

Under the ancestral sky: indigenous astronomy as a tool for critical and intercultural environmental education

ABSTRACT

Considering the urgency of the climate crisis and the need to rethink the relationship between human beings and the natural world in a less dichotomous way, this paper proposes a reflection on the potential of Indigenous Astronomy. It is a tool for promoting critical and intercultural Environmental Education. This reflection is based on the premise that indigenous peoples have a profound knowledge of the cosmos, where there is no distinction between heaven and Earth. In view of this, the main objective of this study is to investigate how Indigenous Astronomy can be integrated into Environmental Education in order to foster processes of sensitization and openness to otherness in socio-environmental issues. This will promote the development of a more holistic and interconnected worldview. The research that underpins this reflection was carried out by means of a bibliographical review of academic works, articles, monographs, dissertations, theses, and official documents that deal with the subject. The results of the research indicate that the inclusion of Indigenous Astronomy in Environmental Education makes it possible to broaden the dialog and engage students in environmental issues. Therefore, in order to strengthen these actions, it is necessary to invest in public policies, teacher training, and teaching resources.

KEYWORDS: Indigenous Cosmology; Environmental Education; Interculturality; Science Teaching; Indigenous Peoples.

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Sob o céu ancestral: a astronomia indígena como ferramenta para uma educação ambiental crítica e intercultural

RESUMO

Diante da urgência da crise climática e da necessidade de repensar as relações entre os seres humanos e o mundo natural de maneira menos dicotômica, o presente trabalho propõe uma reflexão sobre o potencial da Astronomia Indígena como ferramenta para promover uma Educação Ambiental crítica e intercultural. Esta reflexão baseia-se na premissa de que os povos originários possuem um profundo conhecimento sobre o cosmos, onde não há distinção entre o céu e a Terra. Diante disso, o objetivo principal deste estudo é investigar como a Astronomia Indígena pode ser integrada à Educação Ambiental, a fim de fomentar processos de sensibilização e abertura à alteridade nas questões socioambientais, promovendo o desenvolvimento de uma visão de mundo mais holística e interconectada. A pesquisa que fundamenta esta reflexão foi realizada por meio da revisão bibliográfica de trabalhos acadêmicos, artigos, monografias, dissertações, teses e documentos oficiais que abordam a temática. Os resultados da pesquisa indicam que a inclusão da Astronomia Indígena na Educação Ambiental possibilita a ampliação do diálogo e o engajamento dos estudantes nas questões ambientais. Portanto, para o fortalecimento dessas ações, é necessário investir em políticas públicas, formação de professores e recursos didáticos.

PALAVRAS-CHAVE: Cosmologia Indígena; Educação Ambiental; Interculturalidade; Ensino de Ciências; Povos Indígenas.

INTRODUCTION

The connection of people with the sky arose for various reasons, and the need for orientation for ancient peoples was one of them, which was considered fundamental for survival (Fares et al., 2004). For this reason, indigenous people were inspired to build their own clocks and calendars, one of the oldest means associated with socio-cultural and economic parameters (Oliveira-Filho & Saraiva, 2017). These instruments were designed to help predict the seasons for agricultural work, flowering, fruiting, reproduction, festivals, the appearance of diseases and means of protection carried out by the shamans (depending on the region's ecosystem). The daily activities of the indigenous people have an intrinsic relationship with astronomical phenomena, such as day and night, the seasons, the phases of the moon, eclipses and constellations (Afonso, 2006; Afonso & Nadal, 2014).

The sky is considered a cultural component that influences civilizations, human worldviews and their relationship with nature (Oliveira, 2020). So, Indigenous astronomical science encompasses cultural and social knowledge, whether anthropological, socio-environmental or historical. The main characteristics or concepts in Indigenous astronomy are: identity, body, person, space, territory, cosmovision, rituals, mythologies, logics of practice and orality (Martín López, 2013). Therefore, Gondim and Mól (2008, p. 5) state that "[...] human beings are made based on multiple types of knowledge and, among them, popular knowledge, which is present in our country's culture and little recognized in our schools". One of the essential conditions for understanding the culture and construction of knowledge of indigenous peoples is to know their worldview (Afonso et al., 2022):

The worldview of indigenous peoples is based on animism, the belief that there is no separation between the spiritual world and the physical (or material) world and that souls or spirits exist not only in human beings, but also in non-human entities such as animals, plants, inanimate objects and celestial phenomena, being strongly related to the earth and nature (Afonso et al., 2015, p. 182).

