Addressing ethnic and racial issues in the curricula of Natural Sciences degree programs at IFRN

Rusiane da Silva Torres[i]
Federal Institute of Rio Grande do Norte, Ipanguaçu, RN, Brazil

Izabel Cristina Leite de Lima[ii]
Federal Institute of Rio Grande do Norte, Ipanguaçu, RN, Brazil

Sandra Maria Campos Alves[iii]
Federal Institute of Rio Grande do Norte, Ipanguaçu, RN, Brazil

Abstract
The valorization of European knowledge has led to the silencing of African and Afro-Brazilian history and culture in school curricula. This article analyzes the inclusion of ethnic-racial issues in the curricula of undergraduate courses in the Natural Sciences offered by the Federal Institute of Education, Science, and Technology of Rio Grande do Norte. The research stems from the need to comply with public policies based on cultural diversity, such as Law No. 10,639/2003, which establishes the mandatory inclusion of Afro-Brazilian and African history and culture in school curricula. Through a documentary and bibliographic analysis, the study examines how these themes are included in the curricula of undergraduate courses in Biology, Physics, and Chemistry, discussing the challenges and potential of promoting anti-racist and inclusive education. Bardin's (2020) content analysis was used in the data analysis. The results show that, although there have been advances in the implementation of these policies—such as an increase in training activities and teaching materials on diversity—gaps still persist, especially in teacher education. This reinforces the need to prepare teachers who are critical and committed to valuing ethnic and racial diversity in everyday school life.

Keywords
initial teacher education; ethnic-racial issues; teaching; Natural Sciences.

A abordagem das questões étnico-raciais nos currículos das licenciaturas em Ciências da Natureza do IFRN

Resumo
A valorização dos conhecimentos europeus promoveu um silenciamento da história e da cultura africana e afro-brasileira nos currículos escolares. O presente artigo analisa a inclusão das questões étnico-raciais nos currículos dos cursos de licenciaturas das áreas de Ciências da Natureza ofertadas pelo Instituto Federal de Educação, Ciência e Tecnologia do Rio Grande do Norte. A pesquisa parte da necessidade de atender às políticas públicas pautadas na diversidade cultural, como a Lei nº 10.639, do ano de 2003, e estabelece a obrigatoriedade da inclusão da história e cultura afro-brasileira e africana nos currículos escolares. Por meio de uma análise documental e bibliográfica, o estudo examina como essas temáticas estão inseridas nas matrizes curriculares das licenciaturas em Biologia, Física e Química, discutindo os desafios e as potencialidades de promover uma educação antirracista e inclusiva. A análise de conteúdo de Bardin

Esta obra está licenciada com uma Licença Creative Commons Atribuição 4.0 Internacional.

(2020) foi utilizada na análise dos dados. Os resultados evidenciam que, embora haja avanços na implementação dessas políticas – como o aumento de ações formativas e materiais didáticos sobre diversidade –, ainda persistem lacunas, especialmente na formação docente. Isso reforça a necessidade de preparar professores críticos e comprometidos com a valorização da diversidade étnico-racial no cotidiano escolar.

Palavras-chave
formação inicial; questões étnico-raciais; ensino; Ciências da Natureza.

El enfoque de las cuestiones étnico-raciales en los programas de licenciatura en Ciencias Naturales del IFRN

Resumen
La valorización de los conocimientos europeos ha llevado al silenciamiento de la historia y la cultura africana y afrobrasileña en los planes de estudio escolares. Este artículo analiza la inclusión de cuestiones étnico-raciales en los planes de estudio de las licenciaturas en Ciencias Naturales ofrecidas por el Instituto Federal de Educación, Ciencia y Tecnología de Rio Grande do Norte. La investigación surge de la necesidad de cumplir con las políticas públicas centradas en la diversidad cultural, como la Ley nº 10.639/2003, que establece la obligatoriedad de la inclusión de la historia y la cultura afrobrasileña y africana en los currículos escolares. A través de un análisis documental y bibliográfico, el estudio examina cómo estos temas están incorporados en las matrices curriculares de las licenciaturas en Biología, Física y Química, discutiendo los desafíos y las potencialidades de promover una educación antirracista e inclusiva. Para el análisis de los datos, se utilizó el análisis de contenido de Bardin (2020). Los resultados evidencian que, aunque existen avances en la implementación de estas políticas – como el aumento de acciones formativas y de materiales didácticos sobre diversidad –, aún persisten vacíos, especialmente en la formación docente. Esto refuerza la necesidad de preparar profesores críticos y comprometidos con la valorización de la diversidad étnico-racial en la vida cotidiana escolar.

Palabras clave
formación inicial; cuestiones étnico-raciales; enseñanza; Ciencias Naturales.

1 Introduction

Historically, the Brazilian educational system has silenced the contributions of African peoples in school curricula, reflecting the process of colonization and the formation of the country, marked by slavery. According to Santos and Lucini (2022), the enslavement of African peoples in Brazil led to the inferiorization of black culture, and the racial hierarchy that prevailed during the colonial period continued in full force, even after the abolition of slavery in 1888. In this context, black men and women were excluded from two important forms of social advancement: education and the labor market.

Esta obra está licenciada com uma Licença Creative Commons Atribuição 4.0 Internacional.

