

**THE IMPORTANCE OF THE FEDERAL INSTITUTES OF EDUCATION, SCIENCE AND TECHNOLOGY FOR REDUCING EDUCATIONAL INEQUALITY IN BRAZIL**

***A IMPORTÂNCIA DOS INSTITUTOS FEDERAIS DE EDUCAÇÃO, CIÊNCIA E TECNOLOGIA PARA A REDUÇÃO DA DESIGUALDADE EDUCACIONAL NO BRASIL***

***LA IMPORTANCIA DE LOS INSTITUTOS FEDERALES DE EDUCACIÓN, CIENCIA Y TECNOLOGÍA PARA LA REDUCCIÓN DE LA DESIGUALDAD EDUCATIVA EN BRASIL***



Henry Antônio Silva NOGUEIRA<sup>1</sup>  
e-mail: henryasnogueira@gmail.com



Rucelino de Sousa AGUIAR<sup>2</sup>  
e-mail: rucelinosousa@gmail.com



Maria Lourdes Gisi<sup>3</sup>  
e-mail: gisi.marialourdes@gmail.com

**How to reference this paper:**

NOGUEIRA, H. A. S.; AGUIAR, R. S.; GISI, M. L. The importance of the Federal Institutes of Education, Science and Technology for reducing educational inequality in Brazil. **Política e Gestão Educacional**, Araraquara, v. 27, n. 00, e023029, 2023. e-ISSN: 1519-9029. DOI: <https://doi.org/10.22633/rpge.v27i00.18005>



| **Submitted:** 24/04/2023  
| **Revision required:** 25/05/2023  
| **Approved:** 30/06/2023  
| **Published:** 13/07/2023

**Editor:** Prof. Dr. Sebastião de Souza Lemes

**Deputy Executive Editor:** Prof. Dr. José Anderson Santos Cruz

<sup>1</sup> Federal Institute of Education, Science, and Technology (IFAC). Rio Branco – AC – Brazil. Rectorate. Economist. Master's degree in Regional Development. Doctoral candidate in Education at PUC-PR.

<sup>2</sup> Diocesan College of São José (FADISE). Manoel Urbano – AC – Brazil. Master's degree in Theology from FAJE - Jesuit Faculty of Philosophy and Theology. Doctoral candidate in Education at PUC-PR.

<sup>3</sup> Pontifical Catholic University of Paraná (PUC-PR). Curitiba – PR – Brazil. Full Professor in the Graduate Program in Education (PUC-PR). Postdoctoral research at the University of Geneva, Switzerland.

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**ABSTRACT:** The present study investigates the importance of the Federal Institutes of Education, Science, and Technology (IFEs) in reducing educational inequality in Brazil. The research was conducted through a literature review and document analysis using data from the Basic Education Census, INEP Reports, OECD/PISA, and the Nilo Peçanha Platform. The results derived from the PISA analysis indicate that IFEs perform above the national average. In addition, about IDEB, the average grades of IFEs are higher than the general average. When considering the specific results of Institutes located in the North and Northeast regions, it is observed that these institutions, in addition to surpassing the general average, approach the highest grades achieved by private schools. Combined with the conception of education for human emancipation, these results aim to offer comprehensive training and opportunities to less privileged individuals, revealing that IFEs constitute an effective strategy for reducing educational inequality.

**KEYWORDS:** Education. Vocational Education. Federal Institutes. Educational Inequality.

**RESUMO:** O presente estudo tem como objetivo investigar a importância dos Institutos Federais de Educação, Ciência e Tecnologia (IFE's) na redução da desigualdade educacional no Brasil. A pesquisa foi conduzida por meio de uma revisão bibliográfica e análise de documentos, utilizando dados provenientes do Censo da Educação Básica, Relatórios do INEP, OCDE/PISA e Plataforma Nilo Peçanha. Os resultados derivados da análise do PISA indicam que os IFE's apresentam um desempenho superior à média nacional. Além disso, em relação ao IDEB, as notas médias dos IFE's são mais elevadas do que a média geral. Ao considerar os resultados específicos dos Institutos localizados nas regiões Norte e Nordeste, observa-se que essas instituições, além de superarem a média geral, aproximam-se das notas mais altas alcançadas pelas escolas privadas. Esses resultados, aliados à concepção de educação para a emancipação humana, visa oferecer uma formação integral e oportunidades aos indivíduos menos privilegiados da sociedade, revelando que os IFE's constituem uma estratégia eficaz para a redução da desigualdade educacional.

