

ARTICLE

“ENCHANTED” SCIENCE TEACHING: DECOLONIAL STUDIES BASED ON *MACUMBAS* PRACTICES AND SACRED CROSSROADS

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ABSTRACT: coloniality is a concept that reflects colonialist power's racist patterns in contemporary context. Drawing on the Epistemology of the Brazilian *Macumbas* and the Pedagogy of Crossroads, formulated by Luiz Rufino and Luiz Antônio Simas, we advocate for an “enchanted” approach to science teaching: an opportunity to transcend coloniality through science education. Initially, we situate the works of the authors Simas and Rufino within decolonial thought. Subsequently, we explore the underpinnings of the Epistemology of the Brazilian *Macumbas* Practices and the Pedagogy of Crossroads, emphasizing the notions of “enchantment” and crossroads. We conclude the article by proposing a perspective called “enchanted” teaching of science based on critiquing western-centricity and fostering interculturality.

Keywords: Decoloniality, Epistemology of Brazilian *Macumbas*, Pedagogy of the Crossroads, Science Teaching.

ENSINO ENCANTADO DE CIÊNCIAS: APORTES DECOLONIAIS DAS MACUMBAS E ENCRUZILHADAS

RESUMO: O conceito de colonialidade repercute a presença dos padrões racistas de poder do colonialismo na realidade contemporânea. Tendo por base a Epistemologia das Macumbas e a Pedagogia das Encruzilhadas – pensadas por Luiz Rufino e Luiz Antônio Simas –, propomos o ensino encantado de ciências: uma possibilidade de transgressão da colonialidade por meio do ensino de ciências. Primeiro, posicionamos a obra de Simas e Rufino dentro do pensamento decolonial. Em seguida, discutimos os fundamentos da Epistemologia das Macumbas e da Pedagogia das Encruzilhadas, com destaque para os conceitos de encantamento e cruzo. Como conclusão, propomos o ensino encantado de ciências como projeto pautado na crítica à ocidentalidade e na construção da interculturalidade a partir das macumbas brasileiras.

Palavras-chave: decolonialidade, Epistemologia das Macumbas, Pedagogia das Encruzilhadas, ensino de ciências.

LA ENSEÑANZA DE LAS CIENCIAS ENCANTADA: APORTE DECOLONIAL DE MACUMBAS Y ENCRUCIJADA

RESUMEN: El concepto de colonialidad refleja la presencia de los patrones de poder racistas del colonialismo en la realidad contemporánea. A partir de la Epistemología de las Macumbas y de la Pedagogía de las Encrucijadas en el pensamiento de Luiz Rufino y Luiz Antônio Simas, este estudio propone una enseñanza encantada de las ciencias, una posibilidad de transgresión de la colonialidad a través de la enseñanza de las Ciencias. Primero, se posiciona el trabajo de Simas y Rufino dentro del pensamiento decolonial, seguido de una discusión sobre los fundamentos de la Epistemología de las Macumbas y la Pedagogía de las Encrucijadas, centrándose en los conceptos de encantamiento y cruzo. El estudio concluye proponiendo la enseñanza encantada de las ciencias como un proyecto basado en una crítica a la occidentalidad y en la construcción de la interculturalidad a partir de las macumbas brasileñas.

Palabras clave: Decolonialidad, epistemología de las macumbas, pedagogía de las encrucijadas, enseñanza de las ciencias.

INTRODUCTION

According to the Peruvian sociologist Aníbal Quijano (2005), in his research on power regimes in the globalized world —particularly concerning the position occupied by Latin American subjects—race is the basis for social classification and domination in capitalism. According to the author, although racialization has colonial origins associated with the social division of labor, racism continues to shape power regimes even after the end of the historical period of colonization. Quijano (2005) therefore proposes the concept of "Coloniality of Power" to represent this colonial influence on the current power regime. Mignolo (2020) complements this by considering that perpetuating this colonial difference (racialization) also entails perpetuating the silencing of non-Western knowledge and existences in favor of the Eurocentric narrative—a phenomenon linked to the concepts of "coloniality of knowledge" (Lander, 2005) and "coloniality of being" (Maldonado-Torres, 2007), respectively.

Fanon (2008) highlights this silencing by addressing education in the Caribbean and how it contributed to Black individuals rejecting elements that identified them as such while assuming white subjectivities and symbolism. From scenarios like these, discussions on decolonial pedagogies emerge, defined by Walsh, Oliveira, and Candau (2018, p. 5) as "the politicization of pedagogical action" to counter the "hegemonic monocultural and monorational geopolitics," bringing forth the knowledge and experiences of colonized populations — education that "denounces epistemic violence and can generate proposals for strategies that lead us to decolonize our bodies and our discursive practices" (Miranda; Riascos, 2016, p. 570). Thus, the construction of a critical interculturality is proposed, questioning "racialization, subalternization, inferiorization, and their patterns of power" (Walsh, 2009, p. 25).

Regarding science education, although relatively recent, there has been an increasing number of studies sharing this decolonial objective (Silveira; Lourenço; Monteiro, 2021). In this sense, these studies recognize traces of coloniality in both science and its teaching. They point out that methods, instruments, contents, and the entire research and teaching structure mainly derive from Eurocentric references (Dutra; Castro; Monteiro, 2019). Given the prestige of science in society, producing and teaching science based on colonial ideals risks reinforcing inequalities, such as when science supported eugenics, predatory economic policies, the pathologization of homosexuality, among others (Silveira; Lourenço; Monteiro, 2021).

Thus, proposals have emerged to rethink school practices in science education to give prominence to marginalized subjects and knowledge due to coloniality. For example, through the inclusion of knowledge from traditional groups in education — indigenous peoples, quilombola remnants, and agricultural communities, among others (Costa; Lisboa; Fonseca, 2019; Petri; Fonseca, 2019; Rebello; Meirelles, 2022); by breaking stereotypes through the recognition of the contribution of Black Scientists to science (Barbozza; Schittini; Nascimento, 2018; Ribeiro; Pereira, 2018); by discussing social/racial injustices through scientific themes — such as the problematization of the biological notion of race in favor of its

understanding as a social construct through the study of melanin (Cardoso; Rosa, 2018) and the debate on the psychological suffering of the Black Population incarcerated through the study of the use and action of psychotropic drugs (Jesus; Lima, 2018).