Educational institutions predominantly offer a Eurocentric curriculum, based on the valorization of European customs, which minimizes or omits the contributions of African and indigenous peoples. By privileging a single culture, this model of education contributes to the reproduction of racial stereotypes and the exclusion of the recognition and appreciation of African history and culture within the history of Brazil (Gomes, 2012).

Costa (2023) points out that, in order to construct a dominant culture, the rights and lives of other peoples were subordinated; that is, in order for a Eurocentric curriculum to predominate in schools, African and indigenous peoples were silenced and reduced to the status of colonized peoples.

Given this scenario, in 2003, Law No. 10,639 was passed, amending the Law of Guidelines and Bases for National Education (LDBEN), Law No. 9,394/1996, making the teaching of Afro-Brazilian history and culture mandatory in the school curriculum. The law was amended in 2008 by Law No. 11.645, with the inclusion of the teaching of the history and culture of indigenous peoples. The enactment of this law represented an important milestone in the quest for inclusion and appreciation of ethnic and racial diversity in the Brazilian educational system (Brazil, 2003).

Law No. 10,639, dated January 9, 2003, establishes that the study of African and African-Brazilian history must include topics such as the struggle of Black people in Brazil, Black Brazilian culture, and the role of Black people in the formation of Brazilian society, recognizing their contributions in the social, economic, and political spheres. This content must be addressed throughout the school curriculum, with an emphasis on the areas of Art Education, Brazilian Literature, and Brazilian History. This law was subsequently amended by Law No. 11,645/2008, which expanded the requirement to also include the study of the history and culture of indigenous peoples, reinforcing the importance of an education committed to ethnic and racial diversity and the appreciation of the identities that make up Brazilian society (Brazil, 2003, 2008).

However, more than two decades after the enactment of Law No. 10,639/2003, numerous challenges remain for its effective implementation in the field of education. These challenges are not limited to teacher education programs. As pointed out by Pereira *et al.* (2019), the difficulty in applying the law manifests itself in different stages and areas of education, ranging from a lack of adequate teacher education to a shortage

Esta obra está licenciada com uma Licença Creative Commons Atribuição 4.0 Internacional.

of teaching materials that address ethnic-racial relations in a critical manner and integrated into the curriculum. The authors also highlight institutional resistance, the absence of public policies to monitor implementation, and the tendency to treat the topic in a sporadic manner, generally restricted to commemorative dates, which weakens its presence in everyday school life. This scenario reinforces that the problem is structural, permeating the entire organization of Brazilian education.

In the case of Natural Science degrees, these limitations are exacerbated by the almost complete absence of discussions on the contributions of African and Afro-Brazilian peoples to areas such as Biology, Physics, and Chemistry, which maintains the invisibility of knowledge and trajectories that are fundamental to understanding the very construction of scientific knowledge. Thus, the problem addressed by this research is to answer: how are ethnic-racial issues addressed in the curricula of Natural Sciences degree programs at the Federal Institute of Education, Science, and Technology of Rio Grande do Norte (IFRN)?

The objective is to analyze how ethnic-racial issues are included in the curricula of Natural Science degree programs offered by the IFRN, focusing on the subjects (compulsory and optional) and pedagogical practices that address or fail to address topics related to ethnic-racial issues.

In terms of its organization, the article is structured into sections that, in a coordinated manner, seek to achieve the proposed objective. First, the theoretical framework on higher education curricula and ethnic-racial issues is presented. In the following section, the methodology used to analyze the IFRN's teaching degree curricula is detailed. Finally, the research discusses the results found, reflecting on the advances and challenges in the implementation of Law No. 10,639, as well as on the role of undergraduate programs in training critical teachers committed to anti-racist education.

2 Rethinking curricula: ethnic-racial issues in initial teacher education

The curriculum plays an important role in educational issues. Macedo (2006) presents an intrinsic relationship between curriculum, power, culture, and politics and understands that colonialism, in addition to political and economic domination in the early

Esta obra está licenciada com uma Licença Creative Commons Atribuição 4.0 Internacional.

centuries of Portuguese rule in Brazil, also resulted in cultural domination, which was strongly reproduced in school curricula. The author points out that:

> I believe it is possible to approach curricula from a postcolonial perspective, insofar as I do not understand colonialism as political and economic domination, but fundamentally as a cultural process, as an attempt to spread a single legitimate form of meaning creation throughout the world. In this sense, our curricula are also a place-time in which this form is experienced, as are cultural artifacts such as books, films, and works of art (Macedo, 2006, p. 105).

With regard to culture, the author argues that it should be seen as a compilation of shared meanings, produced inside and outside the school space, so differences must be discussed. In this sense, the "[...] curriculum would be a space-time for interaction between cultures" (Macedo, 2006, p. 106), so the school curriculum should act from a multicultural perspective.

Studies on multiculturalism in the classroom refer us to post-critical theories of curriculum. Curriculum theories deal with the function of the curriculum in the educational context. They are divided into traditional, critical, and post-critical (Silva, 2007). Post-critical theories of the curriculum brought to the classroom themes and subjects that had previously been silenced and made invisible as a result of a Eurocentric curriculum.

Regarding multiculturalism, Silva (2007) argues that it is a legitimate movement for the vindication of dominated cultural groups, and therefore constitutes an important instrument of political struggle. Within school curricula, multiculturalism proposes, for example, the inclusion of new subjects and themes, such as the history and culture of African and Afro-Brazilian peoples.