Even though the historical, social, economic, political and cultural importance of indigenous peoples is unquestionable, the public authorities' initiatives aimed at repairing the historical ills suffered by these peoples are still insufficient. The original peoples were disregarded for a long time by governments and the non-indigenous community, they suffered harassment and torture, were enslaved and their lands were taken, in addition to the attempt to civilize them according to an ethnocentrist view (Afonso et al., 2016).

Astronomy taught in Brazilian schools arose from a Western perception of the night sky (Araújo et al., 2017), due to the insistence of institutions on teaching a hegemonic view of the sky as if it were the only one through a method of spatial orientation that induces students to seek the northern sky rather than the southern sky (Campos, 2019). Therefore, in his works, Jafelice (2009, 2010, 2011) mentions that there are several skies and human cultures, just as there are several Earths, visions of the world, of nature and of people. For the author, all ways of thinking are valid and legitimate.

Therefore, the extinction of indigenous peoples' knowledge is justified by the "colonizing mission" and is pointed out as epistemicide, in an attempt to

homogenize the world, disregarding cultural differences (Santos & Meneses, 2020). This epistemicide contradicts the view that Indigenous Astronomy is an area of Science that disseminates “[...] knowledge about the sky linked to the socio-cultural manifestations of peoples, with the potential to address cultural diversity in the context of natural science classes” (Rodrigues & Leite, 2020, p. 1).

Lima and Figueirôa (2010) say that UNESCO, linked to the expansion of interest in the knowledge of traditional peoples, reported in one of its initiatives the "Universal Declaration on Cultural Diversity" of 2001 (Lima & Figueirôa, 2010, p. 296). These initiatives are not just about studying an alternative area of astronomy, but about "respecting and protecting indigenous traditional knowledge systems", considering the contributions of these peoples to nature and the protection of natural resources (UNESCO, 2001, p. 7).

In understanding indigenous peoples and their cultures, it is of fundamental importance to analyze the relationship between the surrounding environment and human beings. This has been widely discussed by different authors (Ayres, 1990; Ab'saber, 1996; Diegues, 2000; Berkes, 2021; Brondizio et al., 2021; Ayres et al., 2023). Therefore, humanity's relationship with nature enables the co-production of ecological knowledge, in order to make a significant contribution to people's quality of life (Brauman et al., 2020).

Halbawchs (1950) considers that each individual belongs to a component of cultural matter that makes them protagonist in the construction of a mosaic of these components, in such a way that in order to assimilate cultural parameters, it is necessary to belong to this mosaic. From this perspective, Law no. 11.645/2008 established the compulsory teaching of Afro-Brazilian ethnicities and culture of Brazilian indigenous peoples in Basic Education, specifically in public and private schools, according to the following paragraphs:

§ 1º: The syllabus referred to in this article shall include various aspects of the history and culture that characterize the formation of the Brazilian population from these two ethnic groups, such as the study of the history of Africa and Africans, the struggle of blacks and indigenous peoples in Brazil, Brazilian black and indigenous culture and blacks and Indians in the formation of national society, rescuing their contributions in the social, economic and political areas, pertinent to the history of Brazil.

§ 2º: Content relating to Afro-Brazilian and indigenous Brazilian history and culture will be taught throughout the school curriculum, especially in the areas of arts education and Brazilian literature and history (Brazil, 2008).

Therefore, the rights guaranteed by law are fundamental for education and for the native peoples, in an attempt to make historical reparations, because since the invasion of the territory called Brazil, these peoples have been fighting for their cultures not to be extinguished (Santos, 2022). In agreement, Oliveira (2022) stated that cultural plurality is one of the cross-cutting themes relevant to education, based on the recommendations of the National Common Curriculum Base (BNCC).