THE CONCEPT OF DECOLONIALITY ACCORDING TO LUIZ ANTÔNIO SIMAS AND LUIZ RUFINO

Consistent with decolonial arguments, Simas and Rufino argue that European domination over its colonies was not limited to commercial relations but also established an agenda of submission and control over all existence that was alien to it: "colonialism was built at the expense of what was produced as its other" (Simas; Rufino, 2018, p. 11). Thus, the "Other" was anyone who was not white and European — a wide diversity of peoples and cultures reduced to the figure of the soulless, uncivilized, and inhuman subject (Simas; Rufino, 2018, 2019). According to Césaire (1978), the Christian discourse that condemned non-Christians as savages provided support for colonialism, aligning with the racist discourse "whose victims were to be Indians, yellows, and blacks" (p. 15).

In the social contract imposed by Europe on the New World, violence was a mechanism for managing the lives and forms of existence of the Other. The physical assault through extermination was one element of this mechanism, but not the only one. This is because, for the dehumanization of this Other, "it is not enough to kill, enslave, and humiliate [...] it is necessary to annihilate" (Simas; Rufino, 2019, p. 53), and annihilation also occurred through symbolic means. For this purpose, colonialism established a regime of truth that situates Eurocentric knowledge as the only legitimate one. In a dichotomous and reductionist manner, any knowledge foreign to Europeans and their modern methods would be illegitimate, wrong, and fantastical.

Like Quijano (2005), the author points to the compulsory exploitation of racialized labor as one of the pillars of European dominance over the Americas, controlling world trade and consequently developing capitalist economy and modern European culture as the center of the world-system. The coloniality of power operated through the displacement and subjugation of the existences of non-European peoples, imposing a hierarchy of knowledge that devalued indigenous and African cultures and knowledge. This symbolic violence allowed European modernity to consolidate its global hegemony. Boaventura de Sousa Santos (1998, p. 208) terms this process epistemicide, "the political-cultural process through which knowledge produced by subordinate social groups is killed or destroyed as a way to maintain or deepen this subordination."

The devaluation and suppression of ancestral knowledge and traditional knowledge, in addition to generating injustices, impoverish our experience of the world. This is because other ways of being in the world, grounded in ancestral knowledge, are also marginalized and forgotten. Those who maintain marginalized ways of knowing/being have their existence denied; they are considered more as "things" than as "people" (Rufino, 2019). Hence, with their immaterial existence compromised, these subjects suffer from an existential—or ontological—deviation: "being is produced as non-existent by having its reference of knowledge subjected to a condition of permanent discredit, subalternity, and by having its enunciation prohibited" (p. 21).

Fanon (2008) portrayed the idea of an existential deviation that the European white man imposed on other peoples, transporting them to an arid and sterile dimension where the fullness of their human existence was denied: the zone of non-being. Fanon influenced Authors like Bernardino Costa (2016) and Weber and Medeiros (2020), and for them the humanist discourse inserts the European man as the universal standard of humanity, excluding Others. Maldonado-Torres (2007) addresses the concept of coloniality of being to account for this sub-ontological difference between effective being (European white man) and existences that are below him (racialized subject), a kind of (non)existence imposed by the regime of power and knowledge gestated in colonialism.

However, Simas and Rufino (2018) argue that there are ontological gaps within the existence imposed upon subjects. Through these, spaces of negotiation and resilience would emerge, based on which the invention of other ways of being in the world was made possible, aiming, moreover, at the reconstruction of community identities dismantled by diaspora and ontological deviation. These other modes of being constructed in resilience and negotiation constitute what the authors call cultures of crevice. For them, despite the diaspora having caused an "irreparable rupture of ties of belonging, the experience of exile forges a kind of survival trans-culture" (Simas; Rufino, 2018, p. 50) that crosses knowledge, memories, and experiences and creates new ways of interacting with community life. For example, samba, concerning Brazilian culture, would be an example of a culture of crevice.

In the Brazilian context, from the dynamics of negotiation in conflict, cultural traditions emerge that Simas and Rufino title as Brazilian *Macumbas*. According to the authors, although currently used pejoratively in Brazil and revealing religious racism, the term "*Macumbas*" (plural of *Macumba*) in its etymology, denotes the plural of *kumba*—which in the Kikongo language would mean "sorcerer," "enchanter of words," "poet." In their work titled "Fire in the Bush—The Enchanted Science of *Macumbas*," however, authors Simas and Funo (2018, p. 15) define the term as "that which presents the marks of the diversity of subaltern expressions." To potentiate life, *Macumbas* gather knowledge from African, Amerindian, and Western norms, constructing "a complex of knowledges that forge their own, cosmopolitan, and pluriversal epistemologies" (p. 27). Beyond plurality, *Macumbas* are also cultures of syncope. Inspired by the musical term, culture of syncope addresses existences that "break constants, find unforeseeable solutions, and create imaginative ways to fill the void, with body, voices, songs" (p. 19).

Based on Brazilian *Macumbas*, as cultures of crevice and syncope, Simas and Rufino (2019) seek to break away from the burden of the colonial past. For them, combating coloniality implies combating the Christian-Cartesian impulse to deny the existence and legitimacy of other worldviews. On the contrary, it should be established that there are rationalities beyond modern reason and that they carry with them other legitimate ways of being and existing. Enrique Dussel (1993), in addressing the origin of modernity as a violent covering-up of the Other, emphasized dialogue in alterity as a premise for the liberation of historically excluded subjects. In the author's Philosophy of Liberation, reason is not limiting or monological, but emancipatory, as it acts to "establish a dialogue, an intersubjective discourse with the reason of the Other, as alternative reason" (Dussel, 1993, p. 173).

Boaventura de Sousa Santos (2007) also shares this line of thought. To overcome social injustices, the author proposes a struggle against so-called cognitive injustices, where the construction of a thought that surpasses the division between West and non-West would be necessary. Dialogue in alterity appears, therefore, in the copresence of subjects in an ecology of knowledges, in which heterogeneous knowledges, in their plurality and autonomy, interact sustainably and dynamically. Similarly, Simas and Rufino (2018) argue that the ontological repositioning of those subalternized requires an epistemological repositioning that legitimizes non-Western knowledges and forms of knowing — such as Brazilian *Macumbas*. Decoloniality in their works resides in seeking, in the resilience of cultures of crevice, in the plurality of *Macumbas*, and in the creative freedom of syncope, the transgressive strength to promote existence in diversity.

THE KNOWLEDGE AND THE EPISTEMOLOGY OF *MACUMBAS*

"Caboclo¹ is the term that designates those who have doubled death through enchantment" (Simas; Rufino, 2019, p. 9); "it is whatever it wishes to be, because it has invented life beyond deviation" (p. 10); it is "being in availability" (p. 12). The metaphorical concept of enchantment, proposed by Simas and

¹ In the Brazilian context, "caboclo" refers to individuals of mixed indigenous and European ancestry, and in some regions, it can also include African ancestry due to significant intermingling among these ethnic groups. The caboclo thus represents a Brazilian archetype of cultural and racial fusion, encompassing diverse identities.