**PALAVRAS-CHAVE:** Educação. Educação Profissional. Institutos Federais. Desigualdade Educacional.

**RESUMEN:** El objetivo de este artículo es investigar la importancia de los Institutos Federales de Educación, Ciencia y Tecnología (IFEs) para reducir la desigualdad educativa en Brasil. Se realizó una investigación bibliográfica y documental. Los datos se recopilaron del Censo de Educación Básica, informes de INEP, OCDE/PISA y la Plataforma Nilo Peçanha. El PISA muestra que los IFEs se ubican por encima del promedio de Brasil. En IDEB, las calificaciones promedio de los IFEs son mayores que el promedio general. Considerando los resultados de los IFEs ubicados en las regiones norte y noreste, se observa que los IFEs, además de obtener un promedio mayor que el promedio general, se acercan a las calificaciones más altas presentadas por las escuelas privadas. Estos resultados, junto con la concepción de educación para la emancipación humana, asegurando a las personas menos privilegiadas de la sociedad la oportunidad de una formación integral, revelan que los IFEs constituyen una estrategia eficaz para reducir la desigualdad educativa. s IFEs constituyen una estrategia efectiva para la reducción de la desigualdad educativa.

**PALABRAS CLAVE:** Educación. Educación Profesional. Institutos Federales. Desigualdad Educativa.

## **Introduction**

This article aims to investigate the importance of the Federal Institutes of Education, Science, and Technology (IFEs) in reducing educational inequality in Brazil. The creation of IFEs as an educational policy within the scope of professional education represents a break from the traditional economic, dualistic, and prejudiced model historically observed in the country.

Educational inequality is a latent, relevant, and urgent problem that needs to be understood. This understanding is of utmost importance for the actors involved, as the effects of this problem are devastating, especially for individuals historically marginalized by the capitalist system. Knowledge about educational inequality is socially relevant, as it contributes to constructing a more just and egalitarian society.

In Brazil, educational inequality is a severe and historical problem that permeates the entire educational system and extends throughout the national territory, harming the country as a whole. Although access to education is a right guaranteed by the Brazilian Federal Constitution of 1988, educational policies, in general, are insufficient, characterized by inequalities in serving different populations, especially in poorer and less developed regions. It is observed that educational inequality in Brazil occurs in several dimensions, encompassing various levels of education, from elementary to higher education, in addition to disparities in performance between public and private school networks.

This study addresses the Federal Institutes of Education, Science, and Technology, which are prominent institutions in federal public education in Brazil. These institutes operate within the scope of professional education and are recognized as a fundamental part of the National Education Policy, encompassing primary and higher education levels. They were created to offer training, mainly of a technical nature, through a comprehensive education approach that goes beyond technical preparation for work, aiming to form citizens capable of consciously acting in the entire social sphere. These institutions have, in their essence, fought against social inequalities and play an important role in addressing educational differences. However, it is essential to note that the effectiveness of the Federal Institutes' performance is questioned in the political scenario, especially during the transition period between governments between 2016 and 2022, marked by a conservative and liberal vision. Therefore, it is necessary to contribute to clarifying the importance of these institutions in the social context, especially in the Brazilian educational situation.

For the development of this study, the dialectical method is used. According to Kosík (2002), this method consists of criticizing reality, a way of thinking beyond what is initially presented, of understanding the inherent complexity of what is shown, a priori, concretely. When examining political issues related to education, professional education, and educational inequality, it is advisable to consider the concept of social contradiction. By focusing on the study encompassing these three mentioned themes, it is appropriate to work within the framework of the dialectical method.

This study falls within the qualitative research approach, using bibliographic and documentary research methods. The data collected is analyzed descriptively, seeking to understand the nuances and complexities of the object of study (MARCONI; LAKATO, 2006). The sources of information include the Basic Education Census (CEB), reports from the National Institute of Educational Studies and Research Anísio Teixeira (INEP) and the Organization for Economic Cooperation and Development (OECD), in addition to data made available by the Nilo Peçanha Platform (PNL). The results obtained by the Federal Institutes are compared with those of the public, state, municipal, and private networks, as well as Brazil's overall results.

This research contributes to advancing the knowledge necessary for developing strategic educational policies aimed at improving the educational system, promoting inclusion and diversity in access to education, and making citizens more aware of their social role. The research is structured in five sections: introduction, theoretical framework, results, discussion, and conclusion.