In higher education, there is a clear need for a curriculum based on multiculturalism, whose purpose is to promote anti-racist education. According t ccording to Gomes (2012, p. 100), after Law No. 10,639/2003, curricular changes were necessary in both basic education and higher education:

> Changes in practices and decolonization of basic and higher education curricula in relation to Africa and Afro-Brazilians. Changes in representation and practices. It requires questioning the places of power. It questions the relationship between rights and privileges rooted in our political and educational culture, in our schools, and in the university itself.

Esta obra está licenciada com uma Licença Creative Commons Atribuição 4.0 Internacional.

Regarding the effectiveness of the law in higher education, Silva and Portela (2022) point out that ethnic-racial relations are included in the curriculum only for legal reasons, but debates on the subject tend to be omitted from initial and continuing teacher education courses. Thus, for the authors, it is necessary to break with "[...] the model of technical rationality, which plagues teacher education curricula and aims [*sic]* at training that values [*sic]* dialogue between school, curriculum, and social reality" (Silva; Portela, 2022, p. 11).

According to Melo and Souza (2025), Law No. 10,639/2003 represented a historic achievement and a fundamental milestone in the field of education for ethnic-racial relations in Brazil. Its enactment signified official recognition of the importance of including Afro-Brazilian and African history and culture in the school curriculum, promoting a more pluralistic, democratic education committed to valuing diversity.

In this sense, although it has not yet achieved full effectiveness in school curricula, its enactment represents an important step forward in addressing racial inequalities in the field of education. As Gomes (2012) argues, the mandatory inclusion of the study of African and Afro-Brazilian history and culture is a significant step toward breaking with the homogenizing view that has historically guided school and university curricula.

In the same vein, Silva and Portela (2022) affirm that, more than curricular changes, structural, conceptual, epistemological, and political transformations are necessary to reposition ethnic-racial relations as a constitutive dimension of teacher education and knowledge production.

Gomes (2021, p. 447) emphasizes that, in addition to the inclusion of ethnic-racial issues in school curricula, it is necessary to decolonize minds, given that, according t , combating racism in society and, in particular, in basic education and higher education, does not depend solely on a "[...] process of transformation or identity affirmation of black people. It also involves the reconstruction of the racial identity of white people," that is, it is essential that white people adopt an anti-racist political and personal stance as the minimum necessary when rethinking their place in the hierarchy of power and in the social context.

Esta obra está licenciada com uma Licença Creative Commons Atribuição 4.0 Internacional.

Regarding the decolonization of the whiteness mind and behavior, Bento (2022) emphasizes that this practice still faces strong barriers in contemporary society, since racial privileges remain naturalized and institutionalized in social and educational structures. The author points out that whiteness operates not only as a racial identity, but as a place of symbolic, economic, and epistemic power, sustained by a system that legitimizes certain forms of knowledge and being to the detriment of others.

3 Methodology

This study is characterized as qualitative research, exploratory and descriptive in nature, based on documentary and bibliographic analysis. It seeks to understand the presence and treatment given to ethnic-racial themes in curricular documents, considering not only the formal existence of content, but also the way in which it is structured and addressed within the Natural Sciences degree courses at IFRN.

Law No. 11,892, dated December 29, 2008, created the Federal Institutes (IFs), which are part of Brazil's Federal Network of Professional, Scientific, and Technological Education. IFs are higher education, basic, and professional institutions, with multiple curricula and *campuses,* specializing in offering professional and technological education in different teaching modalities, based on the combination of technical and technological knowledge with their pedagogical practices. Thus, they play a fundamental role in the qualification of professionals, offering courses that meet the demands of education and the labor market (Brazil, 2008).

The IFRN consists of a Rector's Office and 22 *campuses* distributed throughout all regions of the state of Rio Grande do Norte, namely: Apodi, Caicó, Canguaretama, Ceará-Mirim, Currais Novos, Ipanguaçu, João Câmara, Jucurutu, Lajes, Macau, Mossoró, Natal - Central, Natal - Cidade Alta, Natal - East Zone, Natal - North Zone, Nova Cruz, Parelhas, Parnamirim, Pau dos Ferros, Santa Cruz, São Gonçalo do Amarante, and São Paulo do Potengi.

Among the various educational offerings at these *campuses*, the degree courses stand out, responsible for training teachers in different areas of knowledge. It is in this context that the degree course in Biological Sciences, offered at *the* Macau *campus*, fits

Esta obra está licenciada com uma Licença Creative Commons Atribuição 4.0 Internacional.

in, whose objective is to train teaching professionals with diverse knowledge, focused on teaching, research, and extension in Biology, “[...] seeking the understanding, interpretation, and sociocritical evaluation of the various methods and technological innovations related to the teaching of Biology, from the perspective of the articulation between theory and practice” (IFRN, 2018a, p. 9).

The bachelor's degree in Physics is offered in Caicó, João Câmara, Natal (central), and Santa Cruz and has the central objective of training teachers who are involved in the formation and dissemination of knowledge of Physics "[...] in different social contexts, in formal education or through informal education, in science museums or similar institutions, in addition to being able to coordinate activities to popularize Physics" (IFRN, 2019, p. 13).

The bachelor's degree in Chemistry seeks to train teachers to fully exercise their profession in basic education. In addition, they can work in the area of "[...] chemical analysis and quality control, both in the development of new analytical methods and in the operation of equipment. They may also engage in academic research aimed at generating new knowledge, teaching materials, and methodologies” (IFRN, 2018b). The course is offered at the Apodi, Currais Novos, Ipanguaçu, and Pau dos Ferros *campuses*.