Rufino (2018), finds in the caboclo one of its main references and expressions, referring to the ability to see the world and culture with an open, receptive eye capable of integrating different influences and elements. It is constantly adapting and incorporating new forms and knowledge, reflecting the inherent diversity and cultural richness. This dynamism and openness to diversity parallel the idea of being "enchanted" being open to the multiple possibilities of the world, allowing it to always be new and surprising. In this view, even knowledge can be "enchanted," that is, it can always be seen and understood in new ways, never exhausted in a single interpretation.

Enchanted knowledge is that which resists forgetting and immobility; it remains potent and dynamic because it recognizes itself as unfinished and, therefore, open to the possibilities of the world and creativity. However, this is not the condition of modern knowledge. Knowledges lose vital energy by ignoring the diversity and unpredictability of the world, succumbing to "the closing of possibilities, forgetting, lack of creative power, renewable production, and mobility" (Simas; Rufino, 2018, p. 34). This state of scarcity and loss of potency, representing disenchantment, is, for Simas and Rufino (2019), the result of symbolic death caused by colonial impact.

According to Oliveira (2012), disenchantment consists of limiting the potential of reality through the action of modern reason; a pragmatic and instrumental rationality that supports capitalist and utilitarian aspirations. For the author, the scenario of disenchantment highlights the need for an attitude toward life different from that sown by modernity. At this point, Oliveira (2012) presents enchantment as a fundamental attitude of not rejecting the complexity of the world; on the contrary, of understanding it as a space of coexistence where diverse cultures produce their diverse worlds. Thus, both the archetype of the caboclo mentioned by Simas and Rufino and Oliveira expand the perspective beyond the boundaries created in Enlightenment humanism—which denies alterity in favor of hierarchical standards (Sodré, 2017)—directing it toward where cultures intersect, toward the crossroads of the world.

"The crossroads teach us that there is not only one path; the crossroads are a field of possibilities" (Simas; Rufino, 2018, p. 118). In the Epistemology of *Macumbas*, the crossroads symbolize the practice of crossbreeding: the act of enhancing knowledge from the constitution of contact zones between knowledge. Considering the coexistence of different worldviews, and that no aspect of existence — the world, beings, their knowledges, and practices — is finished, crossbreeding creates possibilities and thus produces enchantment. Knowledge, once "disenchanted", has its potency and mobility restored as it begins to deny any universalist pretension. In this sense, for Simas and Rufino (2018, 2019), denying universality is not denying the entire Western canon but transgressing it; crossing it with other knowledges and presences, bringing forth something new with dynamism and vitality.

This other epistemological horizon, which challenges the rigidity of modern reason and revitalizes the potential of knowledge, would be constituted based on the cracks opened by the pluriversal wisdom of *Macumbas* and, therefore, guided by the ancestry of Afro-descendant peoples (Rufino, 2019; Simas; Rufino, 2018, 2019). According to Machado (2014, p. 58), ancestry is the "logic that organizes African thought recreated on Brazilian soil, [...] which allows one to think, reflect, recreate, create, and experience continuously an African cosmovision." Thus, it is not a construction exclusive to the New World, nor an atavistic perpetuation of African culture in the Americas (Oliveira, 2012), but a founding principle rooted in collective memory, yet always updated, permeating the culture, wisdom, and identity of the diaspora peoples (Machado, 2014).

Far from being just another cultural trait, ancestry has subsidized, through these "memories of another time," the existential reconstitution of subjects whose existence was violated by the colonial burden (Rufino, 2019). Afro-Brazilian rites, myths, music, songs, and dances composed, in the face of the colonial policy of death and forgetting (Simas; Rufino, 2019), a survival strategy that ensured the continuity in Brazil of the African cosmovision and its welcoming, holistic, and ecological way of existing and producing knowledge (Osaniyi, 2019). This philosophy/epistemology of ancestry is a natural guiding principle of crossbreeding because it does not limit itself; on the contrary, it produces enchantment by engaging in the construction of worlds and dialogue between them, rejecting any purity or linearity, coexisting with paradoxes

rather than resolving them (Oliveira, 2012). Thus, according to Machado (2014, p. 59), ancestry "is the form while enchantment is its content."

In this sense, Sodré (2017) proposes a transcultural composition based on the Afro way of thinking; "not a dialogue 'between' formations that pretend to be true and sealed, but the logic of 'through' or back and forth 'across' the thresholds of meaning, not a philosophy of doors but of bridges [...] that pave the way for new terms of disputes of meaning" (p. 22-23). This proposition reinforces a point made by Simas and Rufino: crossing does not only imply establishing contact between different—e.g., syncretism between *orixás*² and Catholic saints is more than juxtaposing two elements of distinct cultures. Syncretism, from this perspective, encompasses a third, hybrid, and intersectional cultural product that cannot be reduced to a single term: it is no longer saint, nor *orixá*; "what is crossed is also transformed into something else" (Simas; Rufino, 2018, p. 69).

The authors ground this aspect of crossing in *Enugbarijó* (Lord of the collective mouth), a face of *Exu* associated with life transformations, represented by a mouth that consumes everything: "it swallows in one way and returns in another, inferring dynamism [...]. In this sense, whatever is swallowed is returned as possibilities" (Simas; Rufino, 2018, p. 51). In the work of Simas and Rufino, *Exu* is the power of creation and movement that acts in transformations, and the "conceptual availability to think about beings and their possibilities of 'becoming'" (Simas; Rufino, 2019, p. 34). As Lord of the third calabash (Igba Ketá) and King of the crossroads of three paths (Obá Oritá Metá), *Exu* reveals the world as a space of ambivalences and plurality, not of certainties and excluding dichotomies (Rufino, 2019). Under the title of Lord of magical power (Elegbara), *Exu* fosters unpredictability and dynamism that stimulate norm-breaking in cultures of syncope (Simas; Rufino, 2018).

It is noteworthy that the relevance of the mythical narratives of *Exu* in the epistemological proposition of Simas and Rufino does not limit its pertinence to the religious realm. It is the myth, transmitted over time through customs, that governs and justifies history (Hama; Ki-Zerbo, 2010). Alive in social imagination, myth exerts "its powers of meaning and resignification" (Osaniyi, 2019, p. 21), teaching humans "their place and role in the universe and revealing what their relationship with the world should be" (Hampâté Bâ, 2010, p. 184).

