective bonds with nature, contributing to biome conservation and to the development of a critical and context-based socio-environmental awareness. The problem addressed was to understand how Environmental Education, developed in Early Childhood Education, can serve as an instrument to sensitize children toward the preservation of the Tocantins Cerrado, considering childhood pedagogical foundations, official policy documents, and the valorization of territory

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and local knowledge. This article aimed to analyze the contributions of Environmental Education in Early Childhood Education to environmental sensitization and to the formation of values oriented toward Cerrado preservation in the Tocantins context. Methodologically, this is a qualitative study of a theoretical and exploratory nature, conducted through a systematized literature review based on national and international scientific publications, normative documents, and public policies related to Environmental Education, Early Childhood Education, and the Cerrado. The bibliographic search was carried out in databases such as Scopus, Google Scholar, and ScienceDirect, with selection guided by the PRISMA protocol and interpretive analysis grounded in Content Analysis. Data analysis was conducted interpretively, in light of Critical Environmental Education. The results show that Environmental Education in Early Childhood Education, when grounded in playful practices, concrete experiences with nature, and the valorization of territory, promotes the construction of affective bonds, a sense of belonging, and the development of ethical and sustainable values. However, challenges were also identified regarding teacher education, school infrastructure, and the effective implementation of legal guidelines in everyday pedagogical practice. It is concluded that Environmental Education in Early Childhood Education is an essential strategy for preserving the Tocantins Cerrado, as it promotes contextualized, critical, and socially grounded education, contributing to the formation of sensitive, participatory subjects committed to sustainability from early childhood.

Keywords: Educational Practices. Cerrado Biome. Citizenship Education. Early Childhood.

RESUMO

A intensificação da crise socioambiental e o avanço das pressões antrópicas sobre o Cerrado brasileiro, especialmente no contexto tocantinense, evidenciam a necessidade de estratégias educativas capazes de promover a sensibilização ambiental desde as etapas iniciais da escolarização. A Educação Ambiental (EA), quando inserida na Educação Infantil, apresenta-se como eixo estruturante para a formação de valores, atitudes e vínculos afetivos com a natureza, contribuindo para a preservação dos biomas e para a construção de uma consciência socioambiental crítica e contextualizada. O problema consistiu em compreender de que maneira a Educação Ambiental, desenvolvida na Educação Infantil, pode atuar como instrumento de sensibilização para a preservação do Cerrado tocantinense, considerando os fundamentos pedagógicos da infância, os documentos oficiais e a valorização do território e dos saberes locais. O objetivo deste artigo foi analisar as contribuições da Educação Ambiental na Educação Infantil para a sensibilização ambiental e a formação de valores voltados à preservação do Cerrado no contexto do Tocantins. Metodologicamente, trata-se de uma pesquisa de abordagem qualitativa, de natureza teórica e exploratória, desenvolvida por meio de revisão de literatura sistematizada, com base em produções científicas nacionais e internacionais, documentos normativos e políticas públicas relacionadas à Educação Ambiental, à Educação Infantil e ao Cerrado. O levantamento bibliográfico foi realizado em bases como Scopus, Google Acadêmico e ScienceDirect, com seleção orientada pelo protocolo PRISMA e análise interpretativa fundamentada na Análise de Conteúdo. A análise dos dados foi realizada de forma interpretativa, à luz da Educação Ambiental crítica. Os resultados evidenciam que a Educação Ambiental na Educação Infantil, quando fundamentada em práticas lúdicas, experiências concretas com a natureza e na valorização do território, favorece a construção de vínculos afetivos, o sentimento de pertencimento e o desenvolvimento de valores éticos e sustentáveis. Contudo, também se identificam desafios relacionados à formação docente, à infraestrutura escolar e à efetivação das diretrizes legais no cotidiano pedagógico. Conclui-se que a Educação Ambiental na Educação Infantil constitui uma estratégia essencial para a preservação do Cerrado tocantinense, ao promover uma educação contextualizada, crítica e socialmente referenciada, capaz de contribuir para a formação de sujeitos sensíveis, participativos e comprometidos com a sustentabilidade desde a primeira infância.

Palavras-chave: Práticas Educativas. Bioma Cerrado. Formação Cidadã. Primeira Infância.

RESUMEN

La intensificación de la crisis socioambiental y las crecientes presiones antropogénicas sobre el Cerrado brasileño, especialmente en el contexto de Tocantins, resaltan la necesidad de estrategias educativas capaces de promover la conciencia ambiental desde las primeras etapas de la escolarización. La Educación Ambiental (EA), al integrarse en la Educación Infantil, se presenta como un eje estructurante para la formación de valores, actitudes y vínculos afectivos con la naturaleza, contribuyendo a la preservación de los biomas y a la construcción de una conciencia socioambiental crítica y contextualizada. El problema consistió en comprender cómo la Educación Ambiental, desarrollada en la Educación Infantil, puede actuar como un instrumento de sensibilización para la preservación del Cerrado de Tocantins, considerando los fundamentos pedagógicos de la infancia, los documentos oficiales y la valorización del territorio y los saberes locales. El objetivo de este artículo fue analizar las contribuciones de la Educación Ambiental en la Educación Infantil a la conciencia ambiental y la formación de valores orientados a la preservación del Cerrado en el contexto de Tocantins. Metodológicamente, se trata de una investigación cualitativa, de carácter teórico y exploratorio, desarrollada mediante una revisión sistemática de la literatura basada en publicaciones científicas nacionales e internacionales, documentos normativos y políticas públicas relacionadas con la Educación Ambiental, la Educación Infantil y el bioma del Cerrado. El levantamiento bibliográfico se realizó utilizando bases de datos como Scopus, Google Scholar y ScienceDirect, con selección guiada por el protocolo PRISMA y análisis interpretativo basado en el Análisis de Contenido. El análisis de datos se realizó de forma interpretativa, a la luz de la Educación Ambiental crítica. Los resultados muestran que la Educación Ambiental en la Educación Infantil, cuando se basa en prácticas lúdicas, experiencias concretas con la naturaleza y la valoración del territorio, favorece la construcción de vínculos afectivos, el sentido de pertenencia y el desarrollo de valores éticos y sostenibles. Sin embargo, también se identifican desafíos relacionados con la formación docente, la infraestructura escolar y la implementación efectiva de las directrices legales en la práctica pedagógica diaria. Se concluye que la Educación Ambiental en la Educación Infantil constituye una estrategia esencial para la preservación del bioma del Cerrado en Tocantins, al promover una educación contextualizada, crítica y socialmente referenciada, capaz de contribuir a la formación de personas sensibles, participativas y comprometidas con la sostenibilidad desde la primera infancia.

