

# Discrepancy between public and private education: deficiency in Brazilian science education.

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**Abstract.** This article explains how Brazilian education still functions in a capitalist way, the text explains how the education of the poorest is inferior to the education of the richest and most affluent populations, a brief history that shows how science education was established in the Brazilian school curriculum, and finally the article exposes the contradictions found during the comparison between three public schools and two private schools in the city of Diadema located in São Paulo (Brazil). The main means of research used was the Internet.

**Keywords:** Schools, teaching, education, science, infrastructure.

## 1. Introduction

Brazilian education faces a precarious situation, education is not valued, cared for and maintained effectively by Brazilian authorities, especially the teaching of sciences which is extremely outdated when considered the lack of laboratory structure existing in Brazilian public schools, thus this article seeks to explore the evils about the precariousness of Brazilian education with a focus on the area of science.

From research on three public and two private schools, points of opposition were elaborated that demonstrate the difference in the quality level of public and private education in Brazilian schools

## 2. Discussion

The Brazilian education unfortunately is still in the "banking" position coined by Paulo Freire, so that it is sold as a product (where students are just customers who receive a flood of information and not necessarily learn to reason and reflect on the issues constituting the world as a whole), thus, in this way, the wealthier social classes are privileged with better infrastructure schools, with laboratories, libraries, and even technological classrooms, while the poor population attends public schools, which are mostly scrapped and outdated in their physical dependencies due to the political abandonment to which the Brazilian educational scenario is submitted. The current educational system causes the renewal of the status quo of social classes and increases the existing socioeconomic gap, this gap can be expressed through an analysis of the discrepancy between the infrastructure of elitist and public schools when it comes to science education.

The teaching of subjects that include natural sciences in Brazilian schools is difficult and outdated in relation to other areas of knowledge, i.e., it is noted that the lack of infrastructure hinders the internalization of concepts that relate to science. One of the principles necessary for the learning of scientific subjects is the visualization and realization of laboratory experiments, the famous "investigative teaching", this type of approach allows students to assume the role of student protagonist, that is, through experimentation and research requested in class they perform scientific reasoning, through reflection, inquiry and hypothesis formulation; It is worth mentioning that among the types of investigative teaching we can highlight four, they are demonstrative - which seeks to explain a fact already recognized by the scientific community, Empirical deductive: which seeks to explain a fact also already recognized through observation, Deductivist rationalist: which seeks to explain facts through the formulation of hypotheses and finally the constructivist which seeks to explain facts from the students' prior knowledge. However, the central question should be: How is it possible to teach using investigative teaching and experimentation if schools lack infrastructure?

The teaching of sciences in Brazil emerged in the middle of the nineteenth century, to add to the "pedagogical project" that praised only the humanities and mathematics, thus denotes the late and outdated emergence of science teaching in Brazil. The knowledge in the area of natural sciences appeared as curricular components only in 1837 in the Pedro II school, which was attended only by wealthy boys. It is noteworthy that the dissemination of science teaching in Brazil occurred only a century later with the emergence of the Brazilian Institute of Education, Science and Culture (IBECC) of the University of São Paulo.

The way science was transmitted in the classroom was not very conducive to the construction of

scientific logical thinking, i.e., a traditionalist and non-critical teaching made the students just memorize the contents without really learning them (the lack of laboratories and adequate didactic materials are intertwined with the fact narrated above); The didactic materials used in the classroom were mostly translated from European books and unfortunately the use of laboratories was not recurrent.

Experimentation is a primordial part of scientific inculcation, it is through it that the scientist (in this case, the students) can prove hypotheses and analyze natural phenomena on scales closer to reality, the "experiment" is an action that is part of the construction of thought, one can relate the act of experimentation to "cognitive" theoretical factors

" The cognitive factor refers to the mental structures that organize the stimuli received by the environment, performing logical, formal or practical operations. It involves attention, concentration, memory, perception and thought. " - Cericato, Itale Refletindo sobre as dimensões da aprendizagem e da não aprendizagem Intervenção psicopedagógica clínica. Curitiba: Iesde Brasil, 2010.,

and "social" forged by psychopedagogue Pain:

" Learning stems from the experiences and opportunities provided by the social world to the subject ... Of interest to this factor is both the frequency and abundance of stimuli provided to the child, as well as the availability to have access to the various channels of existing cultures, i.e. newspapers, radio, television, sports." - Cericato, Itale Refletindo sobre as dimensões da aprendizagem e da não aprendizagem Intervenção psicopedagógica clínica. Curitiba: Iesde Brasil, 2010.,

because the "experience" interferes in the cognitive scope of the human being through the stimulus of doubt, curiosity towards the world in general and is also a form of learning that provides the acquisition of concepts, culture and introduces the individual in society, as a being able to expose and discuss ideas.