## **Theoretical Framework**

Initially, it is vital to highlight the vision we adopt about the social role of education. We work with the conception of a comprehensive human formation, which seeks the emancipation of the individual. In this sense, we base ourselves on the concept of Gramsci (2001, p. 33) who describes the need for a “single initial school of general, humanistic, formative culture, which balances fairly the development of capacities for manual work and the development of capacities for intellectual work”. A humanistic school intended “[...] to develop in each human individual the still undifferentiated general culture, the fundamental power to think and to know how to orient oneself in life [...]”.

Bourdieu and Passeron (1975) propose the theory of social reproduction (TRS), a sociological approach that explains how education reproduces social inequalities. This theory assumes that societies are stratified and that social differences are reproduced over time. These inequalities may be related to social class, gender, race, and sexuality.

Public conflict and the power struggle constitute fundamental elements for understanding social reproduction. In this sense, the social reproduction theory presents a critical approach to understanding how collective differences are maintained and perpetuated, emphasizing the importance of cultural, political, and economic factors. This theory is a powerful tool for comprehending social inequalities and conducting critical analyses of society. In the 21st century, it continues to be the subject of study and debate, enabling a deeper understanding of the complexities of social relations and struggles for justice (BOURDIEU; PASSERON, 1975).

In this context, the Federal Institutes of Education, Science, and Technology are introduced. There is an apparent reference to the theories developed by Marx and Engels (1983), which are classic works in which the authors form essential concepts for social classes, such as comprehensive education. They advocate for a humanistic and professional-technological formation linked to the world of work, intending to build a polytechnic education. "These combinations of productive work, intellectual education, professional education, and physical exercises", for them, "placed the working class on a higher level than the bourgeois and aristocratic classes" (MARX; ENGEL, 1983, p. 60, our translation).

Comprehensive education seeks to overcome the segregation among individuals coexisting in the same society, abandoning the division between those educated for superior functions and those instructed only for tasks necessary for labor. The goal is to inform citizens who understand the productive processes and their roles in these systems (PACHECO, 2015).

The Federal Institutes adopt a conception of professional education based on polytechnics, human formation, and full political and social awareness. The objective is to reduce inequalities and democratize professional and technological education. This approach represents a policy of individual emancipation, aiming to form an inclusive, balanced, and socially and economically fairer society (PACHECO, 2011).

The conception that underpinned the creation of the Federal Institutes is intrinsically linked to the progressive vision that gained strength in Brazil in the 2000s, influenced by the theories developed by renowned authors Marx and Engels (1983), who explored relevant concepts in the context of the idea of social classes, such as comprehensive education. This

conception encompasses a humanistic, physical, and professional-technological formation related to the world of work to build a polytechnic education. By unifying academic education with vocational training, there was a break with the predominant neoliberal model until the mid-1990s.

Terms such as "contextualized training", "human and citizen training that precedes qualification for work", and "integration between science, technology, and culture as inseparable dimensions of human life" demonstrate a new moment in professional education. The goal is to combat inequalities and value the human being as the principal agent to be empowered in forming a society and social and economic development (PACHECO, 2012).

Machado (2008) highlights that the institutional model of the Federal Institutes of Education constitutes an innovation in the agenda of professional and technological education in Brazil. They employ an approach that starts from technique to offer responses to social demands, operating in various collective dimensions, to promote social inclusion through continuous and intimate dialogue between the teaching-learning process, research, extension, and system management.

As emphasized by Arruda (2010, p. 3, our translation), "the interiorization of the Federal Institutes enables rural populations, previously excluded from accessing quality public education, [to have access]. This will undoubtedly give this population segment a different reference point for public education". Therefore, the Federal Institutes of Education represent a regional economic development policy and have great potential as instruments of education democratization. In a broader context, the Federal Institutes align with the strategic role of professional education and technical-scientific knowledge in shaping a more egalitarian society.

## **Results**

The Federal Institutes of Education, Science, and Technology were instituted by Federal Law n. ° 11.892, of December 29, 2008, through which the Brazilian Government established the Federal Network of Professional, Scientific and Technological Education (RFEPCT) and created the Federal Institutes to be part of this network (BRASIL, 2008).