Palabras clave: Práticas Educativas. Bioma del Cerrado. Educación Ciudadana. Primera Infancia.

1 INTRODUCTION

The intensification of the contemporary socio-environmental crisis, marked by the advance of anthropogenic pressures on Brazilian biomes, has highlighted the urgency of educational strategies capable of promoting profound changes in the relations between society and nature (Santos; Muller; Mendes, 2024). The Cerrado, the second largest biome in the country and predominant in the State of Tocantins, stands out both for its high biodiversity and for the growing vulnerability resulting from agricultural expansion, deforestation, fires and fragmentation of ecosystems (Nogueira et al., 2011; Segura-Garcia et al., 2025). In this context, Environmental Education emerges as a strategic field for the formation of values, attitudes, and practices committed to sustainability and socio-environmental justice (Dias et al., 2026).

Early Childhood Education, as the first stage of Basic Education, occupies a central position in this formative process, as it constitutes a decisive period for the cognitive, affective, social and ethical development of children. It is in this phase that perceptions, affective bonds and senses of belonging are consolidated that guide the subject's relationship with the environment throughout life. Thus, the insertion of Environmental Education from early childhood presents itself as a concrete possibility of environmental awareness, especially when based on playful practices, meaningful experiences, and the appreciation of the lived territory (Gugssa, 2023).

Despite the normative recognition of Environmental Education as a continuous, integrated and transversal educational practice, it is observed that, in the school routine, its implementation in Early Childhood Education still occurs in a fragmented, punctual or restricted way to conservationist and commemorative approaches (Sabed, 2016; Dutra; Lima; Dresch, 2020). This scenario shows a distance between the assumptions of Critical Environmental Education, which understands the environment as a space of social, cultural and political relations, and the pedagogical practices effectively developed, especially in specific territorial contexts such as the Cerrado of Tocantins (Brazil; Scareli-Santos; Carneiro da Silva, 2025).

From this perspective, the problem that guides this study consisted of understanding how Environmental Education, developed in Early Childhood Education, can act as an instrument of awareness for the preservation of the Cerrado of Tocantins, considering the pedagogical foundations of childhood, official documents and the valorization of the territory and local knowledge. The relevance of the research is justified by the need to strengthen contextualized educational practices, capable of articulating childhood, territory and

sustainability, contributing to the formation of a critical socio-environmental awareness from the first years of schooling.

Thus, this article aimed to analyze the contributions of Environmental Education in Early Childhood Education to environmental awareness and the formation of values aimed at the preservation of the Cerrado in the context of Tocantins, based on a systematized literature review based on the perspective of Critical Environmental Education.

2 METHODOLOGY

The research adopted a qualitative approach, of a theoretical and exploratory nature, operationalized through a systematized literature review (Soares; Tavares, 2025). The choice for the qualitative paradigm is justified by the need to apprehend educational phenomena in their interpretative complexity, prioritizing the senses, meanings and perceptions that structure the relationship between the child, the territory and the Cerrado biome. In view of the research, this approach enables an in-depth analysis of the nuances that distinguish Critical Environmental Education, oriented to social and political transformation, from the merely conservationist or pragmatic perspectives, widely identified in the specialized literature.

The qualitative nature of the research is particularly appropriate to the object of study, since the formation of ethical values, the construction of affective bonds and the processes of environmental awareness in early childhood are not subject to quantitative metrics. It is about investigating subjective and relational dimensions of the development of socio-environmental awareness, anchored in experiences of belonging and territoriality, which could not be properly captured by isolated statistical approaches. Once this design is defined, the technical strategies for data collection and analysis are explained (Mattar; Ramon, 2021).

Reproducibility is a central principle of scientific integrity in systematized reviews. In order to ensure a consistent mapping of the state of the art, a search strategy was employed that articulated descriptors in Portuguese and English, allowing the socio-environmental reality of Tocantins to dialogue with contemporary international debates on childhood, environmental education and the Anthropocene. This methodological option enables the articulation between local anthropogenic pressures, such as agricultural expansion and deforestation in the Cerrado, and global discussions on environmental crisis and socio-environmental justice. In this sense, the search matrix used in the bibliographic survey is presented, as shown in Table 1.

Table 1

Search matrix of the survey

Database	Boolean operators used	Identified records
Scopus	"early childhood education" AND "environmental education" AND "Cerrado"	45
Google Scholar	"early childhood education" AND "environmental education" AND "Cerrado" AND "Tocantins"	1.200
ScienceDirect	"environmental education" AND ("Brazilian biomes" OR "Cerrado") AND "sustainability"	82

Source: the authors (2026)

The inclusion of terms such as Brazilian biomes, territory, and sustainability expanded the analytical scope beyond the biophysical dimension, incorporating the political, cultural, and identity dimension of the biome. By integrating global and local categories, the research avoids epistemological isolation and positions the Cerrado of Tocantins as a strategic locus of learning, resistance and construction of educational practices in the face of contemporary ecological crises.

This strategy allowed the articulation of international scientific production on Environmental Education in early childhood with national and regional studies related to the Cerrado and the educational reality of Tocantins. In total, 1,327 records were identified, 45 in Scopus, 1,200 in Google Scholar and 82 in ScienceDirect.

To mitigate selection biases and provide greater methodological robustness to the documentary corpus, the PRISMA (*Preferred Reporting Items for Systematic Reviews and Meta-Analyses*) protocol was adopted. The study selection process was structured in four distinct and complementary stages. The first stage, called identification, consisted of the initial survey of scientific productions in the Scopus, Google Scholar and ScienceDirect databases, using the previously defined descriptors, in which 1,327 records were identified, 45 in Scopus, 1,200 in Google Scholar and 82 in ScienceDirect. In the second stage, screening, duplicate records were excluded and titles and abstracts that did not adhere to the research objective were analyzed, especially those unrelated to Early Childhood Education, Environmental Education or the context of Brazilian biomes. The third stage, eligibility, involved the full reading of the selected texts, prioritizing those that articulated Critical Environmental Education to the notion of lived territory, understood not only as a physical space, but as a field of social, cultural and historical relations. Finally, the inclusion stage consisted of the definition of 45 studies of the final corpus of studies, which supported the qualitative analysis and content analysis.

