SCIENTIFIC LITERACY THROUGH INCLUSIVE CHEMISTRY TEACHING: A PEDAGOGICAL PROPOSAL FOR 6TH GRADE STUDENTS IN THE FINAL YEARS OF ELEMENTARY SCHOOL IN THE CITY OF CAXIAS-MA

ALFABETIZAÇÃO CIENTÍFICA ATRAVÉS DO ENSINO DE QUÍMICA DE FORMA INCLUSIVA: UMA PROPOSTA PEDAGÓGICA PARA ALUNOS DO 6° ANO DO ENSINO FUNDAMENTAL ANOS FINAIS DA CIDADE DE CAXIAS-MA

ALFABETIZACIÓN CIENTÍFICA A TRAVÉS DE LA ENSEÑANZA INCLUSIVA DE LA QUÍMICA: UNA PROPUESTA PEDAGÓGICA PARA ALUMNOS DE 6.º CURSO DE LA ENSEÑANZA PRIMARIA DE LA CIUDAD DE CAXIAS-MA

https://doi.org/10.56238/sevened2026.008-016

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ABSTRACT

The research is justified because school inclusion involves integrating children into regular education, promoting their participation in school activities in a social, pedagogical, and physical way. To this end, it is necessary to adapt the curriculum, practices, and assessments, ensuring that all students, with or without disabilities, fully participate in the pedagogical and social dynamics of the school. Given this, the central objective of this work is to spark interest in chemistry among 6th-grade students, introducing basic concepts in an accessible, contextualized, and inclusive way. The activities involved classroom intervention, including the development of teaching resources and the application of a chemistry lesson in a 6th-grade class. It was observed that practical and experimental activities, adapted to meet inclusive needs, proved effective in integrating students with and without disabilities, promoting collaborative and accessible learning. It was concluded that the interaction between theory and practice, combined with inclusive strategies, such as the use of Styrofoam balls to build molecules and adapted experimental activities, favored student learning.

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Keywords: Inclusive Education. Chemistry Teaching. Elementary School. Teaching Resources.

RESUMO

Justifica se a pesquisa pois a inclusão escolar envolve integrar crianças ao ensino regular, promovendo sua participação nas atividades escolares de forma social, pedagógica e física. Para isso, é necessário adaptar o currículo, as práticas e as avaliações, garantindo que todos os alunos, com ou sem deficiência, participem plenamente da dinâmica pedagógica e social da escola. Diante disso, o objetivo central deste trabalho é despertar o interesse pela Química com alunos do 6º ano, introduzindo conceitos básicos de forma acessível, contextualizada e inclusiva. As atividades envolveram, intervenção em sala de aula, incluindo, elaboração de recursos didáticos e aplicação de uma aula sobre química em uma turma do 6º ano. Observou-se que as atividades práticas e experimentais, adaptadas para atender às necessidades inclusivas, demonstraram eficácia na integração de alunos com e sem deficiência, promovendo um aprendizado colaborativo e acessível. Conclui-se que a interação entre teoria e prática, aliada a estratégias inclusivas, como o uso de esferas de isopor para a construção de moléculas e atividades experimentais adaptadas, favoreceu o aprendizado dos estudantes.

Palavras-chave: Educação Inclusiva. Ensino de Química. Ensino Fundamental. Recursos Pedagógicos.

