

Everyday actions in science teaching: a case study in public and private schools

Ações cotidianas no ensino de ciências: um estudo de caso em escolas públicas e privadas

Acciones cotidianas en la enseñanza de las ciencias: un estudio de caso en escuelas públicas y privadas

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Abstract

Science teaching has been guided by different trends that are still used in the classroom today. More recently, the concern with developing experimental activities began to have a strong presence in teaching projects and teacher training courses. In the municipality of Abaetetuba-PA, located in the Amazon, most education professionals do not pay attention to the fact that everyday situations are directly linked to scientific knowledge. This article was intended to approach methodological actions of everyday life at school, seeking support in the empirical knowledge of students so that they can use the academic knowledge acquired in the classroom to understand and solve problems of daily life. The socioeconomic characteristics of the students were analyzed and ten experiments in the area of science were related to daily life, to the syllabus, and applied to 60 students from the 4th grade of an elementary school in the municipal education network (public) and in a private school. All experiments applied with this methodology had widespread acceptance among students and proved to be effective in students' performance. Through the ANOVA calculation, it was found that there were no significant differences for most of the answers between the students of the two schools.

Keywords: Science teaching; Amazon; Life experience.

Resumo

O ensino de ciências tem sido pautado por diferentes tendências que ainda hoje são utilizadas em sala de aula. Mais recentemente, a preocupação em desenvolver atividades experimentais passou a ter forte presença em projetos de ensino e cursos de formação de professores. No município de Abaetetuba-PA, localizado na Amazônia, a maioria dos profissionais da educação não se atenta ao fato de que as situações cotidianas estão diretamente ligadas ao conhecimento científico. Este artigo teve como objetivo abordar ações metodológicas do cotidiano escolar, buscando respaldo no conhecimento empírico dos alunos para que possam utilizar os conhecimentos acadêmicos adquiridos em sala de aula para compreender e resolver problemas do cotidiano. As características socioeconômicas dos alunos foram analisadas e dez experimentos na área de ciências foram relacionados ao cotidiano, ao currículo, e aplicados a 60 alunos da 4ª série do ensino fundamental de uma rede municipal de ensino (pública) e de um escola particular. Todos os experimentos aplicados com essa metodologia tiveram ampla aceitação entre os alunos e se mostraram eficazes no desempenho dos alunos. Através do cálculo ANOVA, verificou-se que não houve diferenças significativas para a maioria das respostas entre os alunos das duas escolas.

Palavras-chave: Ensino de ciências; Amazônia; Experiência de vida.

Resumen

La enseñanza de las ciencias se ha guiado por diferentes tendencias que aún hoy se utilizan en las aulas. Más recientemente, la preocupación por desarrollar actividades experimentales comenzó a tener una fuerte presencia en proyectos de enseñanza y cursos de formación docente. En el municipio de Abaetetuba-PA, ubicado en la Amazonía, la mayoría de los profesionales de la educación no prestan atención al hecho de que las situaciones cotidianas están directamente vinculadas al conocimiento científico. Este artículo tuvo como objetivo abordar acciones metodológicas de la vida cotidiana en la escuela, buscando apoyo en el conocimiento empírico de los estudiantes para que puedan utilizar los conocimientos académicos adquiridos en el aula para comprender y resolver problemas de la vida cotidiana. Se analizaron las características socioeconómicas de los estudiantes y se relacionaron diez experimentos del área de ciencias con la vida cotidiana, con el plan de estudios, y se aplicaron a 60 estudiantes del 4º grado de una escuela primaria de la red educativa municipal (pública) y en un escuela privada. Todos los experimentos aplicados con esta metodología tuvieron una amplia aceptación entre los estudiantes y demostraron ser efectivos en el desempeño de los estudiantes. A través del cálculo de ANOVA, se encontró que no hubo diferencias significativas para la mayoría de las respuestas entre los estudiantes de las dos escuelas.

Palabras clave: Enseñanza de las ciencias; Amazonía; Experiencia de vida.

1. Introduction

Throughout history, the relationship between scientific knowledge, everyday knowledge, and teaching activities is an object of interest for educators. For a long time, especially in Brazil, the correlation between science and everyday life has been pointed out as one of the ways to improve the teaching-learning processes in science (Loguercio *et al.*, 2004).

The reference to everyday life, if it still does not present effective incorporation into the curriculum in action in schools, expresses the existence of a dominant thought concerned with this theme, but it is already observed in schools, still gradually, the rupture of these thoughts centered on instruction, and the cultural heritage of past generations, and points to “constructivism” which focuses on the objective of forming critical citizens capable of intervening and interacting in society and of forming their own concepts and opinions, and decision-making (Jacobson, 2015; Suhendi, 2015; Suhendi, 2021).