And the emphasis given to *Exu* is not without reason. In the philosophical aspect, Osaniyi (2019) asserts that it is the ambiguities of *Exu*-centered thought that evoke crossroads epistemology, open to other modes of being and dialogue among them, associated with Black ancestry. This is because *Exu* would be the one who confers dynamism to all existence by promoting the constant and transformative movement of disorganizing to organizing, and then disorganizing again. William (2019) presents *Exu* as the Lord of Reciprocity, Sociability, and especially exchange relationships; and it is precisely this exchange—giving, receiving, returning transformed—that Sodré (2017) situates as the basis of his transcultural communication.

Based on *Exu*, crossing feeds on the knowledge and practices of daily life. This presupposes crediting daily life as the space/time of knowledge production not only through the accumulation of information but also through experiences. In ancestry, knowledge "is not of the order of writing, of what can be revealed through words [...], but has to do with an 'initiatory practice' that crosses the entire body" (Osaniyi, 2019, p. 28). Thus, the body is positioned as a producer of meanings (Machado, 2014), because more than a physical apparatus, the body is a power of experimenting with the world (Simas; Rufino, 2019). In the Epistemology of *Macumbas*, body and mind are not separated; "thinking" and "feeling" construct analytical and enchanted reason (Simas; Rufino, 2018).

² *Orixás* are deities worshipped in various African-derived religions, such as *Candomblé*, *Umbanda*, and *Macumba*.

EDUCATION AND THE PEDAGOGY OF CROSSROADS

As Rufino (2019) states, Brazilian education has collaborated and continues to collaborate with the monorational/monocultural regime that produces epistemicide and ontological deviation, forging mentalities incapable of protesting against the dehumanization of peoples, the disenchantment of knowledge, and all the social and cognitive injustices resulting from this scenario (Simas; Rufino, 2019). Therefore, based on the epistemological, political, and ethical principles of Brazilian *Macumbas*, Rufino (2019) proposes the Pedagogy of Crossroads as a possibility to transgress the coloniality that entangles Brazilian school education.

The ethical and political foundations

The Pedagogy of Crossroads breaks with the monorational/monocultural regime and, in its place, establishes a commitment to diversity. In Simas and Rufino's (2019) works, committing to life in diversity is a prerequisite for dispatching the colonial burden. This commitment begins with conceiving education itself as a product of the diversity of ways of being/knowing in the world and therefore an essentially human phenomenon. Accepting education as an element of humanity, in turn, implies the need for an ethics (Rufino, 2019)—that is, a sense of responsibility that guides the individual to commit to Others and the consequences of their actions (Simas; Rufino, 2019).

In the Pedagogy of Crossroads, this ethics deals with being open to the different and attentive to social and cognitive injustices, to incite actions that oppose existential deviation (Rufino, 2019). It is therefore a counter-colonial position, as it promotes a shift from Western ethics centered on the individual to an ethics referenced on the Other, an ethical turn that refers to the philosophies of Emmanuel Lévinas and Enrique Dussel. Although starting from different places, both authors denounce the failure of rationalist and anthropocentric ethics of modernity. They argue that this has been responsible for generating egocentric morality and an ontology of the Same, which led humans to self-enclosure, denying openness to the Other. This ethical model is thus bankrupt because it has led humanity to a scenario of world wars, poverty, destruction of nature, and all sorts of disrespect for human rights. In contrast to this Western framework, Lévinas advocates for the recovery of the Other's alterity, which in Dussel's philosophy of liberation translates into an ethics of responsibility towards the poor, excluded, and oppressed (Batista, 2008; Silva, 2012).

Discussing the ethical dimension of education has been necessary considering the hegemony that the Market has achieved with the shrinking of the State through neoliberal policies. Globalized markets have imposed homogeneous models of economy and culture on the world, subjecting the diversity of ancestral ways of life production to the logic of profit and productivity (Casali, 2007). This situation reinforces the hegemonic educational model, committed to the purely instrumental formation demanded by capitalism and to the supposedly universal principles germinated in modernity, amplifying the negation of subjectivities and alterity in the pedagogical sphere (Hermann, 2014). Even with limited reach, it becomes ethically imperative for education and educators to attempt to contribute to changing this scenario. The contents, methods, and means of teaching must be committed to creating, reproducing, and developing life in diversity (Casali, 2007).

"If the statute of humanity used throughout the European colonial civilizing process in the world is based on the destruction of non-white beings" (Rufino, 2019, p. 9), thinking about decoloniality without anti-racism becomes unfeasible. Commitment to the preservation of life in diversity depends on alignment with the anti-racist struggle. Education must act to bring to light the veiled marks of racism on social practices, including those related to sciences and curricula (Oliveira; Candau, 2010).

A historical analysis of Biological Sciences reveals how scientists contributed to the discourse of segregation and racial hierarchization of human diversity. Gould (1978) reexamined the 19th-century research conducted by physician and scientist Samuel Morton regarding the size of human skulls. Morton claimed that the larger cranial volume supported the superiority of whites over Indigenous peoples and these over Blacks — an argument that gained significant traction. Gould, however, points out that Morton

distorted methods, data, and analyses to make the results support his racist discourse. More recently, Mitchell (2018), although noting problems in certain aspects of Gould's work, agrees that Morton's study was influenced by the slave-holding and colonialist context of the time."

There is an urgent need for science education to reveal and combat this and all forms of racism, even if this challenges curriculum norms of the discipline (Selles; Ayres; Benvenuto, 2021). Indeed, "learning beyond the dominant paradigm" that sustains racism and coloniality is a central part of Simas and Rufino's educational project" (2019, p. 54). In the Pedagogy of Crossroads, in particular, three political actions are discussed in education: transgression, transformation, and emancipation. Transgression of the Western canon towards the diversity of beings and knowledge would lead to the uneducation of the subject as a modern individual—egocentric and self-limited. Uneducation, in turn, would affirm commitment to the Other and the consequent awareness of the colonial burden. Thus, it would foster the desire to transform social reality in favor of emancipated existences, free "from racial confinement, deviation, and cognitive injustices" (Rufino, 2019, p. 11).

Some authors have proposed that to transform society towards effective human emancipation, education must elucidate social domination and alienation, assisting in the formation of a revolutionary critical consciousness (Ambrosini, 2012; Lima, 2016). This position aligns with Simas and Rufino's ideas about emancipation and social transformation in their pedagogical project, but it is transgression that the authors dedicate themselves to the most. Transgression, a hallmark of decolonial pedagogies (Mota Neto, 2018), appears in the Pedagogy of Crossroads with the usual character of insubordination to coloniality, but it is also potentiated as a quest for the vitalization of the world, which inevitably passes through its enchantment (Simas; Rufino, 2019). In a vitalized world, where ethics lead to openness to the Other and a sense of responsibility, peripheral subjects would no longer be closed in their own groups and existences but would compose with other subalternized collectivities in the pursuit of overcoming injustices.