The composition of this corpus was based on previously established criteria, which included scientific productions and documents published between 2010 and 2026, due to the

topicality of the debate, as well as studies based on Critical Environmental Education and approaches that valued the territory, local knowledge, and contextualized education. Reports of experience without consistent theoretical foundation, works that approached Environmental Education from a strictly instrumental or pragmatic perspective, and studies unrelated to Early Childhood Education or contexts related to Brazilian biomes were excluded.

Data analysis was conducted based on Content Analysis, as proposed by Bardin, allowing the organization, categorization, and systematic interpretation of information (Bardin, 2016). The emerging analytical categories contemplated aspects such as playful pedagogical practices, environmental awareness in early childhood, socio-environmental identity, appreciation of local knowledge and challenges of implementing Environmental Education in the school context. This approach enabled a critical and contextualized reading of the literature, contributing to the understanding of the role of Environmental Education in the formation of values and bonds with the Cerrado since childhood (Bardin, 2016; Sousa; Salvatierra, 2022), as shown in Table 2.

Table 2

Characteristics of the studies included in this research

Main authors	Year	Document type	Main focus
Ardoin; Bowers	2020	Scientific article (systematic review)	Environmental Education in Early Childhood and Theoretical-Methodological Foundations of the Area
Dolci; Pereira	2020	Scientific article	Environmental Education and Aesthetic Education as Formative Processes for Sustainability
Dutra; Lima; Dresch	2020	Scientific article	Pedagogical practices of Environmental Education in Early Childhood Education
Sabed	2016	Scientific article	Limits and possibilities of Environmental Education in Early Childhood Education
Santos; Muller; Mendes	2024	Scientific article (review)	Teaching biomes in basic education and Environmental Education
Borges et al.	2025	Scientific article	Environmental Education and sustainable development in citizenship education
Da Silva et al.	2025	Scientific article	Environmental Education as a tool for the formation of sustainable citizens
Gugssa	2023	Scientific article	Environmental Education Practices in Basic Education Schools
Brazil; Scareli-Santos; Carneiro da Silva	2025	Scientific article	Environmental Education in formal and non-formal spaces in Tocantins

Main authors	Year	Document type	Main focus
Lopes et al.	2025	Scientific article	Environmental Education, Waste Management and Sustainable Practices
Nogueira et al.	2011	Scientific article	Biodiversity, conservation and characterization of the Cerrado of Tocantins
Segura-Garcia et al.	2025	Scientific article	Environmental dynamics and fire regimes in the Cerrado
Soares; Tavares	2025	Scientific article (review)	Environmental Education and the Cerrado in Brazilian academic production
Dias et al.	2025–2026	Scientific articles	Environmental Education, school afforestation, environmental perception and territory
Official documents (PNEA, DCNEI, DCNEA, BNCC)	1999–2018	Normative documents	Legal and curricular guidelines for Environmental Education and Early Childhood Education

Source: The authors (2026)

The systematization proposed by Bardin made it possible to highlight contradictions and potentialities present in the field analyzed, especially the tension between the formative potential of playfulness and direct contact with nature and the limitations imposed by structural weaknesses of school institutions and the insufficiency of teacher training. It is also noteworthy that the analysis carried out is not intended to neutralize, being explicitly guided by the perspective of Critical Environmental Education, in dialogue with Paulo Freire's Pedagogy of the Oppressed. This reference allowed us to interpret the territory of Tocantins as a space of dispute, resistance and emancipation, recognizing the centrality of the identities of rural peoples, riverside dwellers and traditional communities.

From this perspective, the interpretation of the results is based on the dialogue between scientific and popular knowledge, recognizing the traditional knowledge about the Cerrado as a structuring element of a contextualized Environmental Education, as well as on the normative confrontation, by evidencing the gaps between the consistency of the National Curriculum Guidelines for Early Childhood Education and the National Curriculum Guidelines for Environmental Education and their effective materialization in everyday life school. This methodological architecture ensures that the study goes beyond mere description, configuring itself as an analytical and purposeful instrument, committed to the formation of territorial belonging and ethical commitment to the Cerrado from early childhood.

3 LITERATURE REVIEW

3.1 ENVIRONMENTAL EDUCATION: CONCEPTS, APPROACHES AND PERSPECTIVES

Environmental Education has consolidated itself as an interdisciplinary theoretical-practical field, under constant construction, strongly influenced by the socio-environmental, political, and economic transformations that mark contemporary society (Dias et al., 2026). Its emergence is directly associated with the intensification of the global environmental crisis, especially from the second half of the twentieth century, when the impacts of the industrial development model began to show ecological limits, social inequalities, and risks to human survival itself (Vineis; Gambhir, 2023; Ellis, 2023).

Environmental Education emerges in the international scenario linked to environmental movements and multilateral events that sought to respond to growing environmental degradation. Conferences such as Stockholm (1972), Tbilisi (1977) and, later, Rio-92, were fundamental milestones for the institutionalization of EE, as they recognized it as a strategic instrument for the promotion of new values, attitudes and social practices aimed at sustainability (Dolci; Pereira, 2020).

In Brazil, EE gained strength from the 1980s onwards, being gradually incorporated into public educational policies, culminating in its legal consolidation as an essential component of national education, of a transversal and permanent nature (Ardoin; Bowers, 2020).

Environmental Education practices were strongly associated with punctual actions, of an informative and preservationist nature, aimed at the conservation of natural resources and the change of individual behaviors. With the advancement of theoretical discussions and the deepening of the socio-environmental crisis, this field begins to incorporate social, cultural, economic, and political dimensions, expanding its analytical and formative scope (Gugssa, 2023).