Data collection was carried out through documentary analysis. According to Lüdke and André (2015), documentary analysis seeks to identify factual information in documents based on questions or hypotheses of interest to the researcher. The documentary search was carried out in the political projects of the undergraduate courses in Biology, Physics, and Chemistry. In addition, a bibliographic review was carried out based on books, scientific articles, and official documents that discuss the inclusion of ethnic-racial issues in the teaching of Natural Sciences and in teacher education.

The Biology and Chemistry courses at IFRN underwent changes in 2018, while the Physics course underwent changes in 2019. The Course Pedagogical Projects (PPCs) for these courses have similar elements and are divided into sections, some of which have subsections. The common sections are: presentation; course identification; justification; objectives; requirements and forms of student access; professional profile upon course completion; course curriculum organization; curriculum guidelines and pedagogical procedures; inclusion, diversity, and comprehensive training;

Esta obra está licenciada com uma Licença Creative Commons Atribuição 4.0 Internacional.

methodological indicators; learning assessment criteria and procedures; course and PPC assessment criteria; criteria for academic achievement and knowledge certification; facilities and equipment; teaching and technical-administrative staff profile; certificates, diplomas, and references.

The documents were analyzed using content analysis techniques, as proposed by Bardin (2020), identifying the presence (or absence) of themes related to ethnic and racial diversity in the curricula of the degree programs. The analysis was structured into three main categories, established a *posteriori*, i.e., defined after reading and analyzing the material.

Content analysis consists of a set of techniques used to examine and interpret a set of data (Bardin, 2020). Categorization, in turn, is an operation of classifying elements with similar content. Thus, classifying elements into categories “[...] requires investigating what each of them has in common with the others. What will allow them to be grouped together is the commonality that exists between them” (Bardin, 2020, p. 146).

4 Results and discussions

The categories were chosen after reading and analyzing the documents. The first category, *the presence of ethnic-racial content in the subjects*, seeks to analyze the subjects that have some relation to ethnic-racial issues. The second category, *Neabis as spaces for valuing ethnic-racial diversity in education,* discusses the role of the Afro-Brazilian and Indigenous Studies Centers (Neabis) within the PPCs. To this end, an analysis of section 8 of the PPCs was carried out. Finally, the third category, *Emancipatory education,* seeks to examine the critical training of education professionals, identifying elements that can provide support so that, in the future, these professionals promote teaching based on respect and appreciation of differences.

4.1 Presence of ethnic-racial content in subjects

Section 6 of the PPCs, "Curricular organization of the course," is intended to present the pedagogical proposal of the course, as well as its structural organization.

Esta obra está licenciada com uma Licença Creative Commons Atribuição 4.0 Internacional.

Here, each course presents its curriculum matrix and the syllabi of the compulsory and elective subjects that comprise it. Compulsory subjects are those that all students must take in order to complete the course, as they are fundamental to academic and professional training. Elective subjects, on the other hand, are those that students can choose according to their interests and areas of specialization. These subjects allow students to broaden their education according to their area of interest (Ferreira; Santos, 2024).

African and Afro-Brazilian culture is included in the syllabus of the Epistemology of Science course, a compulsory subject in the three courses surveyed, specifically in the topic "African Epistemology." This content allows for reflection on the modes of knowledge production of African peoples, highlighting, above all, the importance of ancestral knowledge and the contributions of African intellectuals to the construction of scientific thought. Here, the teacher can promote debates based on the appreciation of traditional African customs.

Xavier, Sousa, and Melo (2019) discuss the preservation of traditional knowledge within the teaching of Natural Sciences. For the authors, “[...] the inclusion of traditional knowledge linked to scientific knowledge is considered a viable method in the classroom, however, it needs to be clearly explained so as not to generate doubts in learners” (Xavier; Sousa; Melo, 2019, p. 221).

In the Chemistry course, ethnic-racial issues are present in the compulsory subject Psychology of Learning, specifically in the content topic on new social and family arrangements and their implications in school. This topic should promote discussions on various aspects of diversity, including ethnic-racial diversity, gender diversity, sexual diversity, religious diversity, and age diversity. The guidelines on gender and diversity in schools, present in the document *Training of teachers in gender, sexuality, sexual orientation, and ethnic-racial relations* (Pereira *et al.,* 2007), prepared by the federal government, are part of the mandatory bibliographic references for the subject.

The Human Rights Education course is an elective course in the three programs studied. Its objective is to promote reflection on the importance of fundamental rights and diversity in teacher education. The course syllabus highlights the topic “Human rights, education for diversity, and inclusive education,” which seeks to address the development

Esta obra está licenciada com uma Licença Creative Commons Atribuição 4.0 Internacional.

of teaching practices based on respect for differences, equity, and the appreciation of cultural identities in Brazil. In this sense, the course aims to discuss the role of the school as a democratic and multicultural space, in which human rights education becomes essential to combat any inequalities, whether social, ethnic-racial, or gender-based.

The Education for Diversity course is also offered as an elective within the Physics and Chemistry programs. The course aims to discuss:

> Public policies on gender and diversity education; Schools as sociocultural spaces: ethnic-racial relations, sexuality, and sexual orientation; teacher education and teaching for gender and diversity; Pedagogical practice and access to knowledge from the perspective of the principle of education for all (IFRN, 2018b, p. 121).