This paper aims to reflect on the potential of indigenous astronomy as a tool for promoting critical and intercultural environmental education. The logical sequence of ideas throughout this theoretical essay begins with indigenous cosmology, signaling an interconnection with environmental education. Based on the interconnected worldview of various indigenous cultures, we will explore how

Ancestral Astronomy can serve as a tool to promote respect for diversity and care for nature.

The reflections in this paper originated from the "Indigenous Peoples' Week" booklet published in 2024, entitled *Climate Emergency: Indigenous Peoples Call for the Healing of the Earth!* Organized by Kassiane Schwingel (Kerexu & Julião, 2024). The aforementioned booklet is produced annually by the Lutheran Diaconia Foundation (FLD), through its program "Mission Council among Indigenous Peoples" (COMIN), with the rich collaboration of indigenous authors.

Figure 1

Indigenous Peoples' Week booklet (2024)



Source: Lutheran Portal (2024)

Figure 1 shows the cover of the booklet, which illustrates the consequences of the current climate emergency. When reading it, it is possible to identify the authors' call for respect for indigenous peoples' ways of life, highlighting their unique ways of living and occupying the territory.

Reading the aforementioned work prompted an investigation into indigenous skies and their contributions to nature conservation. Based on the research carried out, we discuss throughout this reflection the potential present in integrating traditional indigenous knowledge into curricula, seeking a dialog between scientific and popular knowledge, in order to overcome the limitations identified in the BNCC (Brito et al., 2019; D'avila et al., 2020) regarding this very important topic.

Finally, considerations will be presented regarding the challenges and possibilities of teaching science that values interculturality and sustainability, contributing to the formation of subjects who are aware of and engaged with socio-environmental issues.

INDIGENOUS COSMOLOGY AND AN WORLDVIEW

Since its origin, the cosmology of indigenous peoples has had an ethical meaning that overflows, breaks and questions the demarcations of educational ontology that incorporate and sustain the dynamics of coloniality, oppression of the other, of the alterity stamped on the faces of youth, women, black people and refugees. It means thinking considering the existence of the other, whose dignity is being dishonored by the same ontological system that thinks and proposes the

parameter, the individual of the current integrality, which aims to legitimize the harassment of others (Rosa, 2019)

Historically, school has been forced on indigenous peoples, often violently. Therefore, when it is included in the daily life of the ethnic groups and conducted according to the customs of each people, in many ways it is welcomed by these collectives (Stumpf & Bergamaschi, 2016). Therefore, the "school institution in an indigenous environment" (Grupioni, 2013), in most circumstances, is regarded with suspicion, and even in a negative light

In this way, Dorrico (2019) discusses the importance of intercultural education to enable respect for cultural diversity and communication between different worldviews. In addition, the author defends the need to include the knowledge of indigenous peoples in school education, valuing their ways of knowing and doing

Alves-Brito and Alho (2022) reflect on epistemic racism, which is responsible for the exclusion of black and indigenous people from science and education, making their knowledge and intellectual production inferior and negatively influencing their self-esteem. With their otherness subalternized in the sciences, indigenous people have become one of the main targets of racist initiatives, keeping them away from schools, universities and places of cultural and scientific autonomy. Faced with the consequences imposed by colonialist policies, Valiente (2018) considers that:

Indigenous science cannot be characterized as less than Western science, but rather as the interaction or dialogue between the different types of knowledge that exist in the world. It is also necessary to remove indigenous knowledge from the traditional conception, that is, to discard from the sphere of antiquity what is perceived as old and outdated; a deeper look at this knowledge reveals the epistemological value it possesses. In the same way, we should look at the scientific productions of indigenous people in universities as another way of thinking and doing anthropology (p.202).

Scientific pessimism was the foundation for indigenous policies to draw up a plan for the elimination of indigenous peoples. Elimination could happen in two ways: through extermination (genocide) or through the radical imposition of European culture (ethnocide) (Brighenti, 2022)

It is still common to present or idealize indigenous peoples as ancient peoples, who are in the process of extinction, who lived without clothes, who survived by hunting and fishing in a huge forest on the banks of a river. Therefore, this belief is nothing more than a fantasy, far removed from the reality of indigenous peoples, most of whom are undergoing an explicit demographic recovery (indicating that they are beyond extinction), with serious health problems, facing serious territorial demarcation issues and in the struggle for their own subsistence due to the environmental devastation produced by humanity (Russo & Paladino, 2016).

