ARTICLE

QUALITY OF EDUCATIONAL PROVISION AND LEARNING INEQUALITY IN BRAZILIAN ELEMENTARY AND MIDDLE SCHOOL[1]

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ABSTRACT: In the last decades, there was a more significant concern with educational quality than towards actions to combat inequality in the public Brazilian agenda due to the broad use of Ideb (Basic Education Development Index). However, studies have pointed out that equity did not follow quality, hindering constitutional principles. In this sense, we investigate the relationship between the educational provision indicators and the measure of learning quality and equity in elementary and middle school. Using data from Brazilian public schools retrieved from School Census, Saeb (Basic Education Evaluation System), demographic, investment data from IBGE (Brazilian Institute of Geography and Statistics) and Siope (Information System on Public Budgets in Education), we could observe that the indicators of educational provision are more closely connected to quality than equity and that more populated cities tend to have quality with less equity. We note a North/South pattern in the country, with more equitable situations in the North and Northeast states, while higher quality situations are observed in the South and Southeast states. Situations portraying more quality with equity are rare in Brazilian cities but were proportionally higher in Ceará. The results indicate that more objective and specific policies are needed to guarantee a quality education with equity. This guarantee is a right for all and is even more relevant in a post-pandemic scenario marked by more profound learning gaps and educational inequalities.

Keywords: educational inequalities, educational equity, educational quality, school infrastructure, educational index.

QUALIDADE DA OFERTA EDUCACIONAL E DESIGUALDADES DE APRENDIZADO NO ENSINO FUNDAMENTAL BRASILEIRO

RESUMO: Nas últimas décadas, a preocupação com a qualidade educacional foi mais evidenciada, na agenda pública brasileira, do que as ações centradas no combate às desigualdades, em função do amplo uso do Índice de Desenvolvimento da Educação Básica - Ideb. Contudo, estudos apontam que a qualidade não tem sido acompanhada de equidade, ferindo princípios constitucionais. Nessa esteira, investigamos a relação entre indicadores de oferta educacional e medidas de qualidade e equidade de aprendizado no ensino fundamental. Utilizando dados das escolas públicas brasileiras, provenientes do Censo Escolar e do Saeb, dados demográficos e de investimentos, provenientes do IBGE e do Siope, observamos que os indicadores da oferta educacional se associam mais à qualidade do que à equidade e que municípios maiores, em termos populacionais, tendem a apresentar qualidade com menos equidade. É possível observar um padrão Norte/Sul do país. Situações de mais equidade são vistas em estados do Norte e do Nordeste. Do lado oposto, situações de mais qualidade são encontradas em estados do Sul e do Sudeste. Situações de mais qualidade com equidade são raras nos municípios brasileiros, mas foram encontradas em maior proporção, no Ceará. Conclui-se que políticas específicas e mais objetivas são necessárias para a garantia de uma educação de qualidade com equidade. Esta garantia é um direito de todos e recebe ainda mais relevância no cenário pós-pandemia de covid-19, em que as lacunas de aprendizagens e o acirramento das desigualdades educacionais têm se revelado cada vez mais profundas.

Palavras-chave: desigualdades educacionais, equidade educacional, qualidade educacional, infraestrutura escolar, indicadores educacionais.

CALIDAD DE LA OFERTA EDUCATIVA Y DESIGUALDADES DE APRENDIZAJE EN LA EDUCACIÓN PRIMARIA BRASILEÑA

RESUMEN: En las últimas décadas, la preocupación por la calidad de la educación fue más evidente en la agenda pública brasileña que los esfuerzos enfocados en combatir las desigualdades, debido al uso generalizado del Índice de Desarrollo de la Educación Básica - Ideb. Sin embargo, estudios indican que la calidad no ha ido acompañada de equidad, violando principios constitucionales. En el contexto, investigamos la relación entre los indicadores de provisión educativa y las medidas de calidad y equidad del aprendizaje en la educación primaria. Utilizando datos de escuelas públicas brasileñas, del Censo Escolar y del Saeb (Sistema Nacional de Evaluación de la Educación Básica), datos demográficos y de inversiones, del IBGE (Instituto Brasileño de Geografía y Estadística) y del Siope (Sistema de Información sobre Presupuestos Públicos en Educación), observamos que los indicadores de oferta educativa están más asociados a la calidad que a la equidad y que los municipios más grandes tienden a presentar calidad con menor equidad. Es posible observar un patrón Norte/Sur en el país. Se observan situaciones más equitativas en los estados del Norte y del Nordeste. Por otro lado, las situaciones de mejor calidad se encontrarán en los estados del Sur y del Sureste. Más situaciones de calidad con equidad son raras en los municipios brasileños, pero fueron encontradas en mayor proporción en el estado de Ceará. Concluimos que son necesarias políticas específicas y más objetivas para garantizar una educación de calidad con equidad. Esta garantía es un derecho de todos y es aún más relevante en el escenario pospandemia del COVID-19, en el que los huecos de aprendizaje y el aumento de las desigualdades educativas se han hecho más evidentes.

Palabras clave: desigualdades educativas, equidad educativa, calidad educativa, infraestructura escolar, indicadores educativos.

INTRODUCTION

Social inequalities are a topic that has occupied the agenda of researchers from various fields of social sciences since its beginnings (GRUSKY, 2008). No less well-known, inequalities in the educational environment were widely evidenced by the persistent association between the socioeconomic and cultural origin of families and the academic success of their children (BOURDIEU; PASSERON, 1975; COLEMAN et al., 1966). On the other hand, there is a large literature that, although it recognizes the importance of the family in the results, discusses how the school system can either perpetuate or mitigate the disparities between students from more or less advantaged socioeconomic conditions (BROOKE; SOARES, 2008).

From this perspective, the conditions of educational provision are highly pertinent. Factors such as the financing system, teacher allocation, professional development for educators and school staff, as well as infrastructure and pedagogical resources available in schools, constitute critical inputs for enhancing education, particularly in highly unequal countries like Brazil. (ALVES *et al.*, 2017; NETO *et al.*, 2013; SIMIELLI, 2017; UNESCO, 2019). However, if the education system's focus remains solely on enhancing educational quality, addressing inequalities may be neglected in policy formulation, potentially leading to unequal opportunities that advantage only certain groups (CRAHAY, 2013; DURU-BELLAT, 2011; RAUDENBUSH; ESCHMANN, 2015).

On the Brazilian public agenda, concern with educational quality is more evident than actions focused on combating inequalities. The creation of the Basic Education Development Index (Ideb- *Índice de Desenvolvimento da Educação Básica*), an objective indicator for measuring the quality of education, marked the culmination of this agenda (BRASIL, 2007). Since that Ideb presents school and education system results based on averages in performance and promotion rates, improvements in the index may obscure significant variations in outcomes (SOARES; XAVIER, 2013). In other words, a municipality could surpass Ideb's targets with high averages while still having a substantial percentage of students performing at very low learning levels.

Even though the reduction of social and regional inequalities has been one of the fundamental principles in the Brasilian Federal Constitution since 1988, it was in 1996, with the Basic Guidelines Law (LDB), that the principle was transposed to education, guaranteeing "equality of conditions for access and permanence at school" through its third article (BRASIL, 1996). In the Presidential Decree that created Ideb in 2005, the word "inequalities" is not mentioned. However, later, when presenting the targets for this indicator, it was assumed that the initial inequalities could not be ignored so that the country could reach, in 2022, the desired level of quality, as we read: "Each system must evolve according to points of different departures and with greater effort from those who leave in a worse situation, with an implicit objective of reducing educational inequality" (FERNANDES, 2007).

The current National Education Plan (PNE-*Plano Nacional da Educação*) has, as one of its guidelines, "overcoming educational inequalities, with an emphasis on promoting citizenship and eradicating all forms of discrimination" (BRASIL, 2014). Within the scope of international commitments, Brazil is a signatory to the 2030 Agenda consisting of 17 Sustainable Development Goals (SDGs). SDG 4, Education, aims to ensure inclusive, equitable, and quality education for all, which guarantees educational opportunities throughout life, without gender or ethnic disparities, for people with disabilities, Indigenous peoples, and children in vulnerable situations (UNESCO, 2016).

Although the guarantee of educational equity appears as principles and objectives in several normative instruments, it is not universalized in practice. In this sense, this paper set out to analyze which conditions of educational provision characterize Brazilian municipalities that can guarantee quality with less learning inequalities.