The syllabus for the course includes: gender and diversity, sexuality, sexual orientation, rights and education, ethnic-racial relations, legislation and public policies on education for diversity, teacher education and teaching with a focus on diversity and education for all.

Ferreira and Santos (2024, p. 188) argue that, although the course is optional, when offered, it seeks to promote a debate on diversity in society and, consequently, in schools:

> Reflection on the teaching of ethnic-racial relations in teacher education courses is relevant, because, as a space for teacher education, it becomes a space conducive to discussions motivated by legal mechanisms, public policies of affirmative action, and the social demands of the black population, as well as for the exercise of educational practices that enable future teachers to understand the relevance of valuing Afro-Brazilian and African history and culture for the construction of black identities.

Thus, the lack of consistent discussions on ethnic-racial relations in teacher education courses reflects a structural weakness in the implementation of Laws No. 10,639/2003 and No. 11,645/2008. It is not just a matter of a lack of content, but of a curriculum that keeps these themes on the periphery, often limited to elective courses or specific approaches, without making them an integral part of the training. As Pereira and Venâncio (2021) point out, this invisibility of African and indigenous cultural expressions and knowledge reveals a historical resistance to recognizing their legitimacy and epistemological complexity, which contributes to the reproduction of a Eurocentric view of knowledge and the body in teaching. In addition, the authors observe that pedagogical

Esta obra está licenciada com uma Licença Creative Commons Atribuição 4.0 Internacional.

practices still treat these manifestations as exotic or folkloric, reinforcing stereotypes and distancing them from critical and scientific treatment.

Thus, the persistence of curricula that do not organically integrate these dimensions results in teachers who are insufficiently trained to apply the legislation in its entirety, compromising the effectiveness of educational policies aimed at valuing ethnic and racial diversity and deconstructing structural racism in schools (Pereira; Venâncio, 2021).

4.2 Neabis as spaces for valuing ethnic and racial diversity in education

The PPCs highlight the need to train professionals committed to inclusion and diversity, thus providing support for comprehensive training. From this perspective, the section "Inclusion," diversity, and comprehensive training is present in the three PPCs analyzed. The documents emphasize the need for training educators who “[...] promote reflection, aiming to raise awareness and knowledge of the importance of individuals’ participation in society” (IFRN, 2018b, p. 40).

With regard to diversity, the IFRN *campuses* have the presence of Neabi, a working group responsible for promoting actions in the areas of teaching, research, and extension that promote the effectiveness of Laws No. 10,639/2003 and No. 11,645/2008 and other related legal instruments.

Among Neabi's objectives are: to propose and develop activities based on ethnic-racial issues; to raise awareness and bring together researchers, teachers, technical-administrative staff, students, representatives of related entities, and others interested in the theme of ethnic-racial relations; to collaborate and promote, through partnerships, strategic actions in the field of initial and continuing training of professionals in coordination with the state's education systems; to broaden the debate and scope of affirmative action and racial equality policies, as well as to produce and disseminate knowledge on ethnic-racial relations among educational institutions, organized civil society, and the general population (IFRN, 2018b). It is composed of representatives of technical and administrative staff, teachers, students, and social movements.

Esta obra está licenciada com uma Licença Creative Commons Atribuição 4.0 Internacional.

For Nascimento (2023), Neabis are essential within higher education institutions, as they recognize and value different peoples and cultures. However, for their implementation to result in anti-racist education, it is essential to guarantee resources that enable the development of projects, as well as the continuing education of teachers and other employees of educational institutions.

Ferreira and Santos (2024, p. 190) highlight the importance of Neabis within Federal Institutes of Education, especially on *campuses* that offer degree courses in the area of Natural Sciences, since the work of Neabi "[...] helps to demystify the idea that subjects such as Chemistry are just numbers and formulas, showing their connection with social and cultural contexts."

The presence of Neabis within the IFRN represents a significant advance in promoting debates and actions aimed at valuing ethnic and racial diversity and ly confronting institutional racism. However, it should be noted that this presence has not yet effectively translated into a transformation of the undergraduate curricula, which remain, to a large extent, tied to a Eurocentric and colonized structure of knowledge.

Although these centers play a fundamental role in raising awareness in the academic community and proposing more inclusive educational practices, their influence on curriculum design is limited, often restricted to specific and extracurricular activities. This highlights the need for deeper integration between the actions of Neabis and curriculum review processes, so that ethnic-racial discussions are not treated as complementary, but as structural dimensions of teacher education in Natural Sciences (Ferreira; Santos, 2024).

4.3 Emancipatory education

This category allows us to identify and evaluate the presence of creativity and autonomy in educational practices, contributing to the construction of a more just and transformative educational system. The section "Professional profile upon completion of the course," present in all three documents, establishes the need to "[...] foster autonomy, creativity, and flexibility" and to "[...] critically understand Brazilian educational problems."

Esta obra está licenciada com uma Licença Creative Commons Atribuição 4.0 Internacional.

Teaching that develops students' critical thinking and autonomy tends to respect differences, whether ethnic, cultural, or social, as proposed by Freire (2002). The author argues that education should be conceived from an emancipatory perspective that develops students' autonomy and critical thinking. In this model, schools should be spaces for the inclusion of the diverse peoples that make up society.