According to data available on the Nilo Peçanha Platform (BRASIL, 2023a), there are currently 38 Federal Institutes in operation, distributed in all states of Brazil, through 656 campuses, offering a total of 11.814 courses in the areas of professional and technological education, at different levels and modalities (BRASIL, 2023b).

It is possible to observe a significant growth in the number of enrollments in the Federal Network as a whole, specifically in the Federal Institutes of Education, from 2017 to 2020. Table 1 presents the data. In 2017, the Federal Network for Professional, Scientific, and Technological Education (RFEPCT) had 1.031,798 enrollments; by 2020, this number had increased to 1.507,476. In 2017, 91% of these enrollments were made in Federal Institutes, and from 2018 to 2020, 92% of RFEPCT students were enrolled in Federal Institutes.

**Table 1** - Enrollments in the RFEPCT and the Federal Institutes from 2017 to 2020

Unit	2017	%	2018	%	2019	%	2020	%
RFEPCT	1.031.798	100%	964.593	100%	1.023.303	100%	1.507.476	100%
IFEs	947.853	91%	888.231	92%	949.831	92%	1.400.589	92%

Source: Own elaboration with data from the Nilo Peçanha Platform (BRASIL, 2023a)

According to the PNL data in Table 2, in 2017, approximately 32.7% of students enrolled in Federal Institutes came from families with an income of 0 to 1,5 minimum wages. This indicator increased to 40.6% in 2018 and 42.6% in 2019 in the following years. In 2020, more than 45% of students came from low-income families, earning from 0 to 1,5 minimum wages. When considering the percentage of students with a family income of up to 2,5 minimum wage, in 2017, about 38.4% of students were in this income range, while in 2020, this number rose to 55.9%. Concerning income of up to 3,5 minimum wages in 2020, about 60.9% of enrolled students declared themselves in this range. These data indicate that the majority of students served by Federal Institutes come from low-income families.

**Table 2** - % of students enrolled in IFEs, from 2017 to 2020, by family income level

Family income level	2017	2018	2019	2020
0<RFP<=0,5	13,2%	16,7%	17,5%	15,3%
0,5<RFP<=1	11,6%	14,6%	14,8%	16,3%
1<RFP<=1,5	7,9%	9,3%	10,3%	14,0%
<b>Total&lt;=1,5</b>	<b>32,7%</b>	<b>40,6%</b>	<b>42,6%</b>	<b>45,6%</b>
1,5<RFP<=2,5	5,7%	6,5%	7,2%	10,3%
<b>Total&lt;=2,5</b>	<b>38,4%</b>	<b>47,1%</b>	<b>49,8%</b>	<b>55,9%</b>
2,5<RFP<=3,5	2,5%	2,7%	3,1%	5,0%
<b>Total&lt;=3,5</b>	<b>40,9%</b>	<b>49,8%</b>	<b>52,9%</b>	<b>60,9%</b>
RFP>3,5	3,2%	3,1%	3,8%	6,4%
Not declared	55,4%	46,8%	42,9%	32,4%

Source: Own elaboration with data from the Nilo Peçanha Platform (BRASIL, 2023a)

Table 3 shows that in 2017, 34.3% of students in the Federal Institutes identified themselves as Black, Grayish-Brown, or Indigenous, with the majority (28%) self-identifying as Grayish-Brown. This percentage increased from 2017 to 2020, reaching 45.4% of students enrolled in the Federal Institutes who self-identified as Black, Grayish-Brown, or Indigenous in the last year. These findings are relevant because these students are often from low-income families and lack educational resources.

**Table 3** - % of students enrolled in the Federal Institutes, from 2017 to 2020, by racial self-identification

Racial Self-Declaration	2017	2018	2019	2020
Black	6%	7%	8%	9%
Grayish-Brown	28%	32%	36%	36%
Indigenous	0,3%	0,5%	0,5%	0,4%
<b>Total</b>	<b>34,3%</b>	<b>39,5%</b>	<b>44,5%</b>	<b>45,4%</b>

Source: Own elaboration with data from the Nilo Peçanha Platform (BRASIL, 2023a)

Regarding student performance in large-scale assessments, considering the results of the Programme for International Student Assessment (PISA), conducted by the Organization for Economic Cooperation and Development (OCDE, 2018), based on 2018 data, the national average proficiency of Brazil in reading, mathematics, and science was 413, 384, and 404 points, respectively. However, students from the Federal Network who participated in PISA achieved an average of 503, 469, and 491 points, respectively, surpassing the national average



(BRASIL, 2019). It is worth noting that most students in the Federal Network are enrolled in the Federal Institutes of Education.