For this purpose, we treat quality as students' learning in Portuguese and Mathematics, although we know that the term can take on other equally important dimensions (GUSMÃO, 2013; OLIVEIRA; ARAUJO, 2005). It was analyzed according to learning levels achieved in proficiency tests, not averages. Inequalities were measured based on gaps between social groups, through which it is possible to observe differences in learning.

To characterize the conditions of supply, we used two indicators that measure public inputs in education: i) the infrastructure of primary schools and ii) the adequacy of teacher training, which were

explained later in this text. We recognize that these indicators partially measure this dimension, but they satisfactorily cover schools in all Brazilian municipalities. To complete the analyses, we included territorial differences, such as regions, federation units, location, and size of municipalities, since the patterns of these inequalities are known in the literature.

From the perspective that both quality and the reduction of inequalities are important criteria for analyzing the country's educational situation, as well as for directing public policies in education, with this study we seek to answer four research questions: i) Where are the municipalities located that exhibit higher quality and greater equity in Socioeconomic Status (SES) levels?; ii) How do educational provision indicators correlate with quality and equity categories?; iii) Do socioeconomic equality situations align with racial and gender equality?; iv) Is a synthesis possible to explain the quality and equity standards of the locations?

To address these questions, we have structured the text into four main sections, alongside this introduction. The subsequent section outlines the theoretical framework that guided our analyses. Following this, we present the methodology, detailing the indicators utilized, the data examined, and the investigative approaches employed. The results section is dedicated to addressing each of the aforementioned questions. Lastly, in the concluding remarks, we discuss the principal findings of the study, its limitations, and propose avenues for future research.

EDUCATIONAL QUALITY AND EQUITY

The Federal Constitution of 1988 (BRASIL, 1988) establishes, in Article 205, that education is the right of everyone and the duty of the State and the family. Article 206 further specifies that education shall adhere to the principle of equal opportunities for access and continued attendance at school, with an emphasis on ensuring a high standard of quality.

But what would this quality be? Unlike the quality used for objects, in which there are clear criteria based on their manufacture, in the social field, the understanding of quality varies according to the values, experiences, and social position of the subjects (OLIVEIRA, ARAÚJO, 2005). An example of this is how the understanding of educational quality has evolved in recent decades. There was a period in Brazil when the quality of education was perceived by the provision of education, that is, access to school. Later, it became associated with the idea of student progression in the education system, and, years later, it became related to school performance, measured by large-scale tests (OLIVEIRA, ARAÚJO, 2005).

Recognizing the correlation between the quality of education and students' learning outcomes within educational institutions, it becomes essential to investigate students' proficiency, giving rise to the Basic Education Assessment System (SAEB-*Sistema de Avaliação da Educação Básica*), which evaluates, every two years, students enrolled in the last year of elementary and high school education. Through SAEB, it became possible to know, describe, explore, and monitor student learning, especially in public schools. From these evaluations, a lot of knowledge was produced. It was possible to verify, for example, that the right to education has been limited mainly by inequalities, both social and regional, with negative consequences on the realization of the right to quality education for all.

In Brazil, while access to basic education can be deemed widespread, only a minority of students successfully complete it, and even fewer do so with adequate performance. In this scenario, we agree with Soares (2004), who argues that increasing proficiency levels and reducing the impact of social position on school success should be the main objectives of any educational system, especially in Brazil, where the dependence on proficiency in socioeconomic, cultural and demographic characteristics is so significant. In the current understanding, quality must also be associated with educational equity. It is not enough to have educational quality for a few or only for the most socially advantaged.

The concept of equity, like quality, does not have a single meaning. In more recent studies, equity is related to the notion of justice. The idea of justice as equity had an important milestone in the work of Rawls (2009), in the 1970s. Rawls established the need for all people to compete under conditions of equality of fair opportunities (principle of equality) and, at the same time, that existing inequalities mainly benefit the least favored members of society (difference principle). Although education was not one of the first social goods considered by Rawls, egalitarians in the educational field, such as Dubet (2004), have been inspired by this conception of justice (RIBEIRO, 2012).

This means that, when we talk about equity, we are thinking about acting on inequalities that are not fair, on the barriers that prevent some individuals from accessing goods considered socially valued. Not all differences turn into inequalities, as this depends on collective appreciation. School culture is a value shared by society and a condition for access to future social positions, there is a collective appreciation of it (LAHIRE, 2008). Thus, inequality is a difference based on scales of value and refers to the rewards or opportunities for individuals within a group or between groups in society. Therefore, the concepts of equity and inequalities are interconnected. While the first provides the philosophical-political foundations, indicating which inequalities are considered fair, and, ultimately, referring to differences, the second helps us in the empirical perception of distances between social groups.

Assuming the limitations of the Brazilian educational system, equity still needs to be promoted to mitigate, among others, the effect of gender, race, and socioeconomic level on student performance. Having recognized these challenges, it is possible to identify some initiatives that have been proposed to measure the quality of education, based on the principles of equity. The Inequalities and Learning Indicator (IDeA- *Indicador de Desigualdades e Aprendizagens*) is one of them (SOARES; RODRIGUES; ERNICA, 2019; ERNICA, RODRIGUES, SOARES, 2023). The measure was designed to explain two ways in which the right to education fails to be met: i) exclusion due to a low level of learning, that is, when students did not learn what they should have learned and ii) exclusion due to learning inequality, that is, one in which individuals from one social group learn less than individuals from another group, having fewer chances of occupying socially valued positions and appropriating the wealth produced by society. Its calculation is based on the comparison of distances between the observed and expected distributions for a given population or group, and the results are published at the municipal level.

Striking a balance between improving educational quality and reducing inequalities is not an easy task. Our empirical analyses show that, in most Brazilian municipalities, higher levels of quality coexist with low levels of equity. In other words, the improvement observed in recent years in students' academic performance has not benefited everyone (ALVES; SOARES; XAVIER, 2016; SOARES; DELGADO, 2016).

However, educational quality with equity should not be seen as something unattainable. This is evidenced by numerous international studies, based on comparative research, which demonstrate that countries that are successful in improving quality are also more equitable (DEMEUSE; CRAHAY; MONSEUR, 2002; OECD, 2018; PARKER *et al.*, 2018; SCHMIDT; BURROUGHS, 2016; VAN DE WERFHORST; MIJS, 2010). In Brazil, some municipalities that adopted policies aimed at combating inequalities have achieved relative success in seeking this balance (KOSLINSKI; RIBEIRO; OLIVEIRA, 2017; RIBEIRO et al., 2020).

METHODOLOGY

It is important to highlight that all educational indicators[2] used were derived from regular collections conducted by the National Institute for Educational Studies and Research Anísio Teixeira (INEP - *Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira*). INEP annually carries out the School Census, which brings together administrative data on students, classes, teachers, and basic education schools throughout Brazil. Every two years, there is an assessment of the academic performance of students enrolled in the 2nd, 5th, and 9th years of elementary and middle school and 3rd year of high school, within the scope of Saeb.

To answer the questions of this study, we begin this section with a description of the data and indicators used in the analysis and, subsequently, we present the regression model used for statistical inference.

To describe quality and inequalities, we used indicators calculated based on the 2017 School Census and Saeb, produced within the scope of IDeA[3] by Soares, Rodrigues, and Érnica (2019), at the municipal aggregation level. Since our interest is to analyze the results in each municipality and their

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[2] About indicators based on the School Census, see <http://portal.inep.gov.br/web/guest/indicadores-educacionais>. About the Saeb, see <https://www.gov.br/inep/pt-br/areas-de-atuacao/avaliacao-e-exames-educacionais/saeb>.
[3] About indicators based on IDeA, see <https://portalidea.org.br/idea/>.

supply conditions, we consider state and municipal administration schools. We focused on all schools with enrollment in the 5th year of elementary school to analyze more synthetically and because existing inequalities in the first stage of elementary school tend to be cumulative.

In addition to educational indicators, we work with information from the Brazilian Institute of Geography and Statistics (IBGE-*Instituto Brasileiro de Geografia e Estatística*[4]) to locate municipalities by states, regions of the country, population size and Rural-Urban typology and, based on data from the Information System on Public Budgets in Education (SIOPE-*Sistema de Informações sobre Orçamentos Públicos em Educação*) of 2017, the student-year value calculated by municipality (VAAT)[5].

Educational Quality and Equity Indicators

The quality and equity indicators in this work were developed based on the measures that constitute the IDeA. The aim to quantify two types of school exclusion: one related to low performance and the other to inequality between social groups.