Regarding respect for differences, the documents highlight that one of the principles of IFRN courses is "[...] respect for the plurality of values and cultural universes." According to Freire (2002, p. 22), the issue of differences, "[...] which involves both the individual and class dimensions of students, whose respect is absolutely fundamental in progressive educational practice, is a problem that cannot be ignored." Differences should not be silenced or minimized in school curricula; a comprehensive education is needed that recognizes and values these dimensions.

Regarding curiosity, the Chemistry PPC establishes that the graduate must "[...] have an interest in continuous self-improvement, curiosity [...] have a humanistic education that allows them to fully exercise their citizenship and, as a professional, respect the right to life and well-being of citizens" (IFRN, 2018b, p. 14). In the other PPCs, it was not possible to identify elements that referred to student curiosity.

A teacher who stimulates students' curiosity is able to promote meaningful discussions on ethnic and racial issues, always based on respect. Thus, respecting differences within the classroom means influencing and guiding everyone involved in the teaching and learning process to adopt respectful and inclusive practices.

In light of what has been discussed, it is clear that the mere presence of references to ethnic and racial diversity in the PPCs is not sufficient to characterize emancipatory education. A truly emancipatory education presupposes the critical questioning of power structures, the valorization of subalternized knowledge, and an active commitment to social transformation (hooks, 2013).

However, when looking at the curricula of the Natural Sciences degree programs at IFRN, it is clear that the approach to ethnic-racial issues is still sporadic and disjointed, revealing a gap between institutional discourse and educational practice. Therefore, the construction of emancipatory education at IFRN depends on the real integration of decolonial and anti-racist perspectives into the curricula, so that teacher education is

Esta obra está licenciada com uma Licença Creative Commons Atribuição 4.0 Internacional.

aligned with an educational project committed to social justice and the plurality of knowledge.

5 Final considerations

Our country's educational curricula are often marked by the valorization of white Western culture and the inferiorization of non-European peoples and cultures. Despite Law No. 10,639/2003, which aims to promote ethnic-racial and cultural diversity in Brazilian schools by establishing the mandatory teaching of African and Afro-Brazilian culture, Eurocentric traits can still be observed in teaching practices in Brazil.

The Eurocentric curriculum tends to exclude and marginalize peoples and cultures, including African and Afro-Brazilian ones. African and Afro-Brazilian cultures are often approached in educational institutions from the perspective of the white European colonizer, resulting in the inferiorization of their customs and traditions. It is essential to view schools as environments that guarantee the right to citizenship and promote debates on cultural diversity.

It should be noted that subjects focusing on diversity are still mostly offered as optional components in teacher education curricula, meaning that not all graduates complete their courses with a solid theoretical foundation on the subject.

The study, which used a qualitative approach (methodology), analyzed the PPCs of undergraduate programs at different institutions and found that, although there have been some advances, the implementation of the principles of Law No. 10,639/2003—which remains in force, even after its amendment in 2008—is still insufficient.

Among the main results, we highlight the fragmented presence of the topic in the curricula and the absence of consistent training strategies for addressing ethnic and racial diversity. Gaps identified include the lack of mandatory courses on these topics and the lack of continuing education for teacher trainers. Thus, the study points to the ongoing need to revisit and improve the PPCs in order to effectively and transversally integrate the principles of current legislation and promote teacher education committed to equity and respect for diversity.

Esta obra está licenciada com uma Licença Creative Commons Atribuição 4.0 Internacional.

6 References

BARDIN, L. *Análise de conteúdo*. São Paulo: 70, 2020.

BENTO, C. *O pacto da branquitude*. São Paulo: Companhia das Letras, 2022.

BRASIL. Lei nº 9.394, de 20 de dezembro de 1996. Estabelece as Diretrizes e Bases da Educação Nacional. *Diário Oficial [da] República Federativa do Brasil*, Poder Executivo, Brasília, DF, 21 dez. 1996. Available at: https://www.planalto.gov.br/ccivil_03/leis/l9394.htm. Accessed on: 1º fev. 2024.

BRASIL. Lei nº 10.639, de 9 de janeiro de 2003. Altera a Lei nº 9.394, de 20 de dezembro de 1996, que estabelece as diretrizes e bases da educação nacional, para incluir no currículo oficial da Rede de Ensino a obrigatoriedade da temática "História e Cultura Afro-Brasileira", e dá outras providências. *Diário Oficial [da] República Federativa do Brasil*, Poder Executivo, Brasília, DF, 10 jan. 2003. Available at: http://www.planalto.gov.br/ccivil_03/leis/2003/l10.639.htm. Accessed on: 1º fev. 2024.

BRASIL. Lei nº 11.645, de 10 de maio de 2008. Altera a Lei nº 9.394, de 20 de dezembro de 1996, modificada pela Lei nº 10.639, de 9 de janeiro de 2003, que estabelece as Diretrizes e Bases da Educação Nacional, para incluir no currículo oficial da rede de ensino a obrigatoriedade da temática "História e Cultura Afro-Brasileira e Indígena". *Diário Oficial [da] República Federativa do Brasil*, Poder Executivo, Brasília, DF, 11 mar. 2008. Available at: https://www.planalto.gov.br/ccivil_03/_ato2007-2010/2008/lei/l11645.htm. Accessed on: 1º fev. 2024

BRASIL. Lei nº 11.892, de 29 de dezembro de 2008. Institui a Rede Federal de Educação Profissional, Científica e Tecnológica, cria os Institutos Federais de Educação, Ciência e Tecnologia, e dá outras providências. *Diário Oficial [da] República Federativa do Brasil*, Poder Executivo, Brasília, DF, 30 dez. 2008. Available at: https://www.planalto.gov.br/ccivil_03/_ato2007-2010/2008/lei/l11892.htm. Accessed on: 1º fev. 2024.