Until 1988, the year in which the new Federal Constitution was promulgated, there were transitional classifications for traditional peoples. Indigenous people were not considered part of the Brazilian nation, and according to Baniwa (2013), they were just integrated subjects. Nor were indigenous peoples interested in being part of a racist and exclusionary nation that did not value their languages, cultures and customs. Since 1988, the scenario has changed, making indigenous people's participants in the constituent process and their diversity has been recognized (Brighenti, 2022).

Eduardo Viveiros de Castro shows the actions aimed at naturalizing, stabilizing and making invisible the extinction of indigenous existence for centuries, through nationalist doctrines of *mestizaje*, public policies, hegemony, separation from the land and the non-right to be what they are. This policy of exclusion is similar to other minorities in Brazil, with the function of systematically annihilating them (Castro, 2016). Thus, the struggles of indigenous peoples strengthen and influence ethnocurial foundations, as the author states below.

[...] what is the centrality of the theoretical-conceptual composition of an ethnocurriculum? Depending on the perspective we are working , it is the radical ethnomethodological project that preaches that, for all practical purposes, social actors are not "cultural idiots", they carry and create ethnomethods (Garfinkel, 1967) plus a critical-hermeneutic inflection in which these actors, in addition to carrying meanings through their actions and ethnomethodic achievements, are subjects who are incessant creators of meanings and, with this, through their actions, forge and organize their sociocultural orders, as well as theorize about them. In this way, they produce descriptibility, intelligibility, reflexivity, analyzability, the place of emergence and the dynamics that make up their ethnomethods (Macedo, 2016, p. 11).

Indigenous histories bring with them knowledge that goes beyond the traditional convictions of academic knowledge (Lima, 2024). In "Por uma história Acre: Saberes e Sabores da Escrita Historiográfica", Durval Muniz de Albuquerque-Júnior (2014) discusses the various meanings of knowledge, highlighting, in addition to its intellectual aspect, its etymology related to "taste" and "flavor". Thus, cultural diversity and inclusion are centralized, allowing these voices that have been marginalized throughout history to be heard and respected, giving rise to a more balanced interaction based on a truly inclusive education (Lima, 2024)

Indigenous peoples' worldviews and conceptual systems lead to other ways of being impressed by, existing in and constituting life and the beings that exist in nature (Krenak, 2019; 2020b; 2022; Wunder, 2017). Considering the authors' statement, one of the examples that makes ethnocide harmful to indigenous people is "When a language falls into disuse and is replaced by the Portuguese language, the relationship of that people with nature, with the cosmos is affected, as well as the balance and harmony in the world" (Baniwa, 2016, p. 45)

Inocência's research (2023) shows a satisfactory dialog between the cartographies proposed by Ailton Krenak and the guiding principles of Environmental Education. By adopting a decolonial point of view, the author asserts how the imposition of a Eurocentric worldview in the colony, known for its hygienist and domineering attitudes, prevented the development of a more harmonious relationship with nature, resulting in actions that we now recognize as ecocide. This analysis contributes to a profound reflection on the need to decolonize thinking and practices in Environmental Education.

INTERCULTURALITY IN CRITICAL ENVIRONMENTAL EDUCATION AND RESPECT FOR DIVERSITY

In his work, Baggio (2013, p. 21) states that "on this land that is now called Brazil, millions of natives of different ethnicities lived before the arrival of the Europeans". Thus, the arrival of the Europeans began an institution of exploitative

culture of the natural and human resources existing in Brazil, transforming the lives of these people forever (Diniz & Barba, 2024). Therefore,

When the Europeans arrived in the 16th century, the Amazon was inhabited by a group of hierarchical societies, with a high demographic density, which occupied the land with settlements on an urban scale, had an intensive system for producing tools, ceramics, diversified agriculture, a culture of rituals and ideologies linked to a centralized political system and a strongly stratified society. These societies were decimated by the conquistadors and their remnants were forced to seek isolation or accept subservience. What had been built in just under ten thousand years was annihilated in less than a hundred years, buried in just over 250 years and denied in almost half a millennium of terror and death (Souza, 2001, p. 23).