Thinking about the central discussion of the present file, a search around the infrastructure of three public schools versus two non-public schools located in the municipality of Diadema in São Paulo was carried out. With a brief search it is possible to notice that very few public schools in the Diadema neighborhood have sufficient and adequate infrastructure for the transmission of scientific knowledge; the presence of laboratories, libraries or even classrooms sufficient for student use are scarce in the region.

The methodology used for the preparation of this article was based on research done on the Internet for a project called "Marco Zero", in which the

present author was a scholarship holder for a semester by the extension chamber of the Federal University of São Paulo. Marco Zero is a program created to help the Diadem community map and understand what are the strengths and weaknesses of each state school in the region, besides other issues (The updated project has not yet been published by the responsible teachers, so all sources used for the project are duly marked in the references).

The public schools chosen for the discussion are: Jorge Ferreira state school located in the Serraria neighborhood (logradouro Leon Trotsky, number 45 ), Eça de Queiroz state school located in the Conceição neighborhood (logradouro Antônio Sanches Moreno, number 140) and Niceia Albarello Ferrari state school teacher located in the center of diadema (logradouro São João, number 200) , while the private schools chosen are: Colégio Carlos Drummond de Andrade located in the Casa Grande neighborhood (logradouro Ourense , number 531).

The disparity between these schools in terms of infrastructure is extremely great: The state school Jorge Ferreira besides the usual school structure has only one library, no accessibility resources, laboratory or computers for students to conduct research and has a large contingent of students (1057) who are mostly black or brown; The state school Eça de Queiroz despite having a good democratic management that is concerned with the community-school relationship does not have a science laboratory and computers sufficient for use of students, the 521 students are mostly white (49.75%); The Niceia Albarello school; The Sesi Diadema school, which is linked to Brazilian industry, has a library, chemistry labs, computer labs, science labs that have glassware, reagents, 3D printers, equipment that measure pressure, distance, etc., the school has 843 mostly white students (54.2%); The Carlos Drummond de Andrade school has state-of-the-art facilities, good infrastructure and has the availability of extracurricular courses for students, for example in the areas of languages, art, robotics and sports in general. It is possible to visually note the difference between the infrastructure present in the schools:



**Fig. 1** - facilities of the school Eça de Queiroz, author: Mariana Rosa (September 2022).



**Fig. 2** - facilities of the school Eça de Queiroz, author: Mariana Rosa (September 2022).



**Fig. 3** - SESI Diadema's labs and dinosaur prints made on a 3D printer. (April 2023).



**Fig. 4** - SESI Diadema's labs and dinosaur prints made on a 3D printer. (April 2023).

The discrepancy between the scores on the National High School Exam (ENEM) shows the difference that the presence of a good infrastructure in science and general education have, we can adopt as an example the overall average of the school Niceia Albarello Ferrari teacher of 499.9 in ENEM, in contrast to the school Carlos Drummond de Andrade highlighted in the city as the best school of 2019 in ENEM in the region that has the overall average of 627.4 in ENEM.

ENEM is a Brazilian exam that was instituted in 1998 to measure the knowledge acquired by young people in basic and middle education, it is the most important exam applied in Brazil in terms of vestibular, the same serves as a gateway to Brazilian public universities (which are synonymous with quality), scholarships in private colleges and also for academic mobility, that is, the exam score can be used to study in other countries like Portugal which is very sought after by Brazilians for example.

Another important fact to be considered in the discussion about the difference between the quality of education in Brazil is made clear by the rate of entry of students from public education into higher education, according to the Folha de São Paulo only 36% of students who completed high school in public schools entered a university to attend higher education, while 79.2% of students from private schools attended higher education.

Despite the great interest that the Brazilian population has for science in general, research conducted by LABJOR (Laboratory for Advanced Studies in Journalism) and FAPESP magazine (Foundation for Research Support of the State of São Paulo) show that knowledge on the subject is extremely limited and poor, a fact that is probably linked to deficiency of science teaching in basic education.

For this scenario to effectively change, it is necessary that there is greater investment in Brazilian public education, it is necessary that all schools have quality infrastructure and sufficient resources so that teachers have the opportunity to transmit scientific knowledge in a coherent manner; it is also necessary to invest in continuing education for these professionals, so that they are in constant cognitive improvement, resulting in better classes for students, in addition demonstrates the need for improvement of teachers' salaries for them to feel encouraged to build with students in the best possible way.

We conclude that the discrepancy between the quality of education in public and private schools, especially in the area of science, is intrinsically linked to the maintenance of the difference in social classes in Brazil, and that while this condition does not change, Brazil will continue to be a country that imports brains and does not effectively value science.

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