The application of new methodologies in science teaching in Brazil is usually difficult in public schools, due to the lack of greater investments in spaces where experiments can be carried out, science laboratories are poorly structured and most teachers have only a degree and no incentives to advance in improving the teaching-learning process (Peroni, 2018; Kim *et al.*, 2007). The private school apparently provides a better structure than the public network and the students are better educated, this increase in training can be seen in the comparison of the profile of students who enter universities (Saviani, 2019). Nata *et al.* (2014), however, state that private school students perform better than public school students in terms of admission to higher education, not necessarily due to an increase in the quality of education in the private network, but due to a kind of educational consumerism and competition between schools.

The city of Abaetetuba is a small town in Pará, in the Brazilian Amazon, where science teaching has been established in a precarious way, mainly in public schools, where the lack of investment in laboratories and in teacher training has been the

main cause, pointed out by teachers and students, of the problems faced in understanding the content of the discipline. In the private school, the situation is a little better, however, it is still possible to notice the same deficiencies found in the public school system. Efforts have been made to change the picture, and research of an exploratory nature of the difficulties faced by teachers and students in the teaching-learning process of the natural sciences is of great help in understanding the issue.

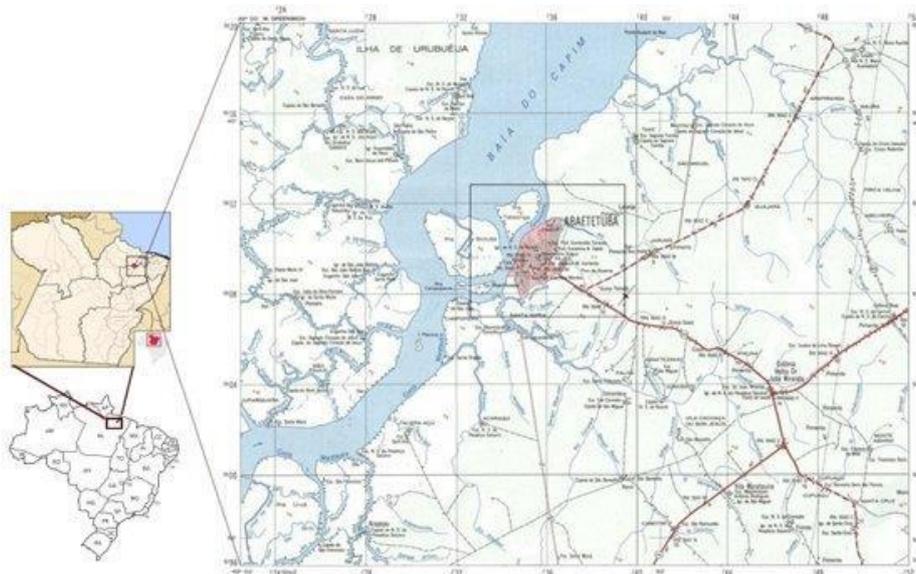
2. Methodology

This article is the result of a case study, considering qualitative and quantitative data. A field research was carried out to acquire data for further statistical analysis. Ludke & Andre (2013) and Pereira *et al.* (2018) based the methodology of this paper.

2.1 Study location

Abaetetuba is an inland municipality in the Amazon, 67.8 km from the city of Belém, the capital of the state of Pará. The Municipality of Abaetetuba (Figure 1) belongs to the Mesoregion of Northeast Pará and the Microregion of Cametá. The municipality has an area of 1,521.45 km² and its population is 141,100 inhabitants. In relation to the municipalities in the state of Pará, Abaetetuba is ranked 61st, which reflects a low socioeconomic level for the municipality with an IDHM of 0.628 (IBGE, 2010).

Figure 1 - Location of the Municipality of Abaetetuba-PA.



Source: IBGE (2010).

2.2 Data collection procedure

The Caminho da Esperança (public) and Nossa Senhora Santana (private) schools were selected for the research. The students belonged to the 4th-grade classes of Elementary School. Classes were given to 30 students aged 10 to 14 years, on the morning shift. The following year, in the same shift, practical classes were applied, located at Rua D. Pedro II, in the Centro district, for 30 students aged between 9 and 10 years.

The socioeconomic situations of students from private and public schools were analyzed, each one in its particularity. To obtain these results, a questionnaire developed by the IBGE (2010) was used, which checks the HDI (Human Development Index).

Chart 1 - Science experiments.