In the composition of the IDeA, the calculation of these measures is based on comparing the distances between the observed and expected distributions for a given population or group, using data from the Saeb editions covering 2007 to 2017. As a result, the IDeA presents several indicators: the level of learning in Portuguese, the level of learning in Mathematics, SES inequality, race inequality, and gender inequality.

In this calculation, individuals are not taken as the unit of analysis because, according to the authors, it is both impossible and even undesirable to verify absolute equality of learning among all individuals. Differences in learning resulting from individual ability are acceptable. Consequently, these indicators are calculated and available only at the municipal level.

Learning Quality Indicator

Measures of learning levels in Portuguese and Mathematics indicate how far municipalities are from a desirable learning level, with the reference value being zero. In this indicator, more negative values signify that the municipality is further from the reference point. Conversely, positive numbers indicate that the municipality's learning situation is above the reference. These learning level indicators are interpreted through five categories: low, medium-low, medium, medium-high, and high.

To classify municipalities according to the quality of learning, these measures, originally calculated separately for Portuguese and Mathematics, were combined into a single indicator, referred to as "quality". In proposing this combination, we found that when municipalities achieve high levels of learning in one subject, they tend to present similar results in the other. Therefore, we consider "higher quality (HQ)" to be medium-high and high levels in both subjects. When municipalities are at the average level in both subjects, they are also classified as "higher quality (HQ)". The remaining situations are classified as "lower quality (LQ)". The classifications are demonstrated in Chart 1.

Chart 1: Preparation of the learning quality indicator according to IDeA learning levels [6]

Learning levels in Portuguese	Learning Levels in Mathematics				
	high	medium-high	medium	medium-low	low
high	HQ	HQ	HQ	LQ	LQ

[4] For information by municipality, see <https://www.ibge.gov.br/estatisticas/economicas/contas-nacionais/9088-produto-interno-bruto-dos-municipios.html?=&t=resultados>.
[5] VAAT is made up of revenues from States, the Federal District and Municipalities linked to education, of a mandatory nature, and revenues from federal universal distribution programs in 2017. Revenue information by municipality can be found on the SIOPE platform <fnde.gov.br/fnde_sistemas/siope>.
[6] Note: HQ= "higher quality"; LQ= "lower quality".

medium-high	HQ	HQ	HQ	LQ	LQ
medium	HQ	HQ	HQ	LQ	LQ
medium-low	HQ	HQ	LQ	LQ	LQ
low	HQ	HQ	LQ	LQ	LQ

Source: Prepared by the authors.

SES Equity Indicator

Based on the inequality measures calculated within the scope of the IDeA, we selected the SES measure to construct the equity indicator for this research. Similar to the creation of quality indicators, the IDeA's SES inequality indicator uses zero as a reference value. In this context, the closer the value is to zero, the smaller the difference between social groups. Negative values indicate greater inequality. Exceptionally, positive values point to atypical situations, revealing the superiority of traditionally underrepresented minority groups.

The IDeA's numerical indicator of SES inequality is interpreted using five categories: extreme inequality, high inequality, inequality, equity, and atypical situations. Since these measures are calculated separately for Portuguese and Mathematics, we combined them to create a single variable, referred to as the equity indicator.

When municipalities presented equity in SES in both subjects, they were classified as having "lower inequalities (LI)". Municipalities that presented an atypical situation or inequality in one subject and equity in the other were also classified in this category. Municipalities that presented atypical situations in both subjects were classified as having "atypical situations (AS)". All other situations were grouped into the "higher inequalities (HI)" category (see Chart 2).

Chart 2: Preparation of the equity indicator according to IDeA's levels of SES inequalities[7]

Levels of inequality in Portuguese	Levels of Inequality in Mathematics				
	extreme inequality	high inequality	inequality	equity	atypical situations
extreme inequality	HI	HI	HI	LI	LI
high inequality	HI	HI	HI	LI	LI
inequality	HI	HI	HI	LI	LI
equity	HI	HI	LI	LI	LI
atypical situations	HI	HI	LI	LI	AS

Source: Prepared by the authors.

Quality and equity indicator

As noted above, both indicators created had two categories indicating whether they are higher or lower. At this stage, aiming to develop a single and more comprehensive measure for evaluating municipalities, we combine the quality and equity indicators once again.

This combination resulted in four groupings: i) lower quality and higher inequality (LQ+HI=Group 1); ii) lower quality and lower inequality (LQ+LI=Group 2); iii) higher quality and higher inequality (HQ+HI=Group 3); and iv) higher quality and lower inequality (HQ+LI=Group 4).

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[7] Note: HI= "higher inequality"; LI= "lower inequality"; AS= Atypical situations.

The cases of municipalities with atypical situations of inequality (10 municipalities) were not considered valid cases for the analysis. Additionally, there were still 35 municipalities in 2017 that did not have valid information to calculate learning and inequalities measures (see Chart 3).

Chart 3: Construction of the quality and equity indicator

Quality indicator categories	Equity indicator categories	
	Higher Inequality (HI)	Lower inequality (LI)
Lower quality (LQ)	No quality and no equity (Group 1)	Equity without Quality (Group 2)
Higher quality (HQ)	Quality without Equity (Group 3)	Quality with Equity (Group 4)

Source: Prepared by the authors.

Educational offer indicators

In this section, we present the educational supply indicators used in this work in detail: school infrastructure and adequacy of teacher training.

School infrastructure

The school infrastructure indicator was developed by Alves and Xavier (2018) and its most current version can be found in UNESCO (2019). The measure encompasses items relating to schools' access to public services, physical facilities, accessibility, equipment, and educational resources. It was constructed using data from the School Census from 2013 to 2017 and the Item Response Theory (IRT-*Teoria de Resposta ao Item*) methodology. Each school assigned an infrastructure score ranging from 0 to 10 points, where higher scores indicate better infrastructure of the educational institution.

At the municipal level, the infrastructure measure is obtained by averaging the infrastructure scores of state and municipal schools within its jurisdiction. In addition to the numerical scale, to facilitate interpretation, the values were classified into three infrastructure ranges in some analyses: Low (up to 5 points), Medium (between 5 and 7 points), and High (above 7 points).

Adequacy of Teacher Training

This indicator, prepared and available by Inep (INEP/MEC, 2014), assesses the adequacy of the academic training of basic education teachers, for each of the subject(s) and grades they teach. Each school-teacher-class pair is classified into one of the five groups, and the information is presented as a percentage by schools and states. The polarity of the indicator is greater-worse, which means that the closer the classification is to group five, the less adequate the teachers' training is.

In this study, we considered classifying the percentage of teachers with adequate training (group 1) into three categories: i) Low (up to 60% of teachers with adequate training); ii) Medium (more than 60% to 80% of teachers with adequate training) and iii) High (above 80% of teachers with adequate training).

Municipal context indicators

In addition to educational indicators, we used information from the Brazilian Institute of Geography and Statistics (IBGE-*Instituto Brasileiro de Geografia e Estatística*) to locate municipalities by state, regions of the country, population size, and rural-urban typology. Based on data from the Information System on Public Budgets in Education (SIOPE-*Sistema de Informações sobre Orçamentos Públicos em Educação*), from 2017, we also considered the total student-year value calculated by municipality, known as VAAT.

The rural-urban typology of municipalities assumes 5 different categories: 1. Intermediate Adjacent; 2. Remote Intermediary; 3. Adjacent Rural; 4. Remote Rural; and 5. Urban. The classification

of municipalities into: "urban", "intermediate" and "rural" depends on the density of occupation and degree of urbanization of each one. The addition of "adjacent" and "remote" allows us to distinguish, respectively, cities that are close to higher-ranking urban centers from those that are distant (IBGE, 2017, p.58-59).

The size of the municipality is an indicator constructed from the number of inhabitants of the place, classified into 7 categories: 1. Up to 5 thousand; 2. More than 5 to 10 thousand; 3. More than 10 to 20 thousand; 4. More than 20 to 50 thousand; 5. More than 50 to 100 thousand; 6. More than 100 to 500 thousand; and 7. More than 500 thousand. The number of inhabitants was obtained from the population projection for 2017, made by IBGE.

Finally, VAAT is a measure calculated by SIOPE, which is a complement to the Fund for Maintenance and Development of Basic Education and Valorization of Education Professionals (Fundeb-*Fundo de Manutenção e Desenvolvimento da Educação Básica e de Valorização dos Profissionais da Educação*) to municipalities, so that the amount transferred per student/year be the same in all cities.