COSTA, K. G. O contexto educacional e racial brasileiro até a Lei 10.639/03. *Revista da ABPN*, Curitiba, v. 15, n. esp., p. 151-173, 2023. Available at: https://abpnrevista.org.br/site/article/view/1492. Accessed on: 10 jan. 2025.

FERREIRA, L. C. V.; SANTOS, N. F. A importância de cumprir a Lei 10.639/03 na formação docente do curso de Licenciatura em Química. *In*: SÁ, C. A. A.; BESSA, J. C. R.; RODRIGUES, L. F. M.; SANTOS, N. F.; SANTOS, S. C. M. (org.). *Pesquisa, ensino e inovação no desenvolvimento nos territórios do eixo Sul-Sul*. Pau dos Ferros: Rede-Ter, 2024. p. 185-193.

FREIRE, P. *Pedagogia da autonomia*: saberes necessários à prática educativa. 25. ed. São Paulo: Paz e Terra, 2002.

Esta obra está licenciada com uma Licença Creative Commons Atribuição 4.0 Internacional.

GOMES, N. L. Relações étnico-raciais, educação e descolonização dos currículos. *Currículo sem Fronteira*, [*S. l.*], v. 12, n. 1, p. 98-109, 2012. Available at: https://www.apeoesp.org.br/sistema/ck/files/5_Gomes_N%20L_Rel_etnico_raciais_educ%20e%20descolonizacao%20do%20curriculo.pdf. Accessed on: 10 jan. 2025.

GOMES, N. L. O combate ao racismo e a descolonização das práticas educativas e acadêmicas. *Revista de Filosofia Aurora*, Curitiba, v. 33, n. 59, p. 435-454, 2021. DOI: https://doi.org/10.7213/1980-5934.33.059.DS06. Available at: https://periodicos.pucpr.br/aurora/article/view/27991. Accessed on: 10 jan. 2025.

HOOKS, b. *Ensinando a transgredir*: a educação como prática da liberdade. Tradução de Sandra Regina Haydu. São Paulo: Martins Fontes, 2013.

IFRN. *Projeto Pedagógico do Curso Superior de Licenciatura em Biologia*. Natal: IFRN, 2018a. Available at: https://portal.ifrn.edu.br/cursos/superiores/licenciatura/biologia/. Accessed on: 12 jan. 2025.

IFRN. *Projeto Pedagógico do Curso Superior de Licenciatura em Física*. Natal: IFRN, 2019. Available at: https://portal.ifrn.edu.br/cursos/superiores/licenciatura/fisica/. Accessed on: 12 jan. 2025.

IFRN. *Projeto Pedagógico do Curso Superior de Licenciatura em Química*. Natal: IFRN, 2018b. Available at: https://portal.ifrn.edu.br/cursos/superiores/licenciatura/quimica/. Accessed on: 12 jan. 2025.

LÜDKE, M.; ANDRÉ, M. E. *Pesquisa em educação*: abordagens qualitativas. 2. ed. São Paulo: EPU, 2015.

MACEDO, E. Currículo: política, cultura e poder. *Currículo sem Fronteiras*, [*S. l.*], v. 6, n. 2, p. 98-113, 2006. Available at: https://biblat.unam.mx/hevila/CurriculosemFronteiras/2006/vol6/no2/7.pdf. Accessed on: 10 jan. 2025.

MELO, L. N. S.; SOUZA, E. Q. Desvelando as relações raciais nas práticas pedagógicas: uma leitura decolonial do cotidiano escolar. *Educação & Formação*, Fortaleza, v. 10, e14203, 2025. DOI: https://doi.org/10.25053/redufor.v10.e14203. Available at: https://revistas.uece.br/index.php/redufor/article/view/14203. Accessed on: 14 out. 2025.

NASCIMENTO, J. A. Ensino de História: novas abordagens e práticas na interação com o Núcleo de Estudos Afro-Brasileiros e Indígenas (Neabi). *Outros Tempos*: Pesquisa em Foco - História, São Luís, v. 20, n. 36, p. 180-200, 2023. DOI: https://doi.org/10.18817/ot.v20i36.1061. Available at: https://www.outrostempos.uema.br/index.php/outros_tempos_uema/article/view/106. Accessed on: 11 fev. 2025.

PEREIRA, A. S. M.; GOMES, D. P.; CARMO, K. T.; SILVA, E. V. M. E. Aplicação das Leis 10.639/03 e 11.645/08 nas aulas de Educação Física: diagnóstico da rede municipal de Fortaleza/CE. *Revista Brasileira de Ciências do Esporte*, Uberlândia, v. 41, n. 4, p. 412-418,

Esta obra está licenciada com uma Licença Creative Commons Atribuição 4.0 Internacional.

2019. DOI: https://doi.org/10.1016/j.rbce.2018.06.004. Available at: https://www.scielo.br/j/rbce/a/HXRhDQFhTV4MTFphJySk8Ps/?lang=pt. Accesed on: 10 jan. 2025.