Experiment	Questions	Material	Procedure
Heat conduction	Why does it get hot when we put a stainless steel spoon inside a pan on the fire?	Lamp, paraffin, universal support, iron bar, straw.	Attach the metal rod to the bracket. Lightly heat the paraffin to fix the straws along the metal rod. Place one end of the stick over the flame. Watch.
The sound	How does sound reach our ears?	Disposable container, portion of cassava flour, wooden spoon, plastic film tray.	Place the plastic wrap arranged in the container. Spread cassava flour flakes over the plastic wrap. Hold the tray close to the container and tap the wooden spoon on the tray. Watch.
Dilation	Why can't we open a pressure cooker the instant we take it off the heat?	5 mL bottle with cap, graduated pipette, colored water, alcohol lamp, phosphorus	The colored water is placed in the 5 ml flask. The alternative pipette is fitted to the vial cap. Light the lamp. The flask is approached by the flame of the lamp. Watch.
Evaporation	Where does rainwater come from?	Burnt out lamp, serum hose, plastic bottle, glass container, cork jar holder	Remove the filament from the lamp. Pierce the stopper and connect the IV hose. Cover the lamp with this device. Pierce the lid of the plastic bottle and insert the hose. Drill a small hole in the bottom front of the plastic bottle. Let the other end of the hose pass. Take care that all connections are sealed. Fix the lamp on the universal support using the clamp, at a height of one and a half palms. On the base of the support under the lamp place the lit lamp. Watch.
Natural indicators	Why when the açaí comes in contact with the lemon turns red and when in contact with the egg white it turns green?	Lemon, egg, portion of açaí juice, two saucers (petri dish), glass rod.	Place a few drops of lemon on one of the saucers. In the other saucer place a portion of the egg white. Drip açaí on the substances of the two saucers. Mix with stick. Watch.
Combustion	What is the composition of fire?	Candle, deep dish, glass bottle, dye, water, match	Mix the dye in the water. Fix the candle on the plate and light it. Put the liquid on the plate. Turn the container over the candle. Watch.
Magnetism	Why is the refrigerator door always closed without having something to hold it?	Small styrofoam ball, no.8 needle, clear glass bowl, water, magnet, blue paint, green paint	Pass the needle 30 times through the magnet. On one end of the needle, apply blue paint and on the other end, apply green. Insert the needle into the styrofoam ball, centering the middle of the ball and needle. Place the set into the bowl of water. Watch.
Friction	Why do they get hot when we rub our hands together?	Straws, tissue paper	Rub the straw with a tissue for a few seconds. Put the straw against the wall.
Water	How is water carried to the taps?	Plastic bottles, piece of hose, lids, silicone, glue, water, yogurt cup	Assembly is carried out in advance by the teacher. Pierce the bottle along the base to measure the hose. Insert the ends of the hose into the holes and seal well with the glue. Wait 24 hours. Fill water bottles halfway up. Observe the water level in the bottles. Carefully place one of them on top of the yogurt cup. Swap the cup for another bottle. Watch.
Air	Does air take up space?	Bowl, glass container, tissues	Place a crumpled tissue in the bottom of the glass. Turn the glass upside down and dip it vertically into the water. Without tilting, remove the cup from the bowl. Remove the tissue and observe it.

Source: CCIA/CPADC Abaetetuba (annals from 1988 to 2004).

This has 13 (thirteen) questions, which were answered by the students' guardians in their respective homes. Ten experiments were also selected (Chart 1) contained in books, the internet, and others.

Assuming that public schools have little purchasing power and lack resources, it was preferred to use common day-to-day materials and easily accessible to students, most of which were extracted from nature (heat, air, water, fruits, light, etc.) and the urban environment (bottles, cups, paper, and plastics) and laboratory materials (thermometer, beakers, test tube).

The use of materials from nature and the urban environment is part of the list of alternative materials that were worked on in the day-to-day of the school and the laboratory materials were presented only as a support demonstration of the research laboratories and that these are also of importance for scientific purposes, as they present greater precision in quantitative analyses.

During the entire process, the student was evaluated with three questions, What happened? Because it happened? What did you learn? Attributing an excellent, good and regular concept, based on didactic criteria for evaluating the answers, having as a parameter clarity, logical sequence, interest, and participation. Although the last two items of this evaluation form are a qualitative requirement, they are necessary here in the quantitative evaluation, as the performance of any student production depends on this (Achter, 2022).

Conceptual attributions were quantified at the value of 2.5 (two and a half points) each, worth 10 points for the whole question, with 100% accuracy, and compared to the table showing the values for the concepts, as shown in Table 1.

Table 1 - Quantitative criteria and concepts.

Criteria	Points	Concepts	Interval
Clarity	2.5	Excellent	8 to 10
Logical sequence	2.5	Good	6 to 7.9
Interest	2.5	Regular	4 to 5.9
Participation	2.5		

Source: Authors.