RESULTS

In this section, we will analyze how quality and inequalities are distributed across the Brazilian territory, highlighting patterns in the location of municipalities. Each subsection aims to answer one of the questions posed in the introduction.

Municipalities that present quality with less SES inequalities

The convergence of quality and equity of status socioeconomic level (SES) within the same municipality is a very rare situation in Brazil. Map 1 illustrates the spatial distribution of the combination of IDeA indicators of SES quality and equity for the 5th year of elementary school. There is valid information for 5,535 municipalities because (1) not all municipalities had the quality measure calculated (for 25 of them there is no information in the IDeA) and; (2) for the 10 municipalities, in which the SES inequality measure was an "atypical situation" (SOARES; RODRIGUES; ÉRNICA, 2019), it was not possible to classify them into one of the groups that combined quality and inequality.

Map 1 – SES quality and inequality groups by municipalities, 5th year of elementary school, Brazil[8]
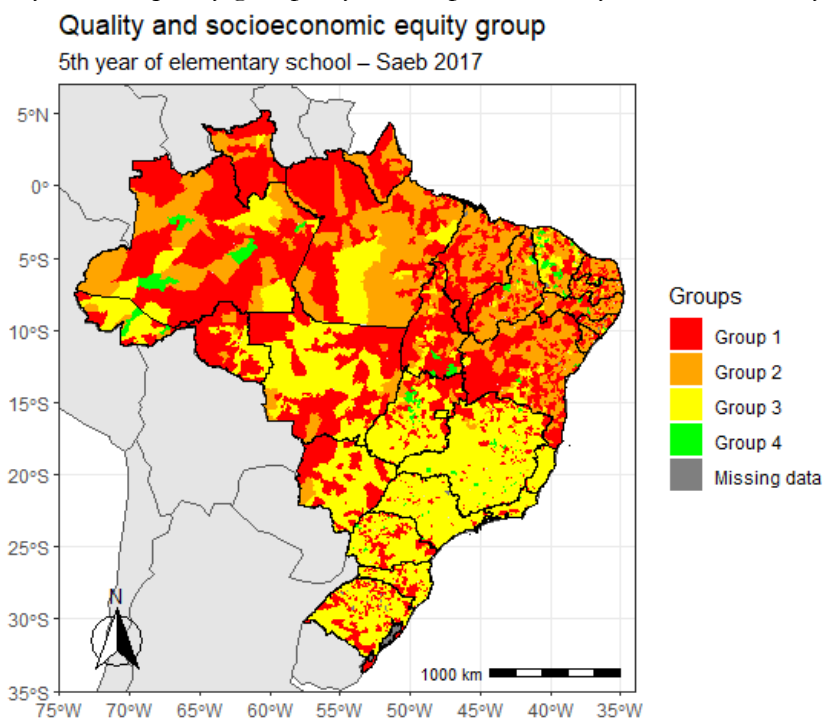
[8] It includes only municipal and state public schools that offer the 5th year of elementary education.

The green color on Map 1 indicates the municipalities in Group 4 (HQ+LI), where there is simultaneously quality learning with low SES inequality for the 5th year of elementary school. There are only 100 of the 5,535 municipalities in the country (1.8% of the total with valid information) in this condition. Additionally, we observed a distinction between the North/Northeast regions as opposed to the South/Southeast regions, with the Central-West in an intermediate situation concerning the HQ.

Thirty of the 100 municipalities in Group 4 are in Ceará, 19 in Minas Gerais, and 12 in Goiás (full distribution in Table A1, Appendix A). However, it is important to analyze the relative weight of these municipalities within their respective states, as this can indicate the presence of intrastate asymmetries (ABRUCIO, 2010; ARRETCHE, 2004). Graph 1 shows this analysis. The horizontal axis (X) of the graph represents the percentage of municipalities with HQ in the total number of municipalities that had this measure calculated in the state and the vertical axis (Y) represents the same in equity (LI). The size of the circles represents the percentage of municipalities with both attributes simultaneously, that is, the municipalities in group 4. The states represented by smaller circles do not have municipalities in this group. Additionally, the colors of the bubbles represent the five regions of the country.

The patterns in Graph 1 corroborate the results in Map 1. Close to the X axis, with the highest values for quality, are the states in the Southeast and South regions, along with Goiás and Mato Grosso do Sul, where more than 60% of its municipalities have teaching with HQ. The state of São Paulo is particularly notable, with more than 90% of its municipalities achieving HQ. However, this quality is for very few. Except for Goiás, which we will comment on below, less than 5% of the municipalities in the states have LI, and municipalities in group 4 are rare (see table A2, Appendix A).

Graph 1 – Distribution of states according to the percentage of municipalities with HQ, percentage of municipalities with LI, and percentage of municipalities in the Group 4[9]
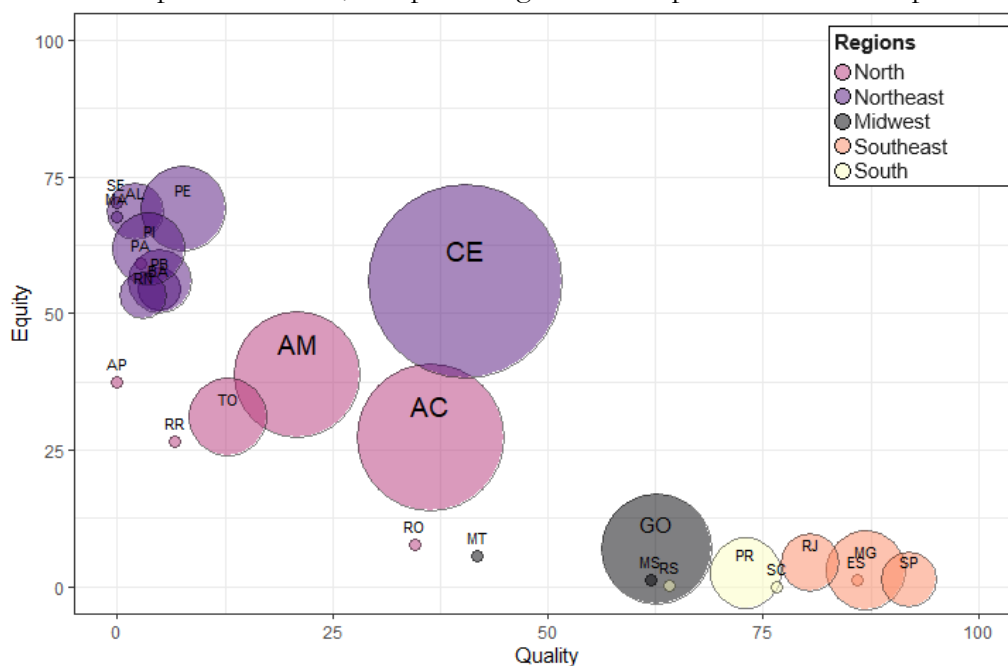
Source: Prepared by the authors, based on information from IDeA, the Basic Education Census, and Saeb from 2007 to 2017.

Goiás differs slightly from this pattern, as it has the largest number of municipalities with LI (6.9%) and, due to the size of the circle, it has more municipalities in Group 4, demonstrating quality with equity (4.9% of its municipalities). It is also worth noting that the 19 municipalities of Minas Gerais

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[9] Observations: (1) the size of the circles is relative to the percentage of municipalities in the state in Group 4 - more quality and less inequality in SES; (2) states represented with a dot do not have any municipalities in Group 4; (3) excludes the Federal District.

in Group 4 represent only 2.2% of the state, which denotes a marked intrastate asymmetry. Espírito Santo, Mato Grosso do Sul, Rio Grande do Sul, and Santa Catarina, represented by the smaller bubbles, do not have any municipalities in Group 4, and Santa Catarina, the point located on the X axis, does not have a single municipality with LI.

Next to the Y axis of the Graph, we observe that the highest values for equity are in states in the Northeast region and some in the North. However, all of them have less than 5% of municipalities with HQ, except for Ceará, which we will comment on below. Pará, Sergipe, Maranhão, and Amapá, represented by the smaller bubbles in Graph 1, do not have municipalities in group 4, and in the last three, represented by the points on the Y axis, no municipality has an HQ.