The author talks about the brutal project, which was introduced and driven by the mercantilist logic supported by the Catholic Church, backed by the attempt to civilize and catechize the indigenous peoples. Following this, the first schools were introduced in Brazil (Diniz & Barba, 2024). In addition, Souza (2001) considers that the social organization and cultural practices of the indigenous people were violently repressed by the colonizers, which are still belittled and denied by the West today.

The colonial project associated with the epistemic death that opened up worldviews that restricted the entities of nature to the business and profit and logic of the metropolis, causing the obliteration of cosmologies and cosmogonies (Grün, 1996, p. 29; Krenak & Campos, 2021). Furthermore, it is essential to consider that:

In the context of peoples inhabiting worldviews, the debate on politics is framed in an a priori colonial mold. The episteme that establishes the political debate is itself colonial. It brings a conceptual mold, established by a logic that we, today, are able to identify as a Western logic. It is the reason of the West imprinting meaning on other worlds, creating subjects who are going to be the image and likeness of this rationality that instituted politics in Latin America [...] In Latin America, a national state is a colonial state. There is no state that is not colonial (Krenak, 2021, p. 64-65).

Faced with the project to colonize ancestral knowledge, which decimated societies and their cultures that praised the entities of nature, Leff (2009) invites us to reflect on the challenges of producing environmental knowledge that is fair, democratic and takes into account diverse worldviews. Therefore, it is taken into account that environmental knowledge involves rational knowledge and sensitive knowledge, the knowledge and flavors of life

Colonial outlines have already been consolidating their limits since the genesis of biodiversity was configured in the context of the formation of scientific knowledge. Therefore, in the natural sciences, where the essence of study is the phenomena observed in the environment, in the links between the biotic and the abiotic, biodiversity is a fundamental theme of teacher training in this area (Rédua & Kato, 2024). What used to be considered biological diversity came to be called biodiversity in 1988, following the publication of articles by the *National Forum on BioDiversity* (Motokane et al., 2010).

The study carried out by Borges et al. (2021), is an important example to be cited in the above work, as it is an investigation into the relationship between Environmental Education and Quilombola culture, embodied in knowledge, environmental and cultural practices in the Quilombola community of Bailique

Centro (Oeiras do Pará). The study carried out by the authors pointed out problems of a socio-environmental, educational and environmental nature, with regard to sustainability, revealing that the materiality of knowledge about nature is based on a concern for the community's bio-socio-diversity conservation, presented through work actions experienced by the group itself.

Considering the previous paragraph, Freitas (2023) takes as a basis the concept defended in the work of Tristão (2013), who considers that Environmental Education is not just a compulsory subject in the school curriculum, but a "philosophy of life". This is because the various approaches to Environmental Education have their origins in environmental ideologies, according to the vision cultures and social paradigms (Hart, 2005).

In view of initial teacher training, (Barbosa et al., 2021) states that environmental education needs to be discussed more effectively in basic education. Therefore, by allowing ourselves to be (re)enchanted by the world we live in, we can reflect on the educational process that takes place in our daily lives with other living beings (Duarte Almada & Venancio, 2021). Based on this assumption, Assis and Chaves (2015) state that teachers need a theoretical foundation to approach Environmental Education in the classroom in an interdisciplinary way. Therefore, the authors recommend professional development courses and reading texts in the field.

For Baptista et al. (2020), Environmental Education is of great relevance in the current scenario of environmental and civilizational crisis that humanity is experiencing, and also requires efforts from all areas of knowledge in the unfolding of its causes and the search for alternatives. The authors also consider it important to reflect on studies and applications related to interculturality, since it deals primarily with discussions about dialogic relations between our cultures and other cultures that have not caused the crisis established by modern Western society during the globalization process.