The results were recorded in bar graphs using the Excel® software, equivalent to each experiment, containing the percentage of answers to the interrogatives of each item of the legend, with one part being equivalent to the public school and the other to the private school, each statistical unit corresponds to a theme (experiment). The software's single-factor ANOVA calculation was used to compare the results between public and private schools.

The choice of the ANOVA method was based on the work of Gul & Akcay (2020) who proposed the use of analysis of covariance (ANCOVA) to determine the impacts of a new model on critical thinking skills in experiment and group control.

In both modalities of educational networks, the evaluation focused on qualitative aspects and was carried out through the items: attendance, participation, interaction, commitment, performance, and motivation. Results were plotted in bar graphs using Excel®.

3. Results and Discussion

3.1 Analysis of the socioeconomic situation

To carry out a comparative study between the performance of students from public and private schools, we first sought to assess the socioeconomic status of students from both schools and then assess how it influences the teaching-learning process.

Regarding the number of residents per household, there was a similarity in the result between the two schools, with no significant differences between the two groups.

Analyzing the type of household, it was found that the majority (90%) of the families of public school students have houses with more than four rooms in their homes, while in the private school only 60% of the percentage. Although the families of private school students have greater purchasing power and can build spacious houses with many rooms, a part prefers to live in apartments. Abaetetuba, being a poorly developed municipality, has large areas on the outskirts of the city where public school families have access to land where they can build, even in a precarious way, homes with more than four rooms.

As for the household condition item, in both the situation the condition of own household paid off was maintained as the majority, with a difference of thirteen percentage points. Families with a better financial situation can live on rent and at the

same time meet their basic needs, some families of public school students, because they have few conditions, only have housing as a result of inheritance or temporarily assigned by someone in the family. It can also be added that the families, from the middle and upper classes, living in the city for a short time, mainly for work reasons, do not plan to settle in the Municipality.

There is a big difference for the item use of the general water network, which has an added advantage for families in the private network, with a percentage of 86%, while the same item that corresponds to the public school is 5%. In this case, the majority (95%) of public school families use well water. In Abaetetuba, some families with a better financial situation have an artesian well, as the supply and quality of water are precarious in the municipality, not being able to meet the needs of the entire population, causing a constant failure in the system. Families without conditions submit to consuming water from rudimentary wells in the open.

Regarding basic sanitation, it was found that the majority (89%) of public school students have only one bathroom in their homes, while in the homes of private families, the majority (50%) have more than two bathrooms. The situation of poverty that low-income people live is observed in the municipality of Abaetetuba, it is noticed that there is a great difference in the quality of life between families seen even in the destination of their waste, 100% of private school students have a septic tank septic, while only 58% of the public school meets this item; 14% of these have rudimentary pits; 28% of public school respondents have their bathrooms built on the banks of rivers or streams. As for the destination of the garbage, it is observed that 4% of the families of the students of the public school are not served by the collection of cleaning service, they discard the garbage in the environment, while in the homes of the families of the students of the private network, 100% are served by garbage collection.

Most private school students' families have a radio, fridge or freezer, video cassette, washing machine, television, electric lighting, and good sanitation. Even in the items for which most responses were not obtained, it is observed that 30% have a computer and 46% have a car. The fact that families have a computer at home allows these students to access the internet, which improves students' access to information, evidencing a very privileged socioeconomic condition for at least 30% of the families of private school students.

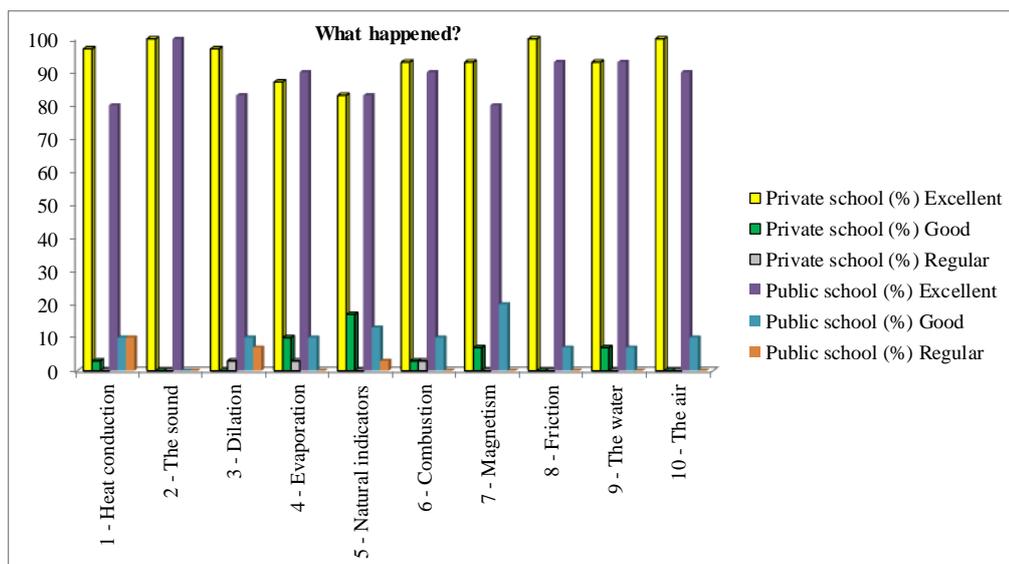
As for the public school, most families have a radio, fridge or freezer, television, electric lighting, and precarious sanitary network, but there are no occurrences of families with a computer and car, this result shows the low socioeconomic level of the students' families. of the public school.