The highlights in Graph 1 are the large circles in its most central plane, the largest of which represents the state of Ceará, where around 40% of its municipalities have HQ and more than 55% have LI. The size of the circle means that Ceará has the highest percentage of municipalities in Group 4, which simultaneously brings together more quality and less inequality in SES (16.4%, according to Table B2 of Appendix B). Acre also stands out due to its relative position in the Graph, 36% of its municipalities have HQ, 27% have LI and 9.1% are in Group 4. The third largest circle represents the state of Amazonas, where 6.5% of the municipalities are in Group 4. The Tocantins circle is equivalent to Minas Gerais (2.2%), but the state has much higher values on the equity axis than on the quality axis.

In general, the state of Ceará stands out compared to the others. There is a vast literature on its good educational results, relating them to education management strategies as influential in creating mobilization around clear objectives (ALVES *et al.*, 2017; CRUZ; FARAH; RIBEIRO, 2020; KOSLINSKI; RIBEIRO; OLIVEIRA, 2017; PADILHA *et al.,* 2013; UNESCO, 2019; VIEIRA; PLANK; VIDAL, 2019). Public elementary education is predominantly municipalized in Ceará with 96% of schools being under municipal administration, according to the School Census. This does not prevent the existence of a collaboration pact between the state and municipalities to improve public education so that policies are formulated by the state and implemented with the partnership of all municipalities. The longevity of this pact, which crosses governments of different political stripes, has guaranteed the continuity of policies and the evolution of their educational indicators. The "Grade 10 School Award", for example, has been maintained, with small adjustments, since 2009 (BROOKE; CUNHA, 2011; CALDERÓN; RAQUEL; CABRAL, 2015).

The state of Acre, also highlighted in previous analyses, began in 1999 with a set of policies related to increasing spending on education, improving school infrastructure, actions to qualify teachers, and strengthening cooperation between the state and municipalities. Research on the state shows that policy planning focusing on learning but at the same time on the diversity of the population favors the improvement of academic performance indicators and the reduction of inequalities, especially regarding gender (GUSMÃO; RIBEIRO, 2016; RIBEIRO et al., 2020).

The municipalities that achieve higher quality and lower inequality are of various types, but in general, they are small municipalities (up to 50 thousand inhabitants) and are classified as adjacent rural (see tables A3 to A4, Appendix A). There is evidence that the larger the municipality, the more difficult it is to achieve equity, that is, a problem of scale that needs to be addressed with more decentralized policies.

The relationship between educational supply indicators and quality and equity groups

In this section, we analyze how quality and equity groups are related to educational supply indicators: school infrastructure and the percentage of teachers with adequate training in the municipality. In Table 1, we observe the coefficients of the correlation matrix between the IDeA indicators. Utilizing numerical scales, the first highlight refers to the negative correlation between quality and SES equity. This suggests the presence of HQ in municipalities, in general, is not accompanied by LI. This negative relationship poses a significant challenge for educational policies.

Given this evidence, a question for public managers and researchers in the area is to understand which factors can contribute to minimizing regional inequalities between schools. According to the table, the quality of supply indicators is positively correlated with the quality of learning and negatively correlated with equity situations. This evidence is also contained in previous studies

(ALBERNAZ; FERREIRA; FRANCO, 2005; ALVES; ORTIGÃO; FRANCO, 2007; SOARES; ALVES, 2003).

Table 1 – Linear correlation matrix between quality of learning, SES inequalities, and supply indicators in municipalities, 5th year of elementary school[10]

Variables	Quality of learning in Mathematics	Quality of learning in Portuguese	SES Equity in Mathematics	SES Equity in Portuguese	Infrastructure of schools in the municipality	% of teachers with adequate training
Quality of learning in Mathematics	1.00	0.96	-0.46	-0.46	0.59	0.42
Quality of learning in Portuguese	0.96	1.00	-0.45	-0.44	0.60	0.42
SES Equity in Mathematics	-0.46	-0.45	1.00	0.75	-0.45	-0.32
SES Equity in Portuguese	-0.46	-0.44	0.75	1.00	-0.44	-0.32
Infrastructure of schools in the municipality	0.59	0.60	-0.45	-0.44	1.00	0.42
% of teachers with adequate training	0.42	0.42	-0.32	-0.32	0.42	1.00

Source: Prepared by the authors, based on information from IDeA, the Basic Education Census, and Saeb from 2007 to 2017.

When the same correlation is calculated by state, we observe that some associations differ from the national trend. In Chart 4, we highlight Roraima, Piauí, Ceará, Sergipe, and Espírito Santo, which show a positive correlation between equity (in Portuguese and Mathematics), infrastructure, and adequacy of training. This set of results suggests that while universalist policies are necessary, they are not sufficient on their own, requiring targeted actions to combat inequalities.

Chart 4 – States with a positive correlation between equity and educational supply indicators

Inequality by component	School infrastructure	% of teachers with adequate training
SES Equity in Mathematics	AC, RR, PA, PI, CE, RN, PB, SE, BA, ES, RJ	RR, AP, TO, MA, PI, CE, AL, SE, MG, ES, PR, SC, RS, MT, GO
SES Equity in Portuguese	AC, AM, RR, PI, CE, PB, AL, SE, ES, RJ	RR, AP, TO, MA, PI, CE, SE, MG, ES, MT, GO

Source: Prepared by the authors, based on information from IDeA, the Basic Education Census, and Saeb from 2007 to 2017.

The following analyses take a closer look at the SES quality and equity groups in the supply indicators. Graph 2 depicts the distribution of infrastructure by groups. The dashed lines in the graph indicate the thresholds that separate the infrastructure bands, as shown on the secondary axis. The "X" inside each box in the diagram represents the average value. Firstly, it is notable that the majorit municipalities, across all groups are concentrated below the highest level of infrastructure (below 7 points). About 25% of the municipalities in Group 3 exhibit infrastructure in the high range.

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[10] All coefficients are significant at 0.01.

Municipalities in this group show less variability (smaller box size) and, as we saw in Map 1, are more concentrated in the South and Southeast regions. Secondly, both the means and medians of infrastructure scores are higher for municipalities in Groups 3 and 4. Lastly, focusing on Group 4, municipalities display varying levels of infrastructure, however, more than 75% are above the mid-range. These findings suggest that while the relationship with infrastructure is not deterministic, it appears to be a necessary condition for enhancing the quality of learning in schools, amidst numerous influencing factors.