Catherine Walsh explains the debates on interculturality and its different mobilizations as follows:

As a concept and practice, interculturality means "between cultures", but not simply a contact between cultures, but an exchange that takes place on equal terms. As well as being a goal to be achieved, interculturality should be understood as a permanent process of relationship, communication and learning between different people, groups, knowledge, values and traditions, aimed at generating, building and providing mutual respect, and the full development of individuals' capacities, over and above their cultural and social differences (Walsh, 2005, p.4).

Thus, Walsh (2005) considers that interculturality is not just about contact between cultures, and Leff (2009) adds that it is about the continuous exchange of knowledge that results from this contact adjusted as a dialogue of knowledge. In this sense, the author considers that critical interculturality is constructed by people who have suffered historical subjugation and subalternization, which starts from a problem of power, the pattern of racialization and the difference that has been constructed from it (Walsh, 2009a).

In this sense, Gomes and Miranda (2014) seek to recover relevant aspects of these narratives linked to interculturality. We face, above all, the broader issue of schooling processes in their relationship with cultural processes. It is important to

consider Oliveira and Almeida's (2023) conception of the pedagogical practices that gave rise to the intercultural cycles, which is faced with the discussion around relations between cultures in education. This discussion is organized into different theoretical, political and pedagogical meanings of expressions such as multiculturalism, interculturalism and intercultural dialogue.

Oliveira and Almeida (2023) identified that the polysemy of the expression "multiculturalism" encompasses various configurations and categories (Gonçalves & Silva, 2003; Candau 2008; Paladino & Almeida, 2012; Nascimento, 2014). In this sense, Hall (2003) believes that all societies, in different historical periods and geographical spaces, have been and are considered multicultural.

Table 1 below explains practical aspects and describes interculturality and diversity in Environmental Education, based on the arguments of the aforementioned authors.

Table 1

Interculturality and Diversity in Environmental Education

Aspects	Description	Practical examples
The concept of interculturality in science education	Recognizing and valuing different cultures in the educational process, respecting the specificities of each group and promoting intercultural dialogue.	Include case studies on indigenous environmental management practices and sustainable techniques of traditional communities.
Respect for Diversity	Appreciation and acceptance of cultural, ethnic, linguistic, religious and lifestyle differences, without judgment or prejudice.	Work on the diversity of practices and knowledge in the classroom, highlighting the value of local knowledge for sustainability.
Integrating Local Knowledge	Use of traditional and local knowledge in teaching, valuing cultural practices that contribute to environmental conservation.	Invite community leaders or masters of traditional knowledge to share their knowledge about the sustainable use of natural resources. In addition, to share this knowledge through the production of teaching materials that promote the sustainable use of natural resources and research and extension projects focused on education.
Environmental and Cultural Conflicts	Discussion of conflicts involving environmental issues and cultural diversity, such as the exploitation of indigenous lands and environmental protection areas.	Debates on deforestation in protected areas and how it harms indigenous and riverside populations, proposing solutions.
Pedagogical tools focused on interculturality	Improving teaching materials that reflect cultural diversity and encourage learning about the environmental practices of various	Use of stories, legends and tales from indigenous culture that encourage respect for and preservation

	cultures.	of nature, relating them to the BNCC.
Intercultural challenges	Facing barriers such as prejudice and stereotypes, as well as the lack of access to resources that promote intercultural environmental education.	Creating spaces for dialog to discuss and deconstruct stereotypes, promoting respect and understanding of the different cultures represented.
Objectives of Intercultural Education	To develop critical and empathetic citizens, capable of valuing and learning from cultural diversity and applying this learning to sustainable environmental practices.	Promoting student involvement in local environmental conservation projects, adapted to the cultural context and with community participation.

Source: Own authorship (2024).

The table above recommends a standard of Environmental Education based on Decolonial Pedagogy (Walsh, 2009; Oliveira; Candau, 2010), understood as a praxis that enables dialog and different forms of solidarity. In addition to proposing ways of fostering a science that values cultural diversity, Chart 1 recognizes the challenges posed by this proposal, pointing to the need to create spaces for dialogue, to discuss and deconstruct prejudices.