3.2 Analysis of experimental activities

Bearing in mind that the scientific method must undergo the action of repetition to confirm or refute the hypothesis, care was taken in advance to work the ten experiments submitted to the same methodology to confirm the results.

For the first question What happened? (Figure 2) Private School students showed a higher percentage of Excellent performance, ranging from 83 to 100%. In the Public School, this percentage ranged from 80 to 100%.

Figure 2 - Percentage of responses to the question “What happened?”



Source: Authors based on survey data (2022).

In the heat conduction experiment, the class was introduced by presenting students with various types of materials so that they could classify them as good and bad conductors of heat. hits.

Knowing that the classroom is not a suitable place for handling the materials of this experiment, the teachers preferred to use only one copy handled by the two classes, preventing eventual accidents. Although the students had not manipulated the materials, there was no lack of interest in the experiment and they actively participated in the observations, raising hypotheses about what would happen with associations of events in their daily lives, through other examples.

Soysal (2022) and Ogunkola and Archer-Bradshaw (2013) say that the teacher when choosing a teaching methodology that aims at direct contact with their daily lives can promote the student's curiosity, leading them to research, reason, raise hypotheses, draw conclusions and assume a practical attitude in their daily lives.

The sound experiment, about the question “What happened”, was the only one where the answer with 100% of Excellent use was the same for the public and private schools. The sound theme is a subject addressed in the Natural Sciences syllabus of the 4th grade of Elementary School, which in a way is not an unknown topic since the 1st grade it is inserted in the subject of hearing of the theme "sense organs", for this reason, the students felt familiar with the class. During the experiment, they were able to handle and explore the materials, repeating the procedures several times, curious and entertained with the result and the time was extended, there was interference from the teachers for the conclusion of the class.

In six experiments (heat conduction, expansion, combustion, magnetism, friction, and air) the performance of the Private School for the question “What happened” was better than that of the Public School with a variation of 93 to 100% of use Excellent, while in the Public School this percentage ranged from 80 to 93%.

Two experiments (natural indicators and water) showed the same level of use (83 and 93% respectively) both in the public and private schools.

Only in the evaporation experiment did the public school students surpass the private school students with 90% of excellent performance against 87% of the private school.

In the class on evaporation, it was observed that the students of the Public School had a previous understanding of the subject close to scientific knowledge, as it is a topic that has already been seen by the previous series as the "water cycle", which does not happen in the School. Private, it can be an explanation for the better results in Public Schools.

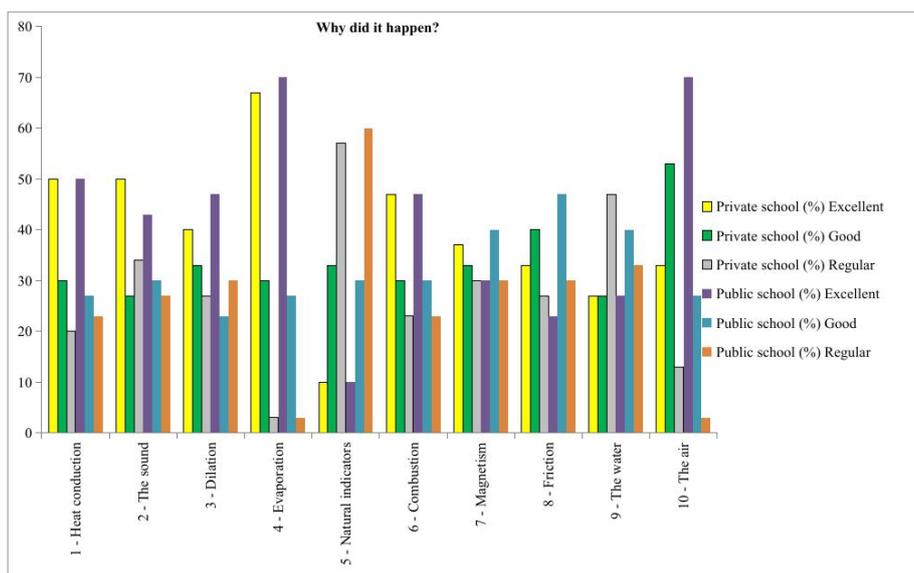
The use of experimentation has already been used by some teachers and several books available, such as Ardley (1996) and Barros *et al.* (2002), who present the importance of content based on the student's experience as a contribution to the reflective act to prepare to act in the face of the needs of time and space, knowing biology and a positive ecological awareness seeking solutions to issues such as garbage and its recycling.