In this aspect, the specialized literature identifies different approaches to Environmental Education, among which the conservationist, pragmatic and critical perspectives stand out. The conservationist approach is characterized by a naturalistic view of the human-nature relationship, prioritizing environmental preservation, the protection of biodiversity, and the adoption of ecologically correct behaviors. Although relevant to initial awareness, this perspective tends to disregard the structural and social dimensions of environmental problems (Dias et al., 2025).

The pragmatic approach, in turn, emerges associated with the discourse of sustainable development and environmental management, emphasizing technical solutions, efficiency in the use of resources, and practices to mitigate environmental impacts. From this perspective,

Environmental Education assumes an instrumental character, oriented to the adaptation of the individual to the demands of the market and the demands of institutional sustainability, which can limit its critical and transformative potential (Santos; Lisbon; Souza, 2021; Da Silva et al., 2025).

Critical Environmental Education, on the contrary, proposes an expanded and problematizing reading of the socio-environmental reality (Dias et al., 2025). Based on references of critical and emancipatory education, this approach understands the environment as a space of political, economic and symbolic disputes, recognizing that environmental problems are intrinsically related to social inequalities, production and consumption models and power relations. Thus, critical EE seeks to train subjects capable of understanding, questioning and intervening in reality, promoting socio-environmental justice and transformative social transformation (Santos; Lisbon; Souza, 2021; Da Silva et al., 2025).

Furthermore, Environmental Education goes beyond the merely pedagogical or informative character, configuring itself as a social and political practice. It is committed to the formation of conscious, participatory citizens who are co-responsible for the construction of fairer and more sustainable societies. By recognizing language, culture, and territory as constitutive dimensions of the educational process, EE begins to value local knowledge, community experiences, and the socio-environmental identity of the subjects (Gugssa, 2023; Dias et al., 2025).

Understood as an emancipatory practice, Environmental Education contributes to the development of autonomy, critical awareness and collective engagement, especially when inserted from Early Childhood Education (Freire, 2011; Ardoin; Bowers, 2020). By enabling meaningful experiences of interaction with the environment and reflection on society-nature relations, EE promotes the construction of ethical, solidary, and sustainable values, which are fundamental for the preservation of Brazilian biomes, such as the Cerrado of Tocantins (Santos; Muller; Mendes, 2024).

In this way, Environmental Education, by articulating historical, conceptual and political dimensions, affirms itself as a structuring axis for the integral formation of subjects, especially in early childhood, a decisive stage for the consolidation of attitudes, perceptions and lasting bonds with the environment.

3.2 ENVIRONMENTAL EDUCATION IN EARLY CHILDHOOD EDUCATION

Early Childhood Education is the first stage of Basic Education and assumes a strategic role in the integral formation of the child, considering its cognitive, affective, social, cultural and ethical dimensions. Based on pedagogical conceptions that recognize the child

as a historical, social, and rights subject, this educational stage is guided by the promotion of full development, through interactions, games, and meaningful experiences (Gugssa, 2023). In this context, Environmental Education finds fertile ground for the construction of attitudes, values and perceptions that favor an ethical and responsible relationship with the environment.

The pedagogical foundations of Early Childhood Education are based on principles that value the child as the protagonist of the educational process, respecting their singularities, times and ways of learning. The National Curriculum Guidelines for Early Childhood Education and the National Common Curriculum Base (BNCC) reinforce the centrality of interactions and play as structuring axes of pedagogical practice, understanding learning as the result of experience, experimentation, and the collective construction of meanings (Brasil, 2018; Santos; Muller; Mendes, 2024).

From this perspective, the Early Childhood Education curriculum should promote experiences that articulate care, educating and playing, enabling the development of autonomy, curiosity, sensitivity and imagination. Such foundations dialogue directly with the assumptions of Environmental Education, by favoring contextualized, interdisciplinary pedagogical practices aimed at the formation of critical subjects from childhood (Freire, 2011; Borges et al., 2025).

The insertion of Environmental Education in early childhood is a fundamental strategy for environmental awareness and the construction of sustainable values. Unlike content-based approaches, EE in Early Childhood Education should prioritize sensory, affective, and symbolic experiences, capable of awakening enchantment, care, and respect for nature. In this sense, environmental awareness occurs in a procedural way, through daily experience, direct contact with the environment and intentional pedagogical mediation (Lopes et al., 2025).

By experiencing Environmental Education practices from an early age, children begin to build positive perceptions about the environment, recognizing themselves as an integral part of nature. This construction contributes to the development of attitudes such as cooperation, collective responsibility and empathy, essential elements for the formation of socio-environmental awareness. Thus, EE in Early Childhood Education assumes a formative character, going beyond the transmission of information and promoting the internalization of ethical and sustainable values (Gugssa, 2023; Bandeira, 2025).

In this sense, play and playfulness are central languages of childhood and play a fundamental role in Environmental Education in Early Childhood Education. Through play, children explore the world, express feelings, elaborate meanings and build knowledge in a

spontaneous and pleasurable way. When articulated with Environmental Education, playful practices enable the child to get closer to nature, strengthening affective bonds and expanding the understanding of the relationships between living beings and the environment (Freire, 2011; Bandeira, 2025).

Concrete experience with nature, such as contact with soil, plants, water and animals, enhances meaningful learning and contributes to the development of environmental sensitivity. Spaces such as gardens, school gardens, green areas and natural environments in the school surroundings are important educational territories, especially in the context of the Cerrado of Tocantins. These experiences allow the child to learn by doing, observing and interacting, strengthening the sense of belonging and the commitment to environmental preservation (Dias et al., 2025).

In this way, by integrating play, playfulness and concrete experiences with nature, Environmental Education in Early Childhood Education promotes significant learning, favoring the formation of sensitive, critical subjects committed to sustainability. This approach reaffirms the transformative potential of Environmental Education from early childhood, contributing to the construction of a more balanced and respectful relationship between society and nature.

3.3 THE CERRADO OF TOCANTINS AS AN EDUCATIONAL CONTEXT

The Cerrado of Tocantins is configured as a territory of high ecological, social and cultural relevance, assuming a strategic role both for environmental conservation and for contextualized educational processes (Brasil; Santos, Carneiro da Silva, 2025). Inserted in the Cerrado biome, the State of Tocantins is home to an expressive diversity of landscapes, species and forms of interaction between society and nature, which makes it a privileged space for the development of Environmental Education practices from Early Childhood Education (Moreira; Bispo, 2020).