Therefore, the Environmental Education presented in Chart 1 is critical and naturally tends to oppose anthropocentrism and the subordination of nature, characterizing it as an understanding that strives to offer a political, democratic, liberating and transformative education (Tozoni-Reis, 2006). It also complements the study by Medeiros, Silva and Araújo (2024), which aims to contribute to education for sustainability through teaching practice.

INDIGENOUS ASTRONOMY AS A TOOL FOR ENVIRONMENTAL AND INTERCULTURAL EDUCATION

Galileo Galilei's revolutionary astronomical observations more than four centuries ago profoundly shook Western culture's worldview, challenging the ancient dualism between Earth and Heaven. Following Galileo's discoveries, the Earth, previously considered a single, immobile celestial body, came to be seen as a planet, a blue star in constant motion. At the same time, the sky, once conceived as a celestial and divine realm, was redesigned as a cosmic space full of celestial bodies, demystifying old beliefs (Soares & Mello, 2012). This profound transformation in the understanding of the cosmos has had a significant impact on the way people perceive the universe and their place in it. According to Ortriz et al. (2019), social representations of astronomy, shaped by these historical changes and individual experiences, have a considerable influence on how students understand and relate to astronomical knowledge.

Astronomy plays a fundamental role in the dissemination of science and scientific diffusion, as it causes enchantment and fascination, not only in young people, but also in the general public (Maciel, 2014). In this sense, Spektor-Levy *et al.* (2013) consider the importance of teaching Science and Astronomy as a mechanism to encourage curiosity and the questioning profile of students and

Eshach (2006) considers that teaching Astronomy in Basic Education gives students a better understanding of scientific concepts.

In the view of Uchoa et al. (2021), the school is considered a space of plurality, where teachers must consider that students are individuals linked to different cultures. Therefore, the author proposes that respect for diversity is one of the attitudes adopted by an educator committed to combating racism, with an anti-racist and decolonial education.

In relation to interculturality, the content on indigenous sciences covered in the classroom has been solidified as an important area of knowledge in laying the foundations for a plural society (Brighenti, 2022). Considering the need to use students' experiences, cultures and daily lives, Freitas et al. (2024) consider it important to propose means of inclusion and scientific dissemination for this audience, enabling meaningful, participatory and emancipatory learning.

Indigenous astronomy, with its transdisciplinary nature, establishes a deep connection between the sky and the Earth. The indigenous view of the cosmos is not limited to the mere observation of the stars, but is part of a broader context, permeated by cultural values and knowledge about nature. This rich cosmovision, which dates back millennia, must be understood in the light of the contributions of researchers (Afonso, 2003).

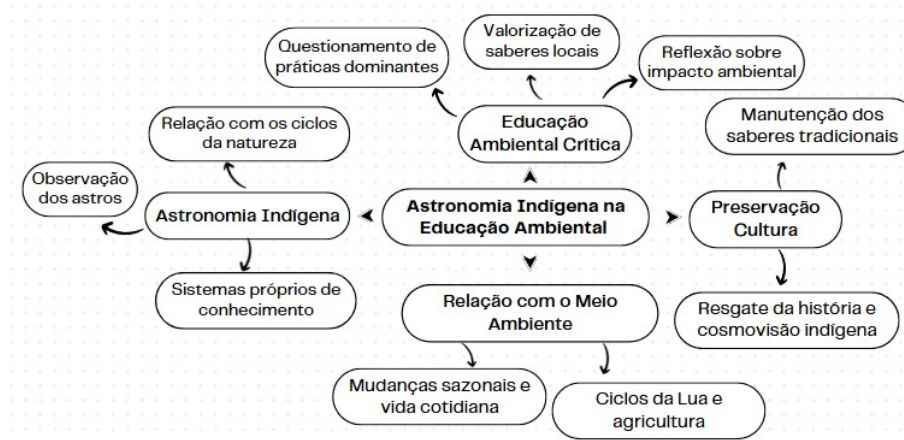
Considering that each social group has its own understanding of celestial bodies (Bueno et al., 2019). In this sense, we have as an example of a space for disseminating this knowledge, the indigenous school, considered to be one of the main historical achievements, as it makes it possible to address issues such as indigenous identities, indigenous cultures, teaching and learning processes and the construction of collectives (Cohn & Santana, 2016)

Law Nº. 11.645/2008 and the implementation of differentiated indigenous schools have made it possible to strengthen topocentric approaches in the classroom from a holistic perspective. These actions enable the development of ecological awareness in view of the multidisciplinary potential of astronomy and the understanding of humans belonging to the planet and responsibility towards nature (Silva - Neto, 2020).