On Theoretical-Methodological Principles

To promote the necessary enchantment for transgression, crossing is practiced as a theoretical-methodological perspective of the Pedagogy of Crossroads. However, let us be clear: crossing is not about exchanging one knowledge for another or placing them side by side in synthesis. Crossing breaks with binarism, weaving interculturalities; "it operates without the pretension of exterminating the other with whom it interacts, but rather of [...] traversing it, adding it as an accumulation of vital force" (Rufino, 2019, p. 18). And it is precisely as a dynamizer of new possibilities that crossing manages to mobilize *axé* towards the accumulation of life potency and, thus, promote enchantment.

However, to enchant through crossing is only possible in an educational project that accepts itself as unfinished and open to the unpredictable. It is essential for education to remain open to possibilities, to relinquish certainties (Simas; Rufino, 2019). Therefore, doubt plays a central role in the Pedagogy of Crossroads, less as "not knowing" and more as openness to the unpredictable adventures that promote invention and alternative paths (Rufino, 2019). With the permanent assertion of doubt, the aim is to break with the single truth and place the subject in a "tactical condition of ignorance", making them available to the unpredictable. Doubt challenges "from the limiting canon so that we have the conditions to broaden the horizons of the world, ours and those of our students" (Simas; Rufino, 2018, p. 19).

While doubt already plays an important role in science education based on modern science, since questioning is an intrinsic step to any scientific method, it still represents a path to truth, a certainty to be consolidated (Almeida, 2013). Pedagogies that aim to abandon the search for absolute truths — such as the Pedagogy of Crossroads and Coppi's Minor Pedagogy (2021) — must remain indifferent to certainty and exactness. Abandoning absolute truths paves the way for the diversity of existences — that are silenced in favor of certain certainties. "This does not mean total skepticism [...] leading us to an uncritical normalization of the flood of information and opinions from information technologies" (Coppi, 2021, p. 109).

Simas and Rufino (2018, p. 39) argue that this stance is not relativism but rather "problematicizing regimes of truth that are always maintained and operated at the expense of explanatory

diversities/possibilities”. Boaventura de Sousa Santos, in an interview with Manuel Tavares, responded to similar criticisms by saying that his proposal for epistemological pluralism does not fit into the postmodern relativism that sometimes denies the status of truth (Tavares; Santos, 2007). Similarly, addressing the opening of science education to ethnobotanical knowledge, Rebello (2019, p. 155) points out that advocating for other knowledge regimes “does not imply delegitimizing the role of science in producing verifiable knowledge, for example, to guide public policies.” This would be a reckless stance in times of fake news and post-truths. The intention is to “value the capacity of traditional knowledge, as a product of experience over generations under a particular culture, to capture” (Rebello, 2019, p. 155) aspects of reality that scientific knowledge does not reach. “If I want to go to the moon, I need scientific knowledge; but if I want to preserve biodiversity, I need indigenous and peasant knowledge” (Tavares; Santos, 2007, p. 134).

The Pedagogy of Crossroads, by conceiving education as a human phenomenon, places the teaching-learning process in interaction with the Other and their diversity, that is, in opportunities for elaboration and sharing of meanings among subjects (Simas; Rufino, 2019). Thus, dialogue constitutes a foundational principle of the Pedagogy of Crossroads. Influential authors in educational research — such as M. Bakhtin, L. Vygotsky, and Merleau-Ponty — already emphasize interaction with the Other as essential to the production and dissemination of knowledge (Guilherme; Morgan, 2020). In science education, incorporating dialogue into teaching practice would enable an environment conducive to doubt and reflection, stimulating the development of scientific competencies (Villani; Pacca, 1997). Simas and Rufino (2019) emphasize, however, that this dialogue cannot be sterile interaction, detached from reality, but rather associated with the ethical exercise of life; a constant movement of challenging the Other and responding to those who challenge us.

This observation recalls Paulo Freire's perception of dialogue. According to Muraro (2015), Freire conceives communicative interaction between subjects as an epistemological prerequisite for knowing, but also as a path to humanization: “dialogue is the bridge between the unfinished being and its more being” (p. 66). Dialogue also opens space for problematizing reality. If knowledge is built from interpellations between subjects, it is possible to develop a critical awareness of existence from them. Freire (1987) discusses the importance of recognizing the mechanisms of oppression that limit existence to develop a liberating praxis: the ability to “identify, criticize, and combat the forms cultivated and maintained by the dominant logic” (Simas; Rufino, 2019, p. 29), which is valued by the Pedagogy of Crossroads, emphasizing criticality as another foundation of the proposal.

Epistemological Scope and the Weaving of Interculturality

Western knowledge is aligned with normative certainty, and modern schools dedicate themselves solely to it. Through control, education frames any possibility of knowledge outside the Western spectrum as wrong. It teaches how to reproduce regulatory mechanisms that operate to legitimize only knowledge produced by modern science (Simas; Rufino, 2019). An example of this would be science education, which for decades cared little about students prior knowledge and cultural frameworks; the focus was on convincing students that the only legitimate way to produce knowledge was through the methods of modern science: “observe, define problems, seek means to solve them, interpret data, formulate generalizations” (Baptista, 2010, p. 684).

On the other hand, the Pedagogy of Crossroads recognizing the pluriversal dimension of knowledge, encourages the expansion of epistemological repertoire (Simas; Rufino, 2018). Seeking to transgress the regime that hierarchizes knowledge, it removes the status of superiority and purity from scientific knowledge to cross it with subalternized ways of knowing. This does not mean opposing science but implies establishing an epistemological model that interweaves different knowledges and ways of knowing. Mignolo (2017) relates this epistemic disobedience to the idea of border thinking — “thinking about exteriority, about the spaces and times that the self-narrative of modernity invented as its exterior” (p. 30)—and it is in the border zones created by crossing — times/spaces of mutual intelligibility, alterity, coexistence, and dialogue — that the power of the Pedagogy of Crossroads resides.

The intention to open educational space to knowledges that traditionally do not circulate within the realms of modernity relates to the debate on multiculturalism. Silva and Brandim (2008) trace the roots of multiculturalism to struggles for racial equality, which began questioning the influence of racism on social, political, and cultural issues. In the pedagogical field, this debate generates works that address the relationship between education, cultural diversity, and inequality, pressuring curriculum policies since the end of the 20th century (Canen, 2000, 2014). However, based on the concept of multiculturalism, there are divergent positions. Candau (2008), for example, criticizes assimilationist approaches that only seek to insert marginalized groups into dominant culture. The author, alongside Catherine Walsh, advocates for interactive multiculturalism (or interculturality): the interaction between cultures as a space for cultural exchange, conflict negotiation, and construction of common projects.