In this perspective, it can be said that the Cerrado is recognized as one of the most biodiverse biomes on the planet, with a high richness of fauna and flora, a high degree of endemism and complex ecological interactions (Moreira; Bispo, 2020). In Tocantins, this biome manifests itself in different phytophysionomies, such as *cerradão*, *cerrado sensu stricto*, *veredas* and *clean fields*, composing a fundamental ecological mosaic for the maintenance of natural cycles. In addition to biodiversity, the Cerrado performs essential ecosystem services, such as regulating the water regime, soil conservation, carbon sequestration, and sustaining strategic watersheds for the country (Resende et al., 2017).

Despite its importance, the Cerrado of Tocantins faces increasing pressures resulting from agricultural expansion, deforestation, fires, habitat fragmentation, and inappropriate use of natural resources (Resende et al., 2017). These threats compromise not only the environmental integrity of the biome, but also the ways of life of the populations that depend on it. In this scenario, Environmental Education plays a central role in raising awareness and training subjects capable of understanding the complexity of the relationships between economic development, environmental conservation and socio-environmental justice (Moreira; Bispo, 2020; Dias et al, 2025).

Furthermore, the valorization of the territory and local knowledge is a fundamental element for an effective and meaningful Environmental Education (Brasil; Santos, Carneiro da Silva, 2025). The Cerrado of Tocantins is not limited to a physical space, but represents a lived territory, historically constructed by traditional communities, rural peoples, riverside dwellers and urban populations who establish symbolic, cultural and productive relations with the environment (Rigotto; Santos; Costa, 2022). This knowledge, transmitted through orality, daily practice, and collective experience, is an important source of socio-environmental knowledge (Moreira, 2025).

Incorporating the territory and local knowledge into the educational context makes it possible to break with decontextualized and universalizing approaches to Environmental Education. By recognizing and valuing the experiences and knowledge of communities, the school strengthens the sense of belonging, expands the dialogue between scientific and popular knowledge, and contributes to the construction of an education committed to the local reality (Moreira, 2025). In Early Childhood Education, this appreciation is especially relevant, as it allows the child to understand the environment in which he lives as part of his identity and history (Moreira; Bispo, 2020; Dias et al, 2025).

Contextualized Environmental Education is based on the articulation between the school curriculum, the territory and the experiences of the subjects, promoting meaningful and socially referenced learning (Dias et al., 2026). In the context of the Cerrado of Tocantins, this approach enables children to recognize nature as a space for life, culture, and learning, developing affective and ethical bonds with the environment (Moreira, 2025). Based on concrete and pedagogically mediated experiences, Environmental Education contributes to the construction of socio-environmental identity from early childhood.

Socio-environmental identity refers to the recognition of the subject as an integral part of the environment, responsible for his or her actions and co-responsible for the preservation of natural resources. In Early Childhood Education, this identity is built through practices that involve the observation of nature, the care of plants and animals, the appreciation of the local

territory and the dialogue about environmental problems experienced in everyday life. In this way, Environmental Education ceases to be an isolated content and becomes a formative axis that articulates values, attitudes and knowledge (Brasil; Santos, Carneiro da Silva, 2025)..

Thus, by assuming the Cerrado of Tocantins as an educational context, Environmental Education contributes to the formation of sensitive, critical subjects committed to the preservation of the biome (Brasil; Santos, Carneiro da Silva, 2025; Moreira, 2025). This perspective reinforces the role of the school, especially Early Childhood Education, as a privileged space for the construction of a socio-environmental awareness rooted in the territory, capable of promoting sustainable practices and strengthening the relationship between society and nature.

3.4 ENVIRONMENTAL EDUCATION AND OFFICIAL DOCUMENTS

The institutionalization of Environmental Education (EE) in Brazil results from a normative process that recognizes it as a structuring dimension of citizenship education and as a permanent component of educational processes. In the context of formal education, this guideline is consolidated, above all, by the National Policy on Environmental Education (PNEA) and by curricular documents that guide Early Childhood Education and Basic Education, such as the National Curriculum Guidelines and the BNCC, reaffirming the integrated, continuous and transversal character of the environmental theme (Brasil, 1999; Brazil, 2018).

From a legal point of view, Law No. 9,795/1999 (PNEA) establishes Environmental Education as an "integrated, continuous and permanent educational practice" at all levels and modalities of formal education, and explains that it should not be implemented as a specific discipline in basic education, guiding its insertion in a transversal and articulated way in the curriculum (Brasil, 1999).

In convergence, the National Curriculum Guidelines for Environmental Education (DCNEA), established by Resolution CNE/CP No. 2/2012, reinforce EE as an essential, interdisciplinary and continuous dimension, to be considered in institutional planning (pedagogical project), curriculum organization and school practices, with emphasis on the articulation between education, ethics, sustainability and social participation (Brasil, 2012).

In the specific field of Early Childhood Education, the National Curriculum Guidelines for Early Childhood Education (DCNEI) guide pedagogical proposals centered on interactions and play, supported by ethical and political principles that favor responsibility, care and coexistence. This milestone is relevant because it creates a pedagogical basis for educational

experiences that bring children closer to nature and environmental care practices, without reducing EE to punctual or merely commemorative actions (Brasil, 2012).

The BNCC reinforces this logic by organizing Early Childhood Education into fields of experience, favoring the insertion of contemporary themes and socio-environmental debate through experiences, exploration of the surroundings, observation and care practices, in line with the principle of integrality of child development. Thus, EE, in the BNCC, tends to operate as an articulating axis of formative experiences, connecting environment, culture, territory and citizenship (Brasil, 2018).

In terms of public policies, the PNEA establishes principles, objectives and responsibilities for the promotion of EE at the national level, guiding integrated actions between formal and non-formal education, and stimulating cooperation between the Union, states and municipalities (Brasil, 1999).

In Early Childhood Education, the application of these guidelines tends to gain concreteness when EE is incorporated into the Political-Pedagogical Project (PPP), teacher planning and institutional routines, focusing on: the organization of educational spaces with the presence of nature, such as gardens, vegetable gardens, pedagogical backyards; the experiences of daily care, such as with water, waste, plants and animals; projects that value the territory and the local biome, in this case, the Cerrado of Tocantins, articulating school-family-community (Freire, 2011; Bandeira, 2025).