Graph 2 – Distribution of municipalities according to average school infrastructure by quality and equity groups - 5th year of elementary school
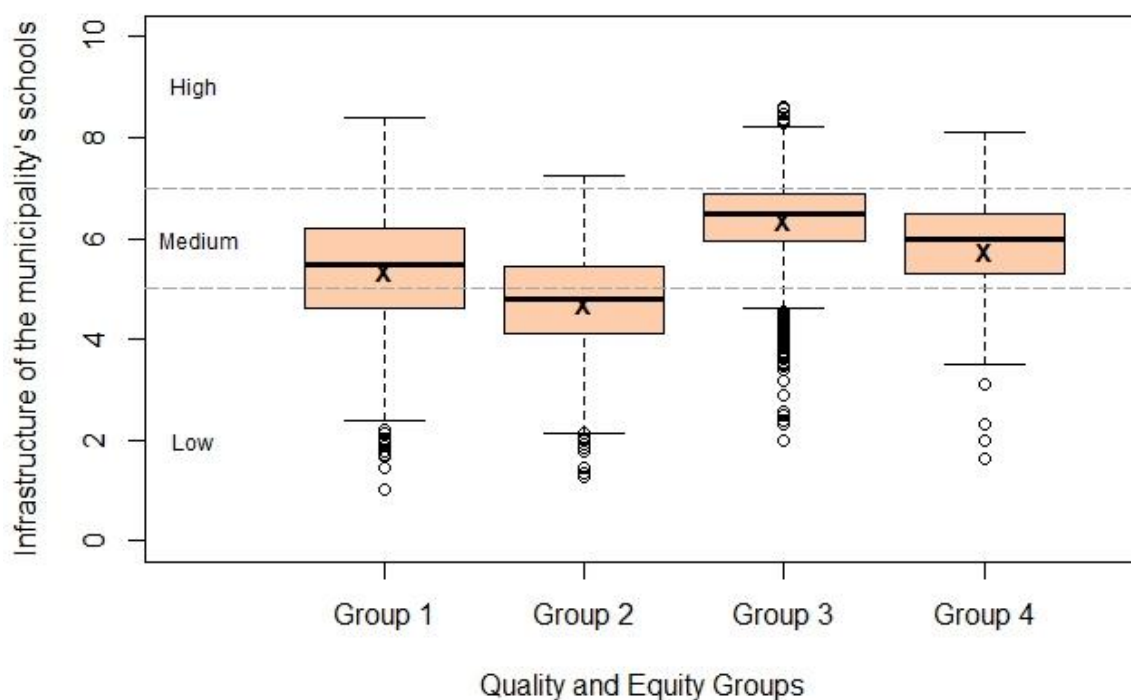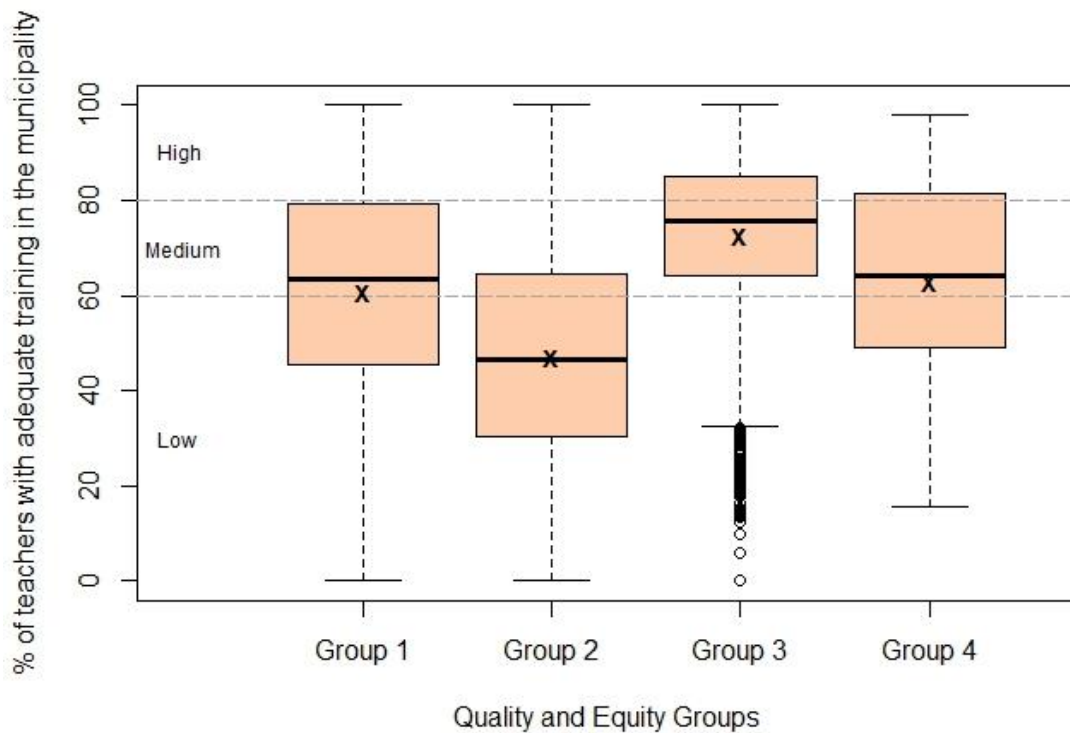

Source: Prepared by the authors, based on information from IDeA and the Basic Education Census from 2007 to 2017.

It is important to highlight that there are not many municipalities in the high infrastructure range, as discussed in UNESCO (2019), which represents another major challenge for education systems. In this range, schools are expected to meet the recommendations established in the 2030 Agenda (UNITED NATIONS, 2015) and the parameters of the Initial Student Cost Quality (CAQi-*Custo Aluno Qualidade Inicial*), which area set as a minimum standard in the PNE (BRASIL, 2014) and in the law of the new Fundeb (BRAZIL, 2020).

In Graph 3, we observe the distribution of the percentage of teachers with adequate training by quality and equity groups. More than 75% of the municipalities in Group 3 are concentrated in the medium and high ranges of the training adequacy indicator. However, a set of outlier values is notable, represented by the circles beyond the base of the lower whisker of the boxplot. We observe variability in the other groups when comparing the distances between the 1st and 3rd quartiles of the distribution (1st and 3rd line in the box). Specifically in the municipalities of Group 4, slightly more than 25% of them are in the high range of the indicator, meaning they have more than 80% of teachers with adequate training for the stage and subject they teach.

Graph 3 – Distribution of municipalities according to the percentage of teachers with adequate training by quality and equity groups - 5th year of elementary school

Source: Prepared by the authors, based on information from IDeA and the Basic Education Census from 2007 to 2017.

Considering that Group 4 comprises many municipalities in the state of Ceará, the weight of the distribution of indicators in the state must be factored into the overall average of the group. Ceará stands out for presenting lower supply indicators than those observed in the South and Southeast regions. This group is also formed, in general, by small municipalities, as indicated in the tables in Appendix B. However, if supply conditions are at more intermediate levels in these municipalities, what might explain their condition of higher quality with lower SES inequality?

It is possible to think that other actions focus on promoting equitable conditions, as already pointed out in specialized literature (CRUZ; FARAH; RIBEIRO, 2020; DAMASCENO; SANTOS, 2011; GUSMÃO; RIBEIRO, 2016; PADILHA *et al.*, 2013; RIBEIRO *et al.*, 2020; VIEIRA; PLANK; VIDAL, 2019). For example, strong intersectoral policy, pact for literacy at the correct age, involvement of schools in secretariat guidelines, monitoring of teachers, monitoring of results, etc.

It would be inaccurate to interpret these results as indicating that "inputs don't matter." Equalizing the distribution of inputs is important and should not be contingent on school performance results. A school with a safe environment, good facilities and equipment, and well-qualified teachers is a fundamental right. Inputs constitute necessary but not sufficient conditions for quality education. They also depend on investment and the establishment of related quality minimums (BRASIL, 2015). Table 2 shows that the financial resources invested in the municipality per student are positively correlated to the inputs analyzed in this study and to the quality of learning in Portuguese and Mathematics.

Table 2 – Linear correlation matrix between VAAT, school infrastructure, percentage of teachers with adequate training and quality of learning

Indicators	Correlation with VAAT
School infrastructure	0.54
Percentage of teachers with adequate training	0.33
Quality of learning in Mathematics	0.42
Quality of learning in Portuguese	0.41

Source: Prepared by the authors, based on information from IDeA, ADFD, and ICG indicators from INEP, Basic Education Census, Saeb from 2007 to 2017 and Siope from 2017.

Situations of equality of SES, race, and gender

So far, we have analyzed the distribution of quality and equity groups relative to the SES. In this subsection, we will investigate how other inequalities are distributed between groups. We used the IDeA measures of race and gender inequalities. We synthesized the race inequalities, originally separated for Portuguese and Mathematics, combining the bands in the two subjects, just as we did for the SES inequalities. In the case of gender, as the patterns between subjects are opposite (girls tend to have better results than boys in Portuguese and worse in Mathematics), we will observe these inequalities separately. The columns in Tables 3 and 4 refer to the IDeA inequality ranges, in which we maintained the indicator's original nomenclature, so equity is compatible with the range we call the least inequality. The lines contain the SES quality and equity groups that we created for this work.

In Table 3, we observe that race equity situations occur in different conditions in the municipalities regarding the quality and equity of SES, that is, there is no coincidence of equity situations for the race and SES criteria. If we take Group 4, among the 100 municipalities, only 30 of them also show equity in terms of race (Table B1, Appendix B).

Table 3 – SES quality and equity groups by race inequality in Portuguese and Mathematics, jointly

SES Quality and Equity Groups	Race inequality bands – Portuguese and Mathematics				
	Inequality	Equity	Atypical situation	Missing	Total
Group 1: LQ and HI	21.3%	37.7%	31.8%	33.3%	28.2%
Group 2: LQ and LI	9.0%	39.9%	63.6%	0.0%	22.0%
Group 3: HQ and HI	67.6%	21.1%	0.0%	66.7%	48.0%
Group 4: HQ and LI	2.1%	1.3%	4.6%	0.0%	1.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Prepared by the authors, based on information from IDeA.

In Table 4, we observe gender inequalities in Portuguese and Mathematics. In these cases, we see that situations of gender equality coexist with high levels of quality without SES equity. When taking only municipalities from Group 4, we found that 63 of the 100 municipalities have gender equality in Mathematics and 14 of them have equality in Portuguese (table B1, Appendix B). It is important to highlight that educational literature has already identified that inequalities between girls and boys are smaller in the 5th grade than in the 9th grade and that, over time, the gap between boys and girls in the 5th grade has been decreasing in Mathematics (ALVES; SOARES; XAVIER, 2016; SOARES; RODRIGUES; ÉRNICA, 2019).