By proposing to cross epistemologies of distinct cultures, the Pedagogy of Crossroads positions itself as intercultural practice. Would it suffice then to integrate Indigenous and Afro-Brazilian knowledges into school scientific content? Simas and Rufino (2018) explain that including subalternized knowledges in curricula does not guarantee enchantment. If education remains normative and standardizing, guiding ways of life and reproducing hegemonic values, all the inventive, transgressive, and liberating potential of crossing will be suppressed. The account of a master invited to teach *jongo*³ corroborates this warning: "the school already had plans for me and wanted to place me a lot of time in each classroom, as they do with other certified teachers. And then I ask you, how do you do a round thing in a square place?" (Simas; Rufino, 2018, p. 75-76).

The symbolic opposition between the square of education and the roundness of culture illustrates the difficulty of connection between these dimensions of reality. Even when traditional knowledges reach the school, according to Simas and Rufino (2018, 2019), it is common for them to be approached superficially, without seeking, from legends and myths, to grasp the complexity of feeling-doing-thinking of these communities. Western thought, stemming from modern science, continues as the reference for legitimizing knowledge, worldviews, and reality itself. Interaction is hierarchized, denying the sophistication of subalternized cultures to treat them as folkloric peculiarities. Abib also shares this perspective (2006, p. 65): "the 'folklorized' way in which [...] manifestations of our popular culture are portrayed [...] is a clear example of the prejudices that persist [...], a legacy of Eurocentric rationality, which still influences the majority of formal education programs."

Leite (1999) discusses folklorization as "simplification through the election of certain stereotypes for exploitation" (p. 125), a strategy that reduces to the exotic to disqualify, "to make disappear the historical subjects of flesh and bone as claimants of a right" (p. 126). Folklorization has been a target of criticism in educational research for its role in perpetuating stereotypes about marginalized cultures. It is criticized, for example, that these cultures are mentioned only on symbolic dates (Gonçalves; Pereira, 2013); stereotyped as exotic "subcultures" of primitive peoples (Santana; Baibich-Faria; Pessoa, 2010; Silva, 2015); crystallized in an idea of pure and immutable essence (Gomes, 2003). These reductionist behaviors, according to Goiz (2017), only reinforce the myth of racial democracy.

For Canen, preventing multicultural education from essentializing ethnic-racial diversity requires "taking prejudice against those perceived as 'the other' as its main axis" (Canen, 2014, p. 93). In addition to combating discriminatory narratives, efforts should work so that racial identity is not treated as something fixed and homogeneous. The author suggests using "knowledge of rituals, recipes, festivals, and other cultural markers that distinguish various marginalized ethnic-racial identities" (p. 92) to avoid reducing cultural plurality to a generic Other. It is necessary to provide space for identities to be represented by their own subjects, having prominence to share "their life experiences, narratives, and sociocultural expressions" (Silva, 2015, p. 11). Simas and Rufino (2018) argue that education should allow the transgressive character of syncopated and crevice cultures to stimulate transgression in pedagogical practice, allowing itself to be

³ *Jongo* is a Brazilian cultural manifestation that combines dance, music, and ancestral traditions of African origin.

affected by the Other, making interculturality more of a shared experience than just an exercise in explaining the Other.

Epistemological Scope and Ontological Commitment

By credibilizing marginalized knowledges and cultures, beyond the strict epistemological question, crossing also acts in the existential reconstitution against the colonial burden. It starts from the premise that existence is a condition for knowledge, and in this sense, it would be impossible to dissociate the credibilization of subalternized knowledges from the credibilization of subalternized existences that constructed them. Thus, there is an ontological commitment in the epistemological repositioning of the Pedagogy of Crossroads, which, by recognizing the ethnic-racial dimension in knowledge issues, seeks to combat epistemological racism and promote the historical repositioning of the racialized Other. The idea is that the rescue of memory and ancestry combats disenchanting forgetfulness and provides subsidies for those whose existence was deprived by coloniality to reconstitute themselves as emancipated beings (Rufino, 2019).

The Pedagogy of Crossroads seeks, therefore, to oppose colonialism, which relegated non-Western peoples — especially those of African origin — to the epistemological and ontological sterility of the zone of non-being (Fanon, 2008). For Dantas and Silva (2016), African philosophical production after the independence struggles on the continent shared this same goal: "to rediscover their place in the world as subjects of intellectuality", "their place of speech (epistemological) and their self-esteem (ontological) in the modern world" (p. 47). They mention the efforts of Marcien Towa to criticize the monopoly of Ancient Greece and its "modern heirs" over Philosophy and Théophile Obenga's efforts to disseminate knowledge —physical, mathematical, astronomical, philosophical— produced in Ancient Egypt. These efforts complement legal determination to include Afro-Brazilian, African, and Indigenous histories and cultures in Brazilian education (Brazil, 2008), strengthening the anti-racist education struggle (Oliveira, 2014).

However, for epistemological plurality in schools to reverberate in the ontological problem, Simas and Rufino propose expanding the educational debate from the dimension of knowledge to the dimension of being and becoming. That is, education should not be limited to teaching content, but should also involve the "process of becoming" (Simas; Rufino, 2019, p. 48), should provoke students "towards other ways of being" (p. 31). According to the authors, education should foster the sociability of subjects within a framework of experiences that transit through other modes of being/knowing. Candau (2012) also points out that if education, concerned with deconstructing discriminations, besides combating the monocultural character of the curriculum, should stimulate the construction of cultural identities through systematic interaction with different subjects and communities, enabling access to other ways of being. In the Pedagogy of Crossroads, social experiences are means of communication and production of knowledge, memories, and affections (Rufino, 2019).

The valorization of everyday life drives education aiming to produce enchantment, intertwining the presence and knowledge of those who navigate scarcity to invent abundant life: "different modes of education, generated in the crevices and needs of invention of everyday life, highlight the potency of world knowledges" (Simas; Rufino, 2018, p. 46). The very use of the concept of informal education in educational research already denotes the formative value of spontaneous experiences in interaction with the community (Marandino, 2017). In intercultural education, experiences lived in everyday life are opportunities to access cultural plurality, expanding learning and sensitivity (Candau, 2016). In daily life, the complexity of the world is lived; the repetition of routine and the unknown of the unforeseen catalyze learning (Carvalho; Fochi, 2017). "One educates by playing on the street, turning into an animal, scribbling on walls, feeling pain, desire, and joy. One educates in festivities, in noise, in difference. (Simas; Rufino, 2019, p. 52).