This normative framework shifts EE from a logic of "content" to a logic of educational practice, sustained by experiences and values, which is especially compatible with Early Childhood Education, in which learning takes place primarily through interaction, experience, language and play (Freire, 2011; Brazil; Santos, Silva, 2025; Moreira, 2025).

Despite the normative robustness, the literature and school practice indicate that the implementation of EE faces recurrent challenges. Among the main ones, they stand out for the risk of superficiality and punctuality, that is, EE is often reduced to events, such as commemorative dates, and isolated activities, without curricular continuity and without a link with the territory, contrary to the requirement of integration and permanence provided for in the PNEA (Freire, 2011; Brazil, 1999; Bandeira, 2025). Furthermore, there are weaknesses in teacher training, in which many teachers did not have sufficient initial and continuing training to work with EE in an interdisciplinary, critical and childhood-appropriate way, which favors conservationist and moralizing practices (focus on "right/wrong"), with little problematization of the socio-environmental context. In addition, the material and organizational conditions, in which the absence of green spaces, pedagogical materials, planning time and institutional support make it difficult to transform EE into a structuring

routine. In addition, the low articulation between documents and practice, in which, although PPPs and curricula cite EE, there are not always developments in pedagogical objectives, didactic sequences, formative assessment and community involvement, reducing the effectiveness of what is proposed by the national guidelines.

In view of this, the effectiveness of Environmental Education in Early Childhood Education requires treating official documents not as a formality, but as pedagogical orientation frameworks, translated into contextualized, continuous and territorially referenced practices, a decisive condition for environmental awareness to be converted into values, attitudes and belonging, particularly in the context of the Cerrado of Tocantins.

4 ANALYSIS AND DISCUSSION

Throughout this study, the main points of the review are discussed, seeking to bring the academic debate closer to the daily reality of children and Early Childhood Education institutions in Tocantins. It is based on the understanding that the Cerrado is not just a school "theme", but a lived territory, which appears in the water, in the climate, in the fires, in the landscape and in the concrete experiences that cross the communities. The analysis articulates literature studies and official documents to understand to what extent Environmental Education, when mediated by play, contact with nature and appreciation of local knowledge, can strengthen affective bonds, a sense of belonging and collective responsibility from early childhood, in addition to evidencing limits and challenges that still make it difficult to transform normative guidelines into continuous and contextualized practices in the pedagogical routine.

In this aspect, it was evidenced that Environmental Education in Early Childhood Education tends to produce more consistent effects of awareness when it is organized as a continuous formative experience, anchored in affective bonds with nature, playfulness and territorial belonging, and not as a set of punctual or moralizing actions. In this sense, the understanding is consolidated by the fact that Environmental Education practices in early childhood are more effective when they prioritize meaningful experiences, relationships and processes, rather than prescriptive content (Ardoin; Bowers, 2020).

Corroborating, the literature states that direct contact with natural environments and pedagogical mediation through play expand children's curiosity, attention, and willingness to care, composing a socio-affective basis indispensable to the construction of environmental values, according to (Dutra; Lima; Dresch. 2020) and (Bandeira, 2021).

This experiential dimension gains density with the discussion about the Cerrado of Tocantins as an educational context. Studies reinforce that the Cerrado is a territory under

continuous environmental pressure, which makes awareness from Early Childhood Education not only desirable, but strategic for local sustainability (Nogueira et al., 2011; Segura-Garcia et al., 2025). At the same time, it is verified that Environmental Education actions linked to conservation units in Tocantins expand learning repertoires and bring the school closer to concrete references in the territory (Moreira and Bispo, 2020). Thus, it can be said that Environmental Education in Early Childhood Education tends to be more powerful when it articulates childhood, nature and territory, making the Cerrado a "living object" of observation, care and narratives, and not just an abstract theme (Ardoin; Bowers, 2020; Bandeira, 2021; Moreira; Bispo, 2020).

However, the literature also indicates important limits to be observed. In this sense, it is verified that, in many contexts, Environmental Education in Early Childhood Education is reduced to occasional activities, often associated with commemorative dates, with low continuity and little integration into the curriculum (Sabed, 2016; Dutra; Lima; Dresch, 2020). This fragility intensifies when there is insufficient teacher training to approach EE in an interdisciplinary and critical way, which favors conservationist and prescriptive practices, centered on "right/wrong", with little problematization of the social and political dimensions of the environmental crisis. At this point, it was found that the displacement of certain practices to a pragmatic/instrumental logic, that is, when EE is limited to behavioral adaptation and waste management as an end in itself, its potential for critical reflection and transformation is reduced (Santos; Lisbon; Souza, 2021; Da Silva et al., 2025). From this, it is inferred that there is a need to reposition EE in Early Childhood Education beyond pragmatism and conservationism, reinforcing a critical, dialogical and territorialized perspective (Dias et al., 2025; Dias et al., 2026).

The centrality of the territory, in turn, appears as the axis of pedagogical and political consistency of Environmental Education in the Cerrado. The discussion about "lived territory" gains strength when interpreting the Cerrado as a space marked by conflicts, inequalities and "sacrifice zones" associated with agribusiness, showing that the environmental crisis is not neutral and affects traditional communities and vulnerable populations in a different way (Rigotto; Santos; Costa, 2022). In this sense, traditional knowledge is constitutive of sociocultural and environmental preservation in the Cerrado, which broadens the understanding of the biome beyond its biophysical aspects (Moreira, 2025). In addition, contextualized Environmental Education must recognize the plurality of narratives about the Cerrado, incorporating memories, practices and local knowledge as components of the lived curriculum, especially in Early Childhood Education, a stage in which belonging and identity

are formed through experiences, language and relationships (Rigotto; Santos; Costa, 2022; Moreira, 2025; Dias et al., 2026).