Carvalho (2003) and Delizoicov *et al.* (2003) seek to didactically encourage observation and sharpen readers' reasoning, providing elements for understanding the phenomena and arriving at obvious, coherent, and relevant answers to scientific knowledge. This (2003) follows the same line as Wolke (2003), using experiments and observations of daily cooking, and states that culinary science progresses thanks to the methods of analysis perfected in recent decades.

The subject of dilatation, whose problem was to find out why you can't open a pressure cooker the moment you take it off the fire, was widely discussed in both groups and ideas diverged, as some students claimed that there was pressure, while some they asked more why is there pressure? And others questioned what is pressure. Faced with the students' anxiety of wanting to find explanations for their doubts, the development of the experiment continued, where analogies were made between the result of the experiment and everyday phenomena, which brought a better understanding to the students of both classes with a result of successful use. Excellent 97% for private school students and 83% for public schools.

Regarding the performance of students from both schools, Ribeiro (1999) says that from simple everyday situations it is possible to clarify doubts and rescue alternative concepts and that the best way to introduce students to the subject to be studied is to use experiments based on the themes and that contributes to a greater elucidation of fundamental concepts and leads the student to more meaningful learning. The student's expectations and previous ideas about the subject should be investigated.

Figure 3 - Percentage of responses to the question “Why did it happen?”.



Source: Authors based on survey data (2022).

The difference of 37% in the Excellent performance of the Public School students was surprising in the air experiment for the question “Why did it happen?”. Although the experience of air is classic, being present in almost all science textbooks, we tried to do it following the methodology of contextualization, with the student’s experience and it proved to be effective for proving the existence of air, as well as the conclusion that it exists, occupies a place in space, therefore it is a matter, a lack of understanding was observed in the students of the private school, who did not obtain a high percentage of Excellent use in this question.

The experiment, natural indicators, which is not directly inserted in the syllabus from 1st to 4th grade, but which has relevance in the health program, alerting the child to the risks of domestic accidents, with chemical products, aroused a lot of interest in the students. However, when there was a need to explain what was observed, the level of performance Excellent was the lowest of all experiments with only 10% for students from both Schools. In this experiment, due to the difficulties presented by public schools, in the purchase of reagents, we sought to present regional alternatives, such as the use of açai extract instead of traditional chemical products.

The students observed the chemical reaction of the açai berry with the lemon that gave rise to the red color and of the egg white giving rise to the greenish color. They were very interested, as the topic, of acids and bases, is very present in their daily lives. During the confirmation of the answers, the classes were surprised by the scientific explanation about the presence of anthocyanin, responsible for the color change in acid and base pH, and that it is present in certain natural products. Students had no prior knowledge of the presence and use of this substance, which explains the low yield of responses with Excellent performance in this experiment and a high percentage of Regular performance, 57% for private school students and 60% for Public School students.

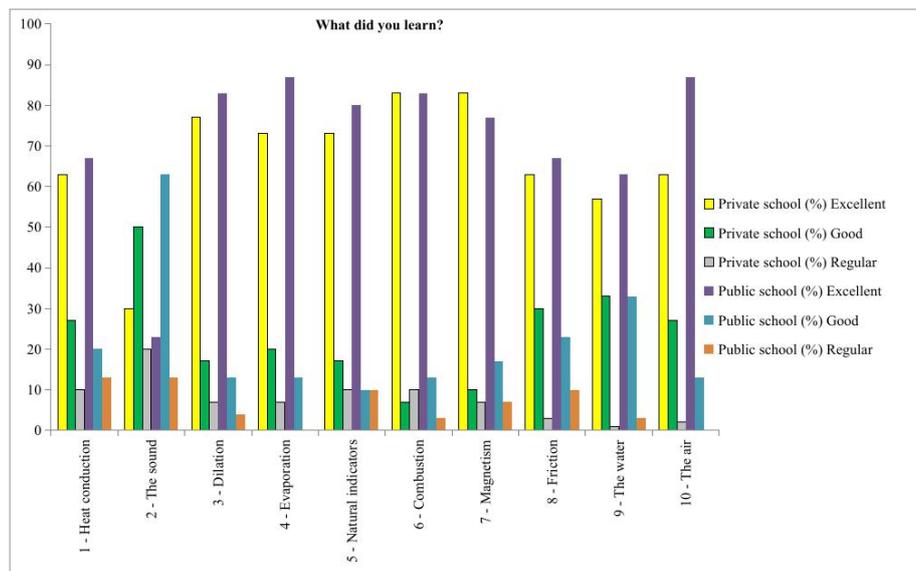
In this context of the lack of knowledge of the students of public and private schools, Bizzo (2004) defends the inclusion of science and technology in the curriculum of elementary school because the sciences can help the students to reason in a coherent way about the facts of daily life and solving practical problems, such intellectual skills will be valuable for any type of activities that you will develop anywhere. Science and technology can help improve people's quality of life as the world moves increasingly in a scientific and technological direction, involving the student in the study of interesting problems or phenomena that surround them (Toma, 2018).