ENCHANTED SCIENCE EDUCATION: AN UNFINISHED CONCEPT

Recognizing the influence of coloniality on science and science education (Dutra; Castro; Monteiro, 2019), as well as the harm caused by colonialist science, has motivated the search for decolonial possibilities (Silveira; Lourenço; Monteiro, 2021). There is a call to change the educational logic to construct a counter-hegemonic pedagogical project that denounces the inequalities caused by coloniality. This is a political practice that must learn from and dialogue with those who resist oppression, so that education itself can confront the status quo and contribute to building paths towards a just world (Dutra; Castro; Monteiro, 2019; Oliveira; Salgado, 2020; Caurio; Cassiani; Giraldi, 2021) — hence, an education that cannot be limited by Eurocentrism (Barbara; Carneiro, 2020; Araujo; Rocha; Vieira, 2021; Caurio; Cassiani; Giraldi, 2021). The Epistemology of *Macumbas* and the Pedagogy of Crossroads contribute to this goal:

education as a rise/enchantment of beings, as vital force and potency of transformation for those affected by the terror of cognitive/social injustices. Principle and invocation of responsibility towards life in all its diversity and as a form of "unlearning" the totalitarian onslaught employed by the model of production of scarcity and death (Simas; Rufino, 2019, p. 13).

At this crossroads between decolonial pedagogies and Brazilian *Macumbas*, the concept of enchanted science education is proposed: a project that, contrary to coloniality, combats modern disenchantment by committing to incompleteness, availability, dynamism, and vitality.

A premise of enchanted science education is to confront the idealization of the modern-capitalist world, exposing its crises and injustices. It is necessary to foster critical reading among individuals and stimulate their ethical sense so that they are capable of being disturbed by the dehumanization of self and the Other (Simas; Rufino, 2019). To counter coloniality, science education must be open to social, political, and cultural issues — especially those that affect the student (Nunes; Ribeiro, 2020; Schindwein; Padilha; Nascimento, 2020; Nunes; Giraldi; Cassiani, 2021).

A potential way to break through the veil of civility and progress of capitalist modernity would be to address issues such as: i) pollution, encroachment on indigenous/quilombola lands, and degradation of preserved areas by agribusiness, mining, and industry agents; ii) neglected diseases and lack of quality housing, especially with basic sanitation; iii) which countries and societal strata contribute most to environmental problems and which are most affected by them; and iv) food insecurity and lack of food sovereignty; among others. Themes like these — associated with the socio-environmental crisis — are strategic as they demonstrate how the capitalist system produces environmental degradation and social inequality (Silva; Gennari, 2020).

The decolonial effort also needs to alter practices that reinforce the exclusion of marginalized groups by erasing/discrediting their knowledge and ways of knowing (Caurio; Cassiani; Giraldi, 2021). The monopoly of modern science on the legitimacy of knowledge reinforces disenchantment (Simas; Rufino, 2018), and overcoming it by allowing space for doubt is a goal of enchanted science education. For this, it is important to work with contemporary views of Philosophy of Science that deconstruct the positivist imaginary responsible for situating scientific knowledge as the result of a single, objective, and impersonal method (Nouvel, 2013). We must also highlight, as Sociology of Science warns, that science and technology are sociocultural products, removing their aura of neutrality to show how they influence and are influenced by society (Chrispino, 2017). This influence can be illustrated by the History of Science both in moments when scientific discourse supported discriminatory — especially racist — initiatives and in situations where modern science appropriated knowledge produced by groups now marginalized (Rosa; Alves-Brito; Pinheiro, 2020). Decoloniality requires showing that other cultures are also knowledge producers and contributed to contemporary scientific knowledge (Barbara; Carneiro, 2020; Araujo; Rocha; Vieira, 2021; Caurio; Cassiani; Giraldi, 2021).

Another aspect of enchanted science education is the critical weaving of interculturality, recalling what Candau (2008) and Walsh (2009) indicated. According to these authors, promoting dialogue between groups and cultures requires considering the power relations that act on reality. In the proposal of enchanted

science education, the importance of problematizing capitalist society and the monopoly of science as assumptions for interculturality to weave horizontal relationships stands out. The risk that interaction between cultures in school settings may be hierarchized suggests the need to remove occidentalism (capitalism, modernity, science) from its mythical position of superiority so that interculturality can be established. The integrity of these cultures must be respected, addressing them as complex worldviews (Rufino, 2019). Thus, interculturality can realize its potential to credentialize other ways of knowing, being, and seeing in the world, contributing to the rescue of subalternized populations as legitimate producers of knowledge and ways of life — not as exotic or folkloric (Simas; Rufino, 2018, 2019).

Enchanted science education cannot simply weave interculturality from untouched traditions, as romanticized portraits of the past would contradict its dynamism: something stuck in time is not open to dialogue. Without dynamism, there is no enchantment (Simas; Rufino, 2019). On the contrary, enchanted science education draws its driving force from the knowledge produced by Brazilian *Macumbas*: a variety of subaltern expressions rooted in ancestral memory (referring to other epistemologies, ontologies, and worldviews), constantly negotiating with colonial oppression, producing plural and cosmopolitan knowledge, crossing African, Indigenous, and European influences (Simas; Rufino, 2018).

Multicultural education could, therefore, liberate itself from the folkloric quest for ideally pure cultures and from the essentialized notion of what it means to be indigenous, African, or Afro-Brazilian. Enchanted science education promotes interculturality without filtering traditional culture to select only what is deemed essentially theirs. Instead, it sees epistemological and pedagogical potential in their crossroads, where different worlds intersect. This approach extends the scope of dialogue beyond traditional communities narrowly defined as isolated societies, reaching groups with a higher degree of cultural hybridization — even in urban contexts. From Brazilian *Macumbas*, we observe the potential for enchantment everywhere life is invented to transgress the colonialist policy of death (Simas; Rufino, 2018).

Futata (2021) addresses various cultural manifestations — such as "capoeira, congado, boi, jongo, maracatu, tambor de crioula" (p. 187) — that perform, in Brazil, an African worldview intertwined with Indigenous and European elements. Valle and Conduru (2022, p. 108), on the other hand, discuss an artistic production that "whether criticizing the economies of the transatlantic slave trade and the legacies of colonialism [...] or celebrating the cultural achievements [...] of African origin," articulates varied influences in a complex process of creation in the face of the diaspora experience. Funk music (Pereira, 2013), Afro blocos in Bahia's carnival (Silva, 2018), and samba schools (Santo, 2016) can also be mentioned as productions of Brazilian cultural history gestated in the crossings of African ancestry on Brazilian soil. In terms of religiosity, Candomblé, Umbanda, Santería, and Vodou are examples of socialities built at the crossroads of traditions from African ethnicities, Indigenous peoples, and colonizers, which act "not only through rituals or dogmas but are fundamental to the understanding of individuals' subjective construction" (Hortegas, 2020, p. 145). Any Brazilian project that intends to counter coloniality must have its roots in these and other efforts of resistance and re-existence of Afro-diasporic, African, Indigenous, and peripheral populations (Bernardino-Costa; Maldonado-Torres; Grosfoguel, 2018).