From the normative point of view, the analysis shows a recurrent mismatch between the robustness of the legal frameworks and the pedagogical materialization in the school routine. The PNEA establishes EE as an integrated, continuous and permanent educational practice (Brasil, 1999), while the National Curriculum Guidelines for Environmental Education reinforce its interdisciplinary and transversal nature (Brasil, 2012). The BNCC, in turn, organizes Early Childhood Education into fields of experience and reaffirms interactions and games as structuring axes (Brasil, 2018), which creates favorable pedagogical conditions for an EE based on experiences with the territory and the environment.

However, it is observed that formal institutionalization does not guarantee effective implementation: there are still planning gaps, insufficient institutional support, absence of green spaces, and difficulties in didactic continuity, which tends to transform EE into a peripheral activity, rather than a structuring axis (Sabed, 2016; Dutra; Lima; Dresch, 2020; Brazil; Scareli-Santos; Carneiro da Silva, 2025).

In this scenario, playfulness appears simultaneously as a potential and as a point of tension. On the one hand, literature converges in recognizing play as a central language of childhood and as a privileged path to environmental awareness (Bandeira, 2021; Dutra; Lima; Dresch, 2020). On the other hand, the effectiveness of these practices depends on objective conditions, such as pedagogical time, adequate spaces, materials, training and didactic intentionality, at the risk of playfulness being treated as "pedagogical activism" disconnected from reflection and continuity.

This tension dialogues with the Freirean perspective, as critical Environmental Education requires problematization of the lived world, even in childhood, through mediations appropriate to the stage, in which the child constructs meanings about care, collectivity, responsibility and justice (Freire, 2011). Thus, it is inferred that environmental awareness in Early Childhood Education must articulate affection and criticality: the bond with nature is a condition of possibility for consciousness, but awareness is strengthened when the territory is also read as a social, cultural and political reality (Freire, 2011; Ardoin; Bowers, 2020; Rigotto; Santos; Costa, 2022).

Therefore, Environmental Education in Early Childhood Education is a relevant instrument of awareness for the preservation of the Cerrado of Tocantins when it assumes a continuous and experiential character, with games, projects and care routines; articulates the lived territory of the Cerrado to educational practices, valuing local knowledge and identities; and it aligns itself with the normative frameworks without reducing them to documentary

formality, translating them into planning, pedagogical mediation and concrete institutional conditions.

5 FINAL CONSIDERATIONS

It is concluded that Environmental Education through Early Childhood Education constitutes an effective instrument of awareness for the preservation of the Cerrado of Tocantins when it is organized as a continuous, integrated and territorially referenced practice. Furthermore, it was evidenced that the insertion of EE in early childhood, mediated by interactions, games and meaningful experiences, favors the construction of affective bonds with nature, the feeling of belonging to the territory and the formation of ethical values oriented to care and collective responsibility, fundamental elements for a critical socio-environmental awareness from the first years of schooling.

The results of the research indicate that playful pedagogical practices, direct contact with natural environments, daily projects of care for water, plants and waste, and the valorization of local knowledge expand the formative power of EE, especially in a biome marked by pressures from human actions and socio-environmental conflicts such as the Cerrado. However, recurrent limitations were also confirmed, such as the persistence of punctual and commemorative approaches, the tendency to instrumental or pragmatic reduction of EE, weaknesses in the initial and continuing training of teachers, insufficient infrastructure, that is, green spaces, materials and pedagogical time, and the mismatch between normative robustness, such as the national plan for Environmental Education and the National Common Curriculum Base, and its effective materialization in the daily life of educational institutions.

As recommendations, the need to strengthen the implementation of Environmental Education in Early Childhood Education is pointed out through articulated fronts, such as institutionalization in the Political-Pedagogical Project and in teacher planning, with continuity and explicit link with the Cerrado of Tocantins; investment in critical, interdisciplinary and childhood-appropriate teacher training, capable of integrating playfulness, problematization and socio-environmental justice; and the improvement of material and pedagogical conditions, with the expansion of educational spaces with nature, such as vegetable gardens, gardens, pedagogical backyards, and greater articulation between school, family and community, incorporating narratives and knowledge of rural peoples, riverside dwellers and traditional communities. It is noteworthy that these measures tend to convert legal guidelines into concrete and sustainable practices, consolidating Environmental Education as the

structuring axis of a contextualized education committed to the preservation of the Cerrado from early childhood.

REFERENCES

- Ardoin, N. M., & Bowers, A. W. (2020). Early childhood environmental education: A systematic review of the research literature. *Educational Research Review*, 31, Article 100353. <https://doi.org/10.1016/j.edurev.2020.100353>
- Bandeira, M. N. P. (2021). Infância e natureza: Práticas de educação ambiental na educação infantil. *Ensino em Perspectivas*, 6(1). <https://doi.org/10.52521/enpe.v6i1.16517>
- Bardin, L. (2016). *Análise de conteúdo*. Edição 70.
- Borges, M. da G., de Souza, A. M., Costa, V. M., Nascimento, V. C. dos S., & Cabecione, D. R. (2025). A importância da educação ambiental para o desenvolvimento sustentável. *Revista Lumen et Virtus*, 16(46), 2748–2765. <https://doi.org/10.56238/levv16n46-081>
- Brasil, A. de O. M., Scareli-Santos, C., & Carneiro da Silva, P. (2025). Ações de educação ambiental em espaços não formais de ensino e aprendizagem: Em análise o Colégio Estadual Rui Barbosa, em Araguaína, Tocantins. *REMEA – Revista Eletrônica do Mestrado em Educação Ambiental*, 42(2). <https://doi.org/10.63595/remea.v42i2.15853>
- Brasil. (1999). Lei nº 9.795, de 27 de abril de 1999. Dispõe sobre a educação ambiental, institui a Política Nacional de Educação Ambiental e dá outras providências. *Diário Oficial da União*.
- Brasil. Ministério da Educação. (2018). Base Nacional Comum Curricular (BNCC). MEC.
- Brasil. Conselho Nacional de Educação. (2012). Resolução nº 2, de 15 de junho de 2012. Estabelece as Diretrizes Curriculares Nacionais para a Educação Ambiental. *Diário Oficial da União*.
- da Silva, K. L., Miranda, M. da S., da Silva, T. B., Gonçalves, J. J. da S., & Campos, C. M. C. (2025). A educação ambiental como ferramenta para a formação de cidadãos sustentáveis. *Revista Lumen et Virtus*, 16(46), 2846–2860. <https://doi.org/10.56238/levv16n46-088>
- Dias, M. A. N., Rosado, L. P., Souza Júnior, H. de, Nascimento, T. do, Pereira, L. M., Lima, P. S. R., Almeida, R., Alves, J. R. C., Tiradentes, A. P. M., Silva, H. N. da, Castro, J. C. de, & Moraes, C. B. de. (2026). Educação ambiental e arborização escolar: Análise comparativa da percepção de estudantes e professores no ambiente escolar. *Caderno Cajuína*, 11(1). <https://doi.org/10.52641/cadaj.v11i1.810>
- Dias, M. A. N., Pereira, L. M., Luiz, J. R. dos S., Marinho, L. dos S. B., Lima, P. S. R., Coelho, M. C. B., Souza, P. A. de, & Santos, A. F. dos. (2025). Verde que educa: A arborização escolar e sua contribuição à educação ambiental. *Contribuciones a Las Ciencias Sociales*, 18(7), Article e19490. <https://doi.org/10.55905/revconv.18n.7-234>
- Dolci, L. N., & Pereira, A. M. (2020). Educação ambiental e educação estética: Um processo educativo para a sustentabilidade. *Educação: Teoria e Prática*, 30(63), 1–16. <https://doi.org/10.18675/1981-8106.v30.n.63.s12349>
- Dutra, T., Lima, L. C. de, & Dresch, J. F. (2020). Práticas pedagógicas de educação ambiental na educação infantil. *Educação em Revista*, 3, Article 15642. <https://doi.org/10.22481/redupa.v3.15642>