Figure 1 below shows some important aspects of Indigenous Astronomy in Environmental Education, with the aim of contributing to the development of planetary awareness.

Figure 2

Fundamental aspects of Indigenous Astronomy in Environmental Education.



Source: Prepared by the authors.

Figure 2 addresses nature as a fundamental resource for the survival of all living beings and Environmental Education contributes to raising awareness of its preservation and conservation (Silva-Neto, 2020), as described by Sauvè (2005, p. 317):

The environment - a resource (to manage, to share). There is no life without the resource cycles of matter and energy. Environmental education implies education for conservation and responsible consumption and for solidarity in equitable distribution within each society, between present societies and between present and future societies [...]. Environmental education is part of a genuine economic education: it is not about -managing the environment||, but rather about -managing|| our own individual and collective behavior with regard to the vital resources extracted from this environment.

The author sees the purpose of discussions on the environment in Environmental Education, which makes it possible to explore the links between the components of identity, culture and nature, with a view to expanding ecological awareness and integrating humanity with other living beings (Sauvè, 2005).

In Jafelice's view (2015), the construction of a topocentric way of thinking is a prerequisite for an integral education and the expansion of the vision of humanity and ecological awareness, whose approach is relative to the place - on Earth - where the individual observing any celestial phenomenon is located

In the context of Science Teaching, this theme encompasses Decolonial studies, making it possible to question the colonial problems present in our daily lives (Orozco - Marin & Cassiani, 2023), affecting socio-environmental issues (Sauvè, 2005). In addition, Orozco - Marin and Cassiani (2023) cite problems that are still present today that can be questioned, such as racism, machismo and economic inequalities, which through dialogue and visibility of inferior audiences.

One of the worrying factors in this reflection is that Environmental Education was consolidated in the curriculum in 1998, with the approval of the National Curriculum Parameters. Therefore, in 2017, with the approval of the BNCC, environmental education was reduced to a footnote (Aquino & Iared, 2023). In addition, this limitation compromises the dialog between the various parts of society, which is the main premise for environmental education policies in schools (Brito et al., 2019; D'avila et al., 2020)

FINAL CONSIDERATIONS

This article reflects on the potential of Indigenous Astronomy to consolidate Critical and Intercultural Environmental Education. By investigating the worldview of various indigenous peoples, we seek to highlight the interconnection between respect for cultural diversity and responsibility towards nature. Motivated by the climate emergency and indigenous peoples' point of view on this crisis, we mention that the inclusion of Indigenous Astronomy in school curricula can contribute to a more critical, decolonial and environmentally responsible education.

Based on the analysis of the booklet *"Emergência Climática: Povos Indígenas Pedem a Cura da Terra!"* by the Lutheran Diaconia Foundation, we observed the urgency of a dialog in science classes that values the indigenous view of nature and environmental challenges. By questioning the limited approach of the BNCC, we seek to build a critical conception that recognizes the importance of Decolonial Pedagogy and respect for cultural diversity.

The researchers in this study discuss the need for an educational ethic that transcends the limits of the dominant ontology, questioning the structures of power and knowledge that perpetuate epistemic racism. By connecting the heavens and the Earth, Indigenous Astronomy offers an epistemological alternative that values traditional knowledge and promotes a more harmonious relationship with nature.

Incorporating Indigenous Astronomy into Environmental Education can contribute to the formation of citizens who are more aware of and engaged with socio-environmental issues. To this end, it is essential to train teachers, produce teaching materials and create public policies that value indigenous knowledge. By promoting a dialog between Western science and traditional knowledge, we can build a fairer and more sustainable future for everyone.

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NOTES

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