But which elements of these cultures would reach the classroom with the aim of promoting enchantment? In the field of science education research, there are ongoing efforts that, starting from multiculturalism (Rebello, 2019) or decoloniality (Silveira; Lourenço; Monteiro, 2021), emphasize the importance of traditional and popular knowledge being included in schools — something essential to enchanted education. However, it is important to note that this knowledge does not enter formal education to be validated by scientific knowledge (Caurio; Cassiani; Giraldo, 2021); its legitimacy does not come from explanations, but from practice (Simas; Rufino, 2018). Nor should it be restricted to a utilitarian view. It is common, for example, for ethnobotanical knowledge in education to be thought of as the uses that traditional peoples make of plants. This approach risks reducing the complexity of the group's culture and distorting their worldview to fit the utilitarianism of Western perceptions of nature (Rebello, 2019).

Traditionally, scientists in this field act as subjects who analyze an object from which they are dissociated (nature). They often seek to deconstruct nature in a controlled environment (laboratory) to find the general laws that govern it and then translate them into mathematical language. Along this line, inherent

human issues such as culture would not fall within the scope of the natural sciences, since humanity would be considered separate from nature (Veltrone, 2013). Both decolonial propositions and the cosmologies of traditional peoples provoke questioning of this modern division between nature and culture, shifting the view from "nature as an external and manageable domain, available to humans" (Süssekind, 2018, p. 244) to a much more fluid perception of the relationships between the human and the non-human, the natural and the cultural. Science education aligns with this conceptual shift that broadens the conception of nature and considers complex reality as its object. In this context, it is not possible to establish boundaries between the human and the natural. Humanity exists as an interdependent part of nature, and it is through humanity that nature gains its symbolic existence:

the forest is a dwelling, where ancestors inhabit mango trees, vines, and gameleiras. In the springs, young women rest, in the shells and grains of sand, mischievous boys wade. Across the fields and hinterlands, brave men drive herds. Healing comes through puffs of smoke from pipes, through herbal blessings with sprigs of rue, and prayers etched in the meaning of rosaries (Simas; Rufino, 2018, p. 13).

Ethnoknowledge, therefore, should propose in the enchanted science teaching not as isolated information about a particular organism or territory, but as part of a network of symbols and narratives that, in their entirety, reflect a way of understanding the world and living in it. Myths, as references for man's existence in his world (Hampâte Bâ, 2010), can constitute pedagogical paths; not treated as exotic discourses, but, for example, as a discursive basis for different ways of relating to nature (Meneses, 2019). Thus, it would be possible to perceive that the "ecologism" commonly attributed to indigenous peoples involves not only knowledge and techniques, but also their own worldviews (Bédard, 2015). The concept of *axé* and its dynamics is also a possible approach to education (Rufino, 2019), especially for science education, as it allows working from the idea of interrelation within an ecosystem to notions of ethics.

We reiterate, however, that it is not necessary to restrict ourselves to myths. The knowledge of Brazilian *Macumbas* lies in knowledge and techniques, utensils and tools, adornments and costumes, festive practices and sacred rites. The essential aspect for enchanted science teaching is that the approach to these elements allows for crossings (Rufino, 2019), the crossing of boundaries between different elements to create something new. Everyday life itself is recognized as an educational force by the Pedagogy of Crossroads, especially because the crossing occurs not only between knowledge, but also between ways of experiencing reality. Thus, in enchanted science teaching, as important as the diversity of knowledge is the diversity of experiences. Providing students, especially in a playful manner, with the transgression of their experience of time and space through crossing; allowing mind and body to experience the world as Others do. Play, dance, and other performative practices are possibilities.

However, interculturality also allows for the presence of bodies in culture. Thus, enchanted science teaching seeks to deconstruct stereotypes and essentialisms; to show the Other as a living being, constituted from ancestry and life's crossroads, unfinished, dynamic, so that students too perceive the dynamism of their own sociocultural identities, opening to enchantment.

CONCLUSIONS

But after all, what would an enchanted science education be? Although science education historically has had different social functions, ranging from technical qualification to a vague preparation for citizenship (Krasilchik, 2000), this article emphasizes the enchanted education that turns the school into a crossroads between biodiversity and cultural diversity. It is hoped that from this ethical encounter with the Other emerges a concern about the injustices perpetrated by coloniality and that the urgency for a new social, political, and economic configuration becomes even clearer.

It is evident that assuming such a commitment requires a repositioning of the teacher and the school. In recent decades, technological advances have already reinforced earlier debates about the need for schools to move away from being spaces for knowledge accumulation through memorization, and for teachers to move away from being mere transmitters of information. Generally, there is talk of teachers acting as mediators in the teaching-learning process (Ferreira; Souza, 2010). In enchanted science education, this mediating action is highlighted as promoting crossings. In this sense, the teacher also acts as a promoter of crossings between their students and other places, times, landscapes, bodies, knowledges, practices... It is not about denying the importance of education encompassing the sociocultural universe of the students themselves, embracing their knowledge and consolidating their identities, but rather pointing out the transgressive power of a school where the identity of individuals is vitalized through dialogue with alterity.

However, it is necessary to recognize that enchanted teaching brings challenges. Based on the theoretical study of works by L. A. Simas and L. Rufino and literature on decoloniality, principles were listed that are fundamental to guide the construction of enchanted science education and elucidate the possible paths that can lead to its realization. At this initial stage, criticism of the idealization of capitalist modernity, questioning the monopoly of modern science, and the crossing between school scientific knowledge and the cultural plurality of Brazilian *Macumbas* constitute priority actions to combat the effects of colonialities through enchanted science education.

However, many questions still require answers: do curriculum standards allow for these approaches? What didactic strategies, within the conditions of Brazilian public schools, can realize the potential of enchanted science education? How to implement a proposal so rooted in African ancestry in a scenario of resurgence of conservatism and religious racism? How can enchanted science education be revitalized through encounters with organized groups of civil society (social movements, professional associations, political groups, etc.)?

Further research is suggested to answer these and other questions. It seems clear that attempting to define enchanted science education or propose an exact characterization of this concept—which is more utopian than prescriptive—would flirt with disenchanting academicism, thus detracting from the intention to open and occupy cracks in coloniality. It remains an unfinished idea. This is because, instead of enclosing it in an ambition for completeness, gaps remain so that the idea is available to the unpredictable, so that it can be affected by the Other in its diversity. Let them stretch, tie, and release ends again, enriching the proposal with their knowledge-experiences.

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3.5

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