Table 4 – Groups of SES quality and inequality by gender inequality in Mathematics and Portuguese Language

SES Quality and Equity Groups	Ranges of gender inequality					
	Mathematics			Portuguese		
	Inequality	Equity	Total	Inequality	Equity	Total
Group 1: LQ + HI	25.80%	29.60%	28.20%	27.10%	34.40%	28.20%
Group 2: LQ + LI	21.30%	22.50%	22.00%	22.80%	17.10%	22.00%
Group 3: HQ + HI	51.10%	46.20%	48.00%	48.20%	46.70%	48.00%
Group 4: HQ + LI	1.80%	1.70%	1.80%	1.90%	1.80%	1.80%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: Prepared by the authors, based on information from IDeA.

Summary of quality standards and inequalities

The findings from the analysis of the distribution of groups by location and size of municipalities, the association with supply indicators, and race and gender inequalities suggest the following: 1) higher quality situations exhibit a territorial pattern consistent with a North/South divide, which also aligns with the distribution of inputs such as infrastructure and the adequacy of teacher training; 2) the municipalities in Group 4 are predominantly small (up to 50 thousand inhabitants); 3) supply indicators are associated with the quality of learning, but do not appear to be related to less SES inequalities; 4) very low levels of supply indicators are not present in situations of equitable quality assurance; and 5) SES equity does not necessarily coincide with race and gender equity. Chart 5 summarizes the results by groups of quality and SES equity.

Chart 5: Summary of results

Group 1: LQ + HI	Group 2: LQ + LI
Predominance in municipalities in the North region, of the remote intermediate and remote rural type;	Predominance in municipalities in the Northeast region, with no pattern of urbanization type (less frequent in urban areas);
With up to 5,000 inhabitants;	More than 10,000 to 100,000 inhabitants (neither very small nor large municipalities);
Adequacy of teacher training: no standard (slightly more common in municipalities with less than 60% of teachers with adequate training);	Adequacy of teacher training: low (less than 60% of teachers with adequate training);
Low infrastructure;	Low infrastructure;
No pattern of race inequality;	Presence of race equity or atypical situation;
No pattern of gender inequality (in Portuguese or Mathematics).	No pattern of gender inequality (in Portuguese or Mathematics).
Group 3: HQ + HI	Group 4 HQ +LI
Predominance in municipalities in the Southeast, South, and Central-West regions, of the intermediate adjacent and urban types;	Predominance in municipalities in the states: AC, AM, CE, GO, TO, and MG, of the adjacent rural type;
In municipalities of all sizes, although slightly more frequent in municipalities with more than 100,000 inhabitants;	More than 5,000 to 20,000 inhabitants;
Adequacy of medium and high teacher training (more than 60% of teachers with adequate training);	Adequacy of teacher training: no standard (slightly more common in municipalities with less than 60% of teachers with adequate training);
Medium and high infrastructure;	Average infrastructure;
	Presence of racial inequality, but 30% of municipalities with equality;

Presence of race inequality or uncalculated inequality scores; No pattern of gender inequality (in Portuguese or Mathematics).	Gender inequality in Portuguese and equity in Mathematics.

Source: Prepared by the authors.

All analyses so far have been univariate or bivariate, enabling the exploration of patterns across groups of municipalities. In addition, we fitted a multinomial logistic regression model to estimate, based on a set of characteristics, the probability of a municipality belonging to one of the groups, compared to being in Group 1 (with lower quality and more inequalities). Table 5 reports the model results.

Table 5 – Results of fitting the multinomial logistic regression model [11]

Quality and inequality groups (a)	Variables	Coefficient	Meaningfulness	Odds ratio
Group 2: lower quality with less inequality	Constant	-2.464	0.000	
	North (b)	1.948	0.000	7.013
	Northeast (b)	2.728	0.000	15.302
	South (b)	-1.914	0.003	0.148
	Midwest (b)	0.004	0.992	1.004
	Up to 5 thousand inhabitants (c)	0.390	0.141	1.477
	More than 5 to 10 thousand inhabitants (c)	0.734	0.005	2.083
	More than 10 to 20 thousand inhabitants (c)	0.969	0.000	2.636
	More than 20 to 50 thousand inhabitants (c)	1.308	0.000	3.698
	More than 50 to 100 thousand inhabitants (c)	0.866	0.003	2.378
	Infrastructure of the municipality's schools	-0.064	0.189	0.938
	Percentage of teachers with adequate training in the municipality	-0.007	0.001	0.993
Group 3: higher quality with more inequality	Constant	-3.211	0.000	
	North (b)	-3.076	0.000	0.046
	Northeast (b)	-3.901	0.000	0.020
	South (b)	-1.337	0.000	0.263
	Midwest (b)	-2.077	0.000	0.125
	Up to 5 thousand inhabitants (c)	-1.615	0.000	0.199
	More than 5 to 10 thousand inhabitants (c)	-0.361	0.092	0.697
	More than 10 to 20 thousand inhabitants (c)	0.189	0.386	1.208
	More than 20 to 50 thousand inhabitants (with)	0.909	0.000	2.483
	More than 50 to 100 thousand inhabitants (c)	1.091	0.000	2.979
	Infrastructure of the municipality's schools	0.870	0.000	2.386

[11] (a) reference category: group 1: lowest quality with most inequality; (b) reference category: Southeast; (c) reference category: more than 100 thousand inhabitants.

Quality and inequality groups (a)	Variables	Coefficient	Meaningfulness	Odds ratio
	Percentage of teachers with adequate training in the municipality	0.007	0.002	1.007
Group 4: higher quality with less inequality	Constant	-8.077	0.000	
	North (b)	-0.710	0.093	0.492
	Northeast (b)	-0.338	0.268	0.713
	South (b)	-2.093	0.000	0.123
	Midwest (b)	-0.977	0.008	0.376
	Up to 5 thousand inhabitants (c)	1.244	0.232	3.471
	More than 5 to 10 thousand inhabitants (c)	2.451	0.017	11.603
	More than 10 to 20 thousand inhabitants (c)	2.381	0.021	10.811
	More than 20 to 50 thousand inhabitants (c)	2.320	0.027	10.180
	More than 50 to 100 thousand inhabitants (c)	2.126	0.056	8..378
	Infrastructure of the municipality's schools	0.698	0.000	2.009
	Percentage of teachers with adequate training in the municipality	0.002	0.758	1.002

Source: Prepared by the authors, based on information from IDeA, INEP indicators, Basic Education Census, and Saeb from 2007 to 2017.

The effects of municipal school infrastructure indicate that the higher average school infrastructure levels correspond to lower the chances of the municipality being in Group 1 and increased the chances of belonging to Group 3 (2.386 times) or Group 4 (2.009 times), regardless of the other variables controlled in the model. For Group 2, the effect of infrastructure was negative, but statistically not significant. This suggests that the infrastructure does not change the chances of the municipality belonging to Group 2 compared to Group 1, possibly because both groups exhibit lower quality, meaning they have the same characteristic in common. Infrastructure becomes significant when comparing groups with and without quality.

The effects of the percentage of teachers with adequate training follow a similar pattern of the infrastructure, although the magnitude of the odds ratios is lower. A municipality where all teachers have adequate training has nearly the same likelihood of belonging to Group 3 as it does Group 1.

All calculated coefficients are independent of the region in which the municipalities are located and the size of the population. This indicates that the effects of infrastructure obtained from the regression model are not negligible.

FINAL CONSIDERATIONS

Raising school performance averages has been a priority for educational policies in recent decades, especially since the introduction of Ideb. The improvement in this indicator was pursued by most education systems, with greater success achieved in the initial years of primary education. However, many educational policies for technical and financial assistance from the Union for States and Municipalities, during the period covered by the data analyzed in this article, had equity as a guiding principle. Despite this focus, there was no effective way to monitor equity. The primary focus of policy success has been on improving Ideb, according to the National Education Plan (PNE-*Plano Nacional da Educação*) (BRASIL, 2014). Due to the absence of an equity measure, this objective of reducing inequalities was not achieved in most of the municipalities, as our findings indicate.

Inequalities in educational provision remain pronounced in Brazil. Inep already produces some indicators measuring the conditions of supply, but an indicator of school infrastructure must be

incorporated. It is essential to consider these conditions, as they are most directly associated with the quality of learning. However, focusing only on this relationship will not promote equity. Equity is rarely achieved through universalist policies; instead, it requires specific policies designed for this purpose.