In the sequential order of the questions addressed to the students, it was remarkable that most of them understood what happened in each experiment, and successfully described what they learned, but in the step that precedes one and precedes another, where they would explain the phenomenon observed by answering the Why it happened? Only the minority presented an acceptable response by the evaluation criterion. This is because the question elaborated requires the search for the reason, that is, the cause of the effect that a simple observation does not subsidize the whole idea that is implicit in the effect, it is the invisible of the experience and needs the representational to be understood.

For the third question "What did you learn?" (Figure 4) Public School students had a higher percentage of excellent performance, ranging from 63 to 87% for seven experiments (heat conduction, expansion, evaporation, natural indicators, friction, water, and air). In the Private Schools, this percentage ranged from 57 to 77% for the same experiments.

This finding may be because the textbooks of the MEC (Ministry of Education and Culture) bring the experience, from the first grade of elementary school and the ease of application teachers display in classrooms and which were only reinforced by the mediator teacher the explanations for the phenomenon. While for the private school, there was a decrease in the excellent item, due to the difficulty of oral and written expression, because they are students with a younger age group than those from the other school.

Figure 4 - Percentage of responses to the question “What did you learn?”.



Source: Authors based on survey data (2022).

The Excellent performance was the same (83%) for the combustion experiment for the students of both schools. The combustion theme was approached, first, with the experiment being processed in a closed system, in which the phenomenon was verified, compared with what happens in an open system, in a second moment. The students were asked to identify the components of combustion, in both moments, the importance of oxygen and fuel, which is burned and consumed, and the reason for the beginning of the phenomenon, through the flame. Some explanations on how to put out a fire, safety measures, and escape from situations involving combustion were given by qualified personnel from the Fire Department, invited to this experiment.

The subject magnetism may seem complex and beyond the understanding of the student, however, its applications are part of the day-to-day and are contained in the syllabus of the 4th grade of elementary school, although the concept is not simple, the use of magnetism is present in many domestic objects and observed by students, hence the initial problem of the experiment, seeking to understand the closing of the refrigerator door.

Friction was an experience that aroused a great deal of interest. The children were amazed to see the results of the experiments. The interest was so great that the students repeated the experience several times.

The experience that had water as its theme took advantage of a problem of the child’s immediate daily life with a striking sub-theme, How is water carried to the faucets? We sought to address atmospheric pressure and its influence on liquids, known as the “Archimedes Siphon” technique, which allows the transport of liquid from the highest level to the lower plane, using a simple hose, vacuum, and atmospheric pressure.

Rodríguez (2021) reinforces that science teaching aims to enable the student to identify problems by observing the facts, raising hypotheses, testing them, confirming them, and even abandoning them when necessary and drawing conclusions alone. The student would have the ability to rediscover what science imposed as the only truly understood then as the scientific method. The “scientific model” was emphasized in the discipline of natural sciences, leading some teachers to make mistakes regarding the concepts of scientific methodology and methodology of science teaching.

The children, when manipulating the previously built system, removed the atmospheric pressure with the simple act of closing the system, as well as changing the levels of the planes in which total interest and satisfactory understanding were observed, followed by dialogic questions with the teachers.

3.3 Differences between the answers of students from public and private schools

Table 2 shows the single-factor Anova calculations for the three questions asked after each experiment between the private and public school students.

Of the results presented, only the percentages of the answers to the question “What happened?”, with an Excellent evaluation, showed significant differences, where the $F_{\text{calculated}}$ value was greater than the F_{critical} with $p < 0.05$. All other results showed that there was no significant difference between the percentages of responses found by students from public and private schools in all experiments evaluated. Based on these results, it can be concluded that although there is a disparity in relation to the socioeconomic situation among the clientele of the schools in evidence, there is no difference in the level of achievement, as there was a prevalence of similarities in the answers, in relation to the other questions and experiments.