According to data from INEP, considering the years 2017, 2019, and 2021, the results of the Basic Education Development Index (IDEB) obtained by Federal Institutes are higher than those presented by the public network (municipal and state) and are above the general average of IDEB scores in Brazil in the years 2017 and 2021, being equivalent in the year 2019. However, compared to the private network, there is still a negative difference for IFEs. In 2017, 2019, and 2021, the average of IFEs about IDEB scores was 4.0, 4.2, and 4.4, respectively (BRASIL, 2021). Table 4 presents this comparison with a focus on Federal Institutes located in Brazil's North and Northeast regions. The data show that Federal Institutes in these regions obtained significantly higher IDEB averages than the total average of public schools close to private schools.

**Table 4** - IDEB results referring to the general average of Brazil, public schools (state and municipal), private schools, and IFEs located in the country's North and Northeast

<b>Brazil, Education Network and IFEs</b>	<b>2017</b>	<b>2019</b>	<b>2021</b>
Brazil	3,8	4,2	4,1
Public	3,5	4,2	3,9
Private	5,8	6,0	5,6
IFEs North and Northeast	5,1	4,7	5,1

Source: Author's elaboration with data from INEP (BRASIL, 2023b).

The Programme for International Student Assessment (PISA) and the Basic Education Development Index (IDEB) are the leading official assessments used by Brazilian governments and are widely employed in the planning of educational public policies at all levels of government administration, including state, municipal, and federal levels. These indicators evaluate student performance and school institutions, encompassing public and private education networks.

## **Discussion**

This study aims to verify the importance of the Federal Institutes of Education, Science, and Technology in reducing inequality. These institutions are part of the Federal Network of Professional, Scientific, and Technological Education. They incorporate elements and evidence pertinent to the issue raised, which is closely linked to criticisms about the effectiveness of this education policy, especially in the field of professional education, in the context of social inclusion.

At the center of this discussion, it is observed that this educational policy, represented by the Federal Institutes of Education, tends to overcome the technicist view of professional education while intensifying the fight against internal and external inequalities in the educational system. First and foremost, these institutions aim to broadly intervene in social reality through education for social life, ensuring the inclusion of individuals from historically disadvantaged classes. They were created to contribute to the construction of a less unequal society, offering professional and technological education at all levels and modalities, focusing on training citizens to be aware of the social context in which they are inserted.

As stated by Frigotto (2010), the creation of IFEs, in the environment of democratizing Brazilian education was a strategy to position itself against neoliberal ideals that understood professional education in a prejudiced and self-interested way. In addition, it sought to establish the polytechnic as a methodological basis, approaching the conception of the unitary school idealized by Gramsci (2001).

Pacheco (2012, p. 29), refers to Federal Institutes of Education as institutions focused on the human being and their professional and technological training through a structuring tool of the social being. The author states that "it is, therefore, a training that takes place during human life, through experiences and knowledge, throughout social and productive relationships".

Federal Institutes have shown highly relevant results in the Brazilian educational panorama, especially about inclusion. One of the fundamental objectives of creating these institutions is the integration of historically excluded groups from the educational system, directly related to the reduction of educational inequality. This is reflected in the number of enrollments and the socioeconomic profile of students. Federal Institutes enable access for thousands of students from low-income families to a wide range of courses in various areas of knowledge and multiple educational modalities.

An important aspect that marks Federal Institutes is the internalization and approximation with the regional reality, acting in various regions of the country and creating opportunities for professional qualification, citizenship, and continuity of studies at other levels and modalities of education. As Arruda (2010, p. 3) highlighted, "the internalization of Federal Institutes makes it possible for rural populations, previously separated from quality public education, to have this access. This will surely provide this population contingent with another reference to public education".

This is a crucial issue in educational inequality, as the action of IFEs in less favored regions, in addition to contributing to regional development, reduces the educational disparity between students from these locations and those from historically more privileged areas in Brazil's pedagogical and social panorama. It is important to note that by providing the inclusion of disadvantaged class students in the educational system, enabling access to resources and better quality education, Federal Institutes are playing a direct and positive role in the problem of educational imbalance.

Pacheco (2011), emphasizes the concept established by Federal Institutes, where it goes beyond the formation of labor, ceasing to be merely a market instrument and becoming an essential public policy for the construction of citizens in the world of work. That is, in addition to technical knowledge, they provide a broader philosophical formation, as well as propaedeutic schools.