Learning inequalities must also be considered. This dimension requires a consistent measure that incorporates the main criteria that generate inequalities, including SES, race, gender, at least. The IDeA is a proposal in this sense. Its novelty is to shed light on equity and offering a new perspective on the "quality of education": one that challenges the notion of quality for the few. However, one of the limitations of this proposal is that it only considers data from elementary school leaving secondary education uncovered. This limits its usefulness as a guide for basic education and restricts its application to interventions in elementary education. Another limitation concerns the fact that the smallest unit disclosed is the municipality, which hinders more specific interventions, such as those targeting individual schools. Finally, there are issues of access and retention in education that are also uncovered in this measure.

As the IDeA calculation unit is municipalities, this study is limited to describe the inequalities between these locations. However, our findings indicate that some states and municipalities exhibit different patterns from those observed nationally, making them interesting cases for future research, similar to the study conducted by Érnica and Rodrigues (2020).

No less important, it is worth mentioning that quality periodic and public data are fundamental to producing evidence-based indicators and policies. Finally, the contribution of this study was to indicate the combination of variables that most likely favor the balance between quality and equity. However, we need to be realistic: it is not possible to assume that this balance will be generalized without this objective being more explicit part of the political agenda. Collaboration policies between the union and federated entities, and among them, need to be reinforced, including quality and equity indicators.

This agenda is even more relevant in the current, post-COVID-19 pandemic scenario, where learning gaps and the intensification of educational inequalities have become increasingly profound.

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AUTHORS' CONTRIBUTION

Author 1 – Responsible for the conceptual design of the research, data processing, analysis, and writing of the article.

Author 2 – Responsible for the conceptual design of the research, data processing, analysis, and writing of the article.

Author 3 – Responsible for analyzing and writing the article.

DECLARATION OF CONFLICT OF INTEREST

The authors declare that there is no conflict of interest with this article.

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Appendix A – Distribution of municipalities by quality and equity criteria according to location and/or type of municipality

Table A1 – SES quality and equity groups by states and regions of the country

	Groups for quality and equity			
	Group 1: Lower quality with high inequality	Group 2: Lower quality with low inequality	Group 3: Higher quality with high inequality	Group 4: Higher quality with low inequality
Brazil	**28.2%**	**22.0%**	**48.0%**	**1.8%**
North	**50.0%**	**36.2%**	**11.8%**	**2.0%**
RO	57.7%	7.7%	34.6%	0.0%
AC	45.5%	18.2%	27.3%	9.1%
AM	46.8%	32.3%	14.5%	6.5%
RR	66.7%	26.7%	6.7%	0.0%
PA	38.2%	59.0%	2.8%	0.0%
AP	62.5%	37.5%	0.0%	0.0%
TO	58.3%	28.8%	10.8%	2.2%
Northeast	**34.9%**	**57.5%**	**4.9%**	**2.6%**
MA	32.4%	67.6%	0.0%	0.0%
PI	36.4%	60.0%	1.8%	1.8%
CE	20.2%	39.3%	24.0%	16.4%
RN	44.3%	52.7%	2.4%	0.6%
PB	40.5%	54.5%	3.6%	1.4%
PE	25.9%	66.5%	4.9%	2.7%
AL	30.3%	67.7%	1.0%	1.0%
SE	29.3%	70.7%	0.0%	0.0%
BA	41.3%	53.8%	4.3%	0.5%
Southeast	**10.7%**	**0.7%**	**87.0%**	**1.6%**
MG	12.2%	0.8%	84.8%	2.2%
ES	12.8%	1.3%	85.9%	0.0%
RJ	16.3%	3.3%	79.3%	1.1%
SP	7.8%	0.2%	91.1%	0.9%
Sul	**29.4%**	**0.3%**	**69.7%**	**0.6%**
PR	26.3%	0.8%	71.2%	1.8%
SC	23.4%	0.0%	76.6%	0.0%
RS	35.7%	0.2%	64.1%	0.0%
Midwest	**40.7%**	**3.0%**	**53.7%**	**2.6%**
MS	36.7%	1.3%	62.0%	0.0%
MT	52.5%	5.7%	41.8%	0.0%
GO	35.4%	2.0%	57.7%	4.9%
DF	0.0%	0.0%	100.0%	0.0%

Source: Prepared by the authors, based on information from IDeA and IBGE.

Table A2 – Percentage of municipalities in each state of the country, by analyzed criterion

STATE	Percentage of municipalities		
	High quality	High equity	High quality with low inequalities
SP	92.1	1.1	0.93
MG	87.0	3.0	2.23
ES	85.9	1.3	0.01
RJ	80.4	4.3	1.09
SC	76.6	0.0	0.01
PR	72.9	2.5	1.75
GO	62.6	6.9	4.88
MS	62.0	1.3	0.01
RS	61.2	0.2	0.01
MT	41.8	5.7	0.01
CE	40.2	55.4	16.39
AC	36.4	27.3	9.09
RO	34.6	7.7	0.01
AM	21.0	38.7	6.45
TO	12.9	30.9	2.16
PE	7.6	69.2	2.70
RR	6.7	26.7	0.01
PB	4.9	55.6	1.35
BA	4.8	54.3	0.48
PI	4.5	60.7	1.82
RN	3.0	53.3	0.60
PA	2.8	59.0	0.01
AL	2.0	66.7	1.01
AP	0.0	37.5	0.01
MA	0.0	67.3	0.01
SE	0.0	70.3	0.01

Source: Prepared by the authors, based on information from IDeA.

Table A3 – Groups of quality and SES inequality by type of municipalities

Groups	Tipologia Rural-Urbana dos municípios						
	Adjacent Intermediary	Remote Intermediary	Adjacent Rural	Remote Rural	Urban	Without classification	Total
Group 1: Lower quality with high inequality	17.2%	48.3%	34.1%	48.9%	15.6%	25.0%	28.2%
Group 2: Lower quality with low inequality	26.9%	16.7%	23.7%	36.2%	13.4%	25.0%	22.0%
Group 3: Higher quality with high inequality	54.0%	33.3%	40.0%	13.0%	70.0%	50.0%	48.0%
Group 4: Higher quality with low inequality	1.9%	1.7%	2.2%	1.9%	1.0%	0.0%	1.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Prepared by the authors, based on information from IDeA and IBGE.

Table A4 – Quality and SES inequality groups by municipality size

Groups	Size of the municipality (number of inhabitants)							
	Up to 5 thousand	More than 5 to 10 thousand	More than 10 to 20 thousand	More than 20 to 50 thousand	More than 50 to 100 thousand	More than 100 to 500 thousand	More than 500 thousand	Total
Group 1: Lower quality with high inequality	45.4%	28.3%	24.5%	17.8%	18.9%	21.0%	33.3%	28.2%
Group 2: Lower quality with low inequality	11.2%	19.7%	29.2%	32.1%	22.1%	8.7%	4.2%	22.0%
Group 3: Higher quality with high inequality	41.8%	49.2%	44.3%	48.8%	57.6%	69.9%	62.5%	48.0%
Group 4: Higher quality with low inequality	1.5%	2.8%	2.0%	1.4%	1.4%	0.4%	0.0%	1.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Prepared by the authors, based on information from IDeA and IBGE.

Appendix B – Absolute frequency of municipalities by indicator ranges and other inequalities

Table B1 – Distribution of municipalities by quality groups of inequalities, supply indicators, and race and gender inequalities (absolute numbers)

Indicators		Group 1: Lower quality with high inequality	Group 2: Lower quality with low inequality	Group 3: Higher quality with high inequality	Grupo 4: Higher quality with low inequality	Total
School infrastructure	Low	562	710	163	18	1,453
	Medium	916	506	1,999	73	3,494
	High	82	3	494	9	588
Percentage of teachers with adequate training	Low	681	836	522	40	2,079
	Medium	469	253	1,091	32	1,845
	High	354	111	1,005	27	1,497
Race inequalities - Mathematics and Portuguese (equity)	Inequality	683	288	2,167	69	3,207
	Equity	868	917	485	30	2,300
	Atypical situation	7	14	0	1	22
	No information	2	0	4	0	6
Gender inequalities – Mathematics (equity)	Inequality	534	440	1,055	37	2,066
	Equity	1,026	779	1,601	63	3,469
Gender inequalities – Portuguese (equity)	Inequality	1,288	1,084	2,287	86	4,745
	Equity	272	135	369	14	790

Source: Prepared by the authors, based on information from IDeA, ADFD, and ICG indicators from INEP, Basic Education Census, and Saeb from 2007 to 2017.