PEREIRA, A. S. M.; VENÂNCIO, L. African and Indigenous games and activities: a pilot study on their legitimacy and complexity in Brazilian physical education teaching. *Sport, Education and Society*, [*S. l.*], v. 26, n. 7, p. 718-732, 2021. DOI: https://doi.org/10.1080/13573322.2021.1902298. Available at: https://www.tandfonline.com/doi/full/10.1080/13573322.2021.1902298. Accessed on: 10 jan. 2025.

PEREIRA, M. E. *et al.* (org.). *Formação de professoras/es em gênero, sexualidade, orientação sexual e relações étnico-raciais*. Rio de Janeiro: Cepesc, 2007.

SANTOS, A. T.; LUCINI, M. Decolonialidade, ensino de História e educação das relações étnico-raciais. *Revista Interdisciplinar Cadernos Cajuína*, São Paulo, v. 7, n. 2, p. 1-14, 2022. DOI: https://doi.org/10.52641/cadcajv7i2.6. Available at: https://v3.cadernoscajuina.pro.br/index.php/revista/article/view/6. Accessed on: 10 jan. 2025.

SILVA, M. V. M.; PORTELA, E. L. O currículo como narrativa étnico-racial: implicações afrocentradas para a formação de professores. *Revista Espaço do Currículo*, João Pessoa, v. 15, n. 1, p. 1-13, 2022. DOI: https://doi.org/10.15687/rec.v15i1.62557. Available at: https://periodicos.ufpb.br/index.php/rec/article/view/62557. Accessed on: 11 fev. 2025.

SILVA, T. T. *Documentos de identidade*: uma Introdução às teorias do currículo. 3. ed. Belo Horizonte: Autêntica, 2007.

XAVIER, A. R.; SOUSA, L. M.; MELO, J. L. M. Saberes tradicionais, etnobotânica e o ensino de Ciências: estudo em escolas públicas do Maciço de Baturité, Ceará, Brasil. *Educação & Formação*, Fortaleza, v. 4, n. 11, p. 215-233, 2019. DOI: https://doi.org/10.25053/redufor.v4i11mai/ago.3355. Available at: https://revistas.uece.br/index.php/redufor/article/view/3355. Accessed on: 13 fev. 2025.

Rusiane da Silva Torres, Federal Institute of Rio Grande do Norte (IFRN)
https://orcid.org/0000-0002-9898-6976
PhD candidate in the Graduate Program in Education at the Northeast Education Network (Renoen), IFRN campus. Scholarship recipient from the National Council for Scientific and Technological Development (CNPq).
Professor at the Federal University of Pará (UFPA), assigned to the Academic Unit School of Application.
Contribution: Project management, formal analysis, conceptualization, data curation, writing – first draft, writing – revision and editing, research, methodology, supervision, validation, and visualization.
Lattes: http://lattes.cnpq.br/1367809689874532
Email: rusianehistoria@gmail.com

Esta obra está licenciada com uma Licença Creative Commons Atribuição 4.0 Internacional.

Izabel Cristina Leite de Lima, Federal Institute of Rio Grande do Norte (IFRN)
[ii] https://orcid.org/0000-0001-7745-7269
PhD candidate in teaching at the Northeast Teaching Network (Renoen) and Master's degree in Professional and Technological Education from the Graduate Program in Professional and Technological Education (Profept) in the National Network based at IFRN. Social worker at IFRN. Professor at UFPA, assigned to the Academic Unit School of Application.
Contribution: Project management, formal analysis, conceptualization, data curation, writing – first draft, writing – revision and editing, research, methodology, supervision, validation, and visualization.
Lattes: http://lattes.cnpq.br/3008935140550760
Email: izabel.leite@ifrn.edu.br

Sandra Maria Campos Alves, Federal Institute of Rio Grande do Norte (IFRN)
[iii] https://orcid.org/0000-0002-9343-9324
Postdoctoral degree from the University of Adelaide, Australia, and PhD from the University of São Paulo (USP). Currently a civil servant at IFRN. Works in the Postgraduate Courses in Professional Education (Profept) and the Northeast Education Network (Renoen).
Contribution: Project management, formal analysis, conceptualization, data curation, writing – first draft, writing – revision and editing, research, methodology, supervision, validation, and visualization.
Lattes: http://lattes.cnpq.br/6487313935953110
Email: sandra.campos@ifrn.edu.br

DATA AVAILABILITY

The entire dataset supporting the results of this study has been published in the article itself.

Editor in charge: Lia Machado Fiuza Fialho

***Ad hoc* reviewers:** Arliene Stephanie Menezes Pereira Pinto and Marcia Paula Chaves Vieira

Translated by: Thiago Alves Moreira

How to cite this article (ABNT):
TORRES, Rusiane da Silva; LIMA, Izabel Cristina Leite de; ALVES, Sandra Maria Campos. A abordagem das questões étnico-raciais nos currículos das licenciaturas em Ciências da Natureza do IFRN. *Educação & Formação*, Fortaleza, v. 10, e15029, 2025. Available at: https://revistas.uece.br/index.php/redufor/article/view/e15029

Received on April 17, 2025.

Accepted on October 31, 2025.

Published on December 01, 2025.

Esta obra está licenciada com uma Licença Creative Commons Atribuição 4.0 Internacional.