Table 2 - Single-factor ANOVA calculation between response percentages.

What happened?									
Group	Excellent			Good			Regular		
	Sum	Mean	Variance	Sum	Mean	Variance	Sum	Mean	Variance
Private school	943	94.3	33.12	47	4.7	31.57	9	0.9	2.10
Public school	882	88.2	42.62	97	9.7	25.12	20	2	13.11
	$F_{\text{calculated}}$	p-value	F_{critical}	$F_{\text{calculated}}$	p-value	F_{critical}	$F_{\text{calculated}}$	p-value	F_{critical}
Anova	4.913	0.040	4.414	4.410	0.050	4.414	0.795	0.384	4.414

Because it happened?									
Group	Excellent			Good			Regular		
	Sum	Mean	Variance	Sum	Mean	Variance	Sum	Mean	Variance
Private school	394	39.4	238.93	336	33.6	60.49	281	28.1	242.54
Public school	417	41.7	381.79	321	32.1	57.88	262	26.2	258.84
	$F_{\text{calculated}}$	p-value	F_{critical}	$F_{\text{calculated}}$	p-value	F_{critical}	$F_{\text{calculated}}$	p-value	F_{critical}
Anova	0.085	0.774	4.414	0.190	0.668	4.414	0.072	0.791	4.414

What did you learn?									
Group	Excellent			Good			Regular		
	Sum	Mean	Variance	Sum	Mean	Variance	Sum	Mean	Variance
Private school	665	6.5	244.28	238	3.8	156.62	77	7.7	29.79
Public school	717	1.7	368.01	218	1.8	255.51	63	6.3	24.90
	$F_{\text{calculated}}$	p-value	F_{critical}	$F_{\text{calculated}}$	p-value	F_{critical}	$F_{\text{calculated}}$	p-value	F_{critical}
Anova	0.442	0.515	4.414	0.097	0.759	4.414	0.358	0.557	4.414

Source: Authors based on survey data (2022).

3.4 Analysis of qualitative aspects

The results obtained about the qualitative aspects of work for the private school showed excellent, ranging from 90 to 100%, as almost all participated with commitment and successfully met the parameters required by the evaluation. Good performance ranged from 0 to 7% and Regular ranged from 0 to 3%.

The same fact occurred in the public school, the results obtained were excellent, ranging from 93 to 100%, which caused some admiration from the school's technical staff, when observing the class domain, in the application of this methodology, but a minority of students, for various reasons, did not meet the requirements of this assessment. Good performance ranged from 0 to 10% and Regular ranged from 0 to 7%.

We worked with the purpose of helping teachers, methodically, to carry out their pedagogical activities, however, it was not intended to make a demagoguery apology to the point of considering it as the only way capable of leading the teacher to achieve their educational goals, however, is one of the ways in which the educator can resort to his didactic purposes since the experiences have three important aspects: the macro or visible, the micro or invisible and the culturally accepted representational, as this forms the whole of the interaction and production of human knowledge. therefore, the presence of the teacher and other resources is necessary for the interpretation of representational (symbols, icons) mediators of learning (Godino, 2021).

When talking about the “influence of the everyday-knowledge relationship” in the construction of the curriculum, Niemi (2020) reports that she believes in the scope of a curriculum in a more current view, which must meet the peculiarities of the community in which the school is inserted, because it is there that for the student, the reality is being worked on. The relationship with the student's daily life is one of the points that can guarantee the adequacy of teaching content to the needs of the community in which he is inserted. And one of the main goals of the school is to form citizens capable of acting for the benefit of society.

In the case study proposed here, it became evident that the socioeconomic situation does not influence the development of the teaching-learning process, although this is a small sample of the educational framework of the public network, it is clear that in extreme situations of absolute misery the result of research similar to this one may be different, which is not the case for the clientele of the two schools in evidence (Gurr, 2019).

At each moment of execution, aspirations were nourished with the results achieved. Which, in most cases, exceeded expectations and increasingly became convinced that it is not only the complex instruments and chemical reagents of a classical laboratory that are means through which a scientific practice is successfully carried out and that the socio-economic situation of the school clientele are not always the villains responsible for school failure (Lynch, 2019).

4. Conclusion

When working with contextualized experimentation with observations of everyday life with the aforementioned schools in evidence, better performance of the students was shown, a fact that gave the teachers involved the success of the work, as the active students interacted satisfactorily, as they were explanations of their reality.

All experiments applied using the relationship with everyday actions had widespread acceptance among students and proved to be effective in classroom performance, since it is not frequent to carry out work of this nature in our municipality, which is so necessary for the development of fundamental skills, to interact with the real formation of the student. The differences between public and private schools were not significant, showing that although the private school has a better structure than the public school, the performance was similar.

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