An extremely relevant point is the identity profile of the students who are part of this Institute in relation to their self-declared race. Notably, these institutions play an essential role in including these minorities, as many students self-declare as Black, Grayish-Brown and Indigenous. This data highlights the social function of Federal Institutes in inclusion and reducing disparities between different social groups. They are public institutions that offer inclusive and quality education directed to the entire population, regardless of their social origin, race, gender, or economic condition.

It is equally important to highlight the performance of students enrolled in Federal Institutes of Education, Science, and Technology in large-scale nationally and internationally assessments. This study revealed that in the international analysis carried out by the OECD, PISA and the IFEs obtained averages higher than the general average of Brazil and close to the standards of private schools with the best results in qualification.

In the case of IDEB, one of the leading national assessments, the Federal Institutes present significantly better results than the averages of other municipal and state public network

schools. A particularly relevant scenario is when comparing IDEB solely with the Institutes located in the country's poorest regions and with a similar average to that of a private school. This demonstrates that Federal Institutes are institutions that reduce educational disparities among students from different social classes.

These comparisons highlight the relevance of the Federal Institutes of Education (IFEs), as they predominantly serve low-income populations. These students usually have limited access to educational resources, one of the main characteristics of educational inequality. With the increasingly better results of the Federal Institutes, this difference tends to decrease between low-income students and those with better living conditions.

## **Conclusion**

The Federal Institutes, created in 2008 as part of the Federal Network of Professional, Scientific, and Technological Education, represent one of the most significant educational policies of the century. They operate throughout the national territory in various modalities of education, both face-to-face and at a distance, offering instruction at primary and higher levels and reaching the neediest social strata. These institutes play a fundamental role in forming free citizens aware of their role in the social context and, especially, in the world of work. It is perceived that this policy, represented by the Federal Institutes, will surpass the technicist vision of professional education and intensify the struggle against inequalities, both internal and external to the educational system.

In this way, the Federal institutions contribute to improving the quality standard of Brazilian education nationwide, promoting the comprehensive development of emancipated and skilled citizens. They are based on a proposal to reorganize the educational model in vocational education, engaging with the regional reality and connecting with the global scenario. The Federal Institutes build a social network capable of responding to social demands and generating educational arrangements. They understand that individual formation occurs in all society spaces, going beyond school and technical training limits. This represents a break from traditional thinking and a significant advancement in overcoming prejudice regarding class inequality.

The Federal Institutes are fundamental in reducing educational inequality in Brazil, as they offer targeted vocational education primarily to a socially vulnerable audience. This education aims to prepare students for the job market and a broader understanding of the social

context. The conception of Federal Institutes is intrinsically linked to the democratization of public educational institutions and presupposes the fight against educational and social inequality in general.

These institutions represent a milestone in educational policies, especially concerning including socially vulnerable populations through professional and technological education. Their project aims to provide fairer conditions in social and economic terms. In this research, we analyzed the aggregated performance of different institutes at regional and national levels. We encountered some difficulties accessing specific information about the development of Institutes in the North and Northeast regions. In addition, it is essential to address other relevant issues for future research, such as measuring the specific functioning between Institutes, considering their particularities.

The Federal Institutes of Education, Science, and Technology are public educational institutions that challenge the production and democratization of knowledge, placing the human being as the principal agent of social transformation. Their objective is to contribute to the formation of a more just and less unequal society.

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### ***CRediT Author Statement***

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**Acknowledgements:** We thank the Pontifical Catholic University of Paraná and the Diocesan College of São José - Diocese Rio Branco - Acre.

**Funding:** Not applicable.

**Conflicts of interest:** There are no conflicts of interest.

**Ethical approval:** Ethical approval was not required as this was bibliographic and documentary research.

**Data and material availability:** The data are available on websites and libraries.

**Authors' contributions:** Henry Antônio Silva Nogueira, the author, conducted the research by collecting and systematizing the data, as well as writing the analysis. Rucelino de Sousa, co-author, assisted in the bibliographic research, reviewing literature and documents and participating in the study's development. Maria Lourdes Gisi, co-author, provided guidance throughout the work and contributed to the study's review.

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**Processing and editing: Editora Ibero-Americana de Educação.**  
Proofreading, formatting, normalization and translation.