- Ellis, E. C. (2023). The Anthropocene condition: Evolving through social-ecological transformations. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 379(1893). <https://doi.org/10.1098/rstb.2022.0255>
- Freire, P. (2011). *Pedagogia do oprimido* (50ª ed.). Paz e Terra.
- Gussa, M. A. (2023). Characterizing environmental education practices in Ethiopian primary schools. *Development*, 102, Article 102848. <https://doi.org/10.1016/j.jedudev.2023.102848>
- Ineis, P., & Gambhir, A. (2023). Social inequalities and the environmental crisis: Need for an intergenerational alliance. *Frontiers in Public Health*, 11. <https://doi.org/10.3389/fpubh.2023.1226961>
- Lopes, A. A., Oliveira, J. L., Gregio, J. L., Marlon, E. S., Barradas, T. F., Santos, R. C., & Garcia, E. A. (2025). Educação ambiental e gestão de resíduos: Práticas sustentáveis para a minimização da degradação ambiental. *Revista Lumen et Virtus*, 16(46). <https://doi.org/10.56238/levv16n46-082>
- Mattar, J., & Ramos, D. K. (2021). *Metodologia da pesquisa em educação: Abordagens quantitativas, qualitativas e mistas* (1ª ed.). Edições 70.
- Moreira, C. A. G. (2025). Saberes tradicionais e a preservação sociocultural e ambiental no Cerrado brasileiro. *Revista Científica Eletrônica da Faculdade de Piracanjuba*, 5(8).
- Moreira, C. J., & Bispo, M. O. (2020). Educação ambiental no Parque Estadual do Cantão, Tocantins: Uma experiência na transição entre o Cerrado e a Amazônia. *Geografia em Questão*, 13(5). <https://doi.org/10.48075/geoq.v13i5.27155>
- Nogueira, C. de C., Ferreira, M. N. e, Recoder, R. S., Carmignotto, A. P., Valdujo, P. H., Lima, F. C. T. de, Gregorin, R., Silveira, L. F., & Rodrigues, M. T. (2011). Vertebrados da Estação Ecológica Serra Geral do Tocantins: Faunística, biodiversidade e conservação no Cerrado brasileiro. *Biota Neotropica*, 11(1). <https://doi.org/10.1590/S1676-06032011000100030>
- Resende, M. M., Fernandes, G. W., Andrade, D. C., & Néder, H. D. (2017). Valoração econômica de serviços ecossistêmicos fornecidos por uma área protegida no Cerrado brasileiro: Aplicação do método de valoração contingente. *Brazilian Journal of Biology*, 77(4), 681–689. <https://doi.org/10.1590/1519-6984.21215>
- Rigotto, R. M., Santos, V. P., & Costa, A. M. (2022). Territórios tradicionais de vida e as zonas de sacrifício do agronegócio no Cerrado. *Saúde em Debate*, 46(esp. 2), 1–15. <https://doi.org/10.1590/0103-11042022E201>
- Sabed, D. (2016). A educação ambiental na educação infantil: Limites e possibilidades. *REMEA – Revista Eletrônica do Mestrado em Educação Ambiental*(esp.), 133–158.
- Santos, L. A. N. dos, Muller, M. G., & Mendes, A. A. (2024). O ensino de biomas no contexto da educação básica brasileira: Uma revisão da literatura a partir da Análise Textual Discursiva. *Ambiente & Educação: Revista de Educação Ambiental*, 29(2). <https://doi.org/10.63595/ambeduc.v29i2.1673>
- Santos, V. da S., Lisboa, A. de J. R., & de Souza, S. R. (2021). A educação ambiental como uma ferramenta pragmática para a formação da responsabilidade social / Environmental education as a pragmatic tool for the formation of social responsibility. *Brazilian Journal of Development*, 7(12), 116655–116671. <https://doi.org/10.34117/bjdv7n12-428>

Segura-Garcia, C., Alencar, A., Arruda, V. L. S., Bauman, D., Silva, W., Conciani, D. E., & Menor, I. O. (2025). The fire regimes of the Cerrado and their changes through time. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 380(1924), Article 20230460. <https://doi.org/10.1098/rstb.2023.0460>

Soares, J. S. L., & Tavares, G. G. (2025). Educação ambiental e Cerrado: Histórico e concepções na pesquisa acadêmica brasileira (2010–2024). *Revista Brasileira de Educação Ambiental (RevBEA)*, 20(6), 243–258.

Sousa, P. R. G. de, & Salvatierra, L. (2022). Análise de conteúdo de livros didáticos do PNLD 2020 sobre Educação Ambiental. *Amazônia: Revista de Educação em Ciências e Matemáticas*, 18(41), 1–15.