RESUMEN

La investigación se justifica porque la inclusión escolar implica integrar a los niños en la enseñanza regular, promoviendo su participación en las actividades escolares de forma social, pedagógica y física. Para ello, es necesario adaptar el plan de estudios, las prácticas y las evaluaciones, garantizando que todos los alumnos, con o sin discapacidad, participen plenamente en la dinámica pedagógica y social de la escuela. En vista de ello, el objetivo central de este trabajo es despertar el interés por la química en los alumnos de 6.º curso, introduciendo conceptos básicos de forma accesible, contextualizada e inclusiva. Las actividades incluyeron la intervención en el aula, la elaboración de recursos didácticos y la impartición de una clase de química en un curso de 6.º. Se observó que las actividades prácticas y experimentales, adaptadas para satisfacer las necesidades inclusivas, demostraron su eficacia en la integración de alumnos con y sin discapacidad, promoviendo un aprendizaje colaborativo y accesible. Se concluye que la interacción entre la teoría y la práctica, junto con estrategias inclusivas, como el uso de esferas de espuma de poliestireno para la construcción de moléculas y actividades experimentales adaptadas, favoreció el aprendizaje de los estudiantes.

Palabras clave: Educación Inclusiva. Enseñanza de la Química. Educación Primaria. Recursos Pedagógicos.

1 INTRODUCTION

School inclusion is understood as a process that happens by the insertion of the child, in the regular classroom, in the everyday activities of the school, in a social, pedagogical and physical way, in which it is up to the restructuring of the curriculum, practices and evaluation so that the student, regardless of whether or not he has a disability, can participate in the pedagogical and social dynamics of the school. The school, from an inclusive perspective, would meet the demands of these students, in order to respect their peculiarities and provide opportunities for learning school content.

In the educational context, scientific literacy is not only limited to understanding concepts and theories, but also involves developing skills to question, analyze, and apply knowledge ethically and inclusively. In the teaching of Chemistry, inclusive education is a challenge due to the need for abstraction for the understanding of many concepts and the adequacy of language tools and didactic models that contemplate the understanding of all students.

Teaching Chemistry to 6th grade students involves overcoming challenges related to the complexity of the discipline and the often negative perception that students have in relation to science. However, by adopting inclusive and practical pedagogical approaches, it is possible to turn these challenges into meaningful learning opportunities. Studies show that implementing inclusive educational strategies in chemistry teaching can improve student participation and understanding, especially those with special educational needs. These strategies may include the use of assistive technologies, curricular adaptations, and practical activities that promote interaction and experimentation (Santos *et al*., 2020). Thus, an inclusive approach in teaching Science, especially in Chemistry, ensures that all students, regardless of their initial abilities or socioeconomic backgrounds, can actively participate in and benefit from scientific learning.

In view of the above, this work proposes a proposal for the introduction of basic concepts of chemistry through the exploration of elements of children's daily life, aiming to awaken in them greater interest in science, in a more engaging and inclusive way.

2 DEVELOPMENT

2.1 THEORETICAL FRAMEWORK

2.1.1 History of inclusive education

Inclusive Education emerged at different times and contexts, especially from the 90s when the World Conference on Special Education took place, and in 1994 the Salamanca

Declaration was proclaimed, which "defines policies, principles and practices of Special Education and influences Public Education Policies". (UNESCO, 1994; Souto, 2014).

For a long time, the different was placed on the margins of education: the student with disabilities was attended separately, or simply excluded from the educational process, based on standards of normality. Before inclusive education, there was a model of segregated education, where the education of students with specific educational needs took place in parallel with the so-called regular education. There were the so-called special schools or classes, belonging to the special education subsystems implemented in the various public education networks through the National Center for Special Education (CENESP), created in 1973 (Ferreira; Glat, 2003; Bastos, 2014).

In Brazil, special education has moved from a segregationist model — marked by the creation of isolated institutions such as the Benjamin Constant Institute (1854) and INES (1857) — to an inclusive perspective. Historically, care took place in special classes or parallel institutions (Mazzotta, 2005). However, driven by international frameworks such as the Salamanca Declaration (1994) and LDB No. 9,394/96, the national policy made a commitment to integrate students with disabilities into regular education. From the 2000s onwards, guidelines such as the National Policy on Special Education in the Perspective of Inclusive Education (2008) consolidated the mandatory provision of specialized educational services and the elimination of barriers to access and permanence in school

2.1.2 Teaching of Chemistry in Elementary School

In the early years, it does not exist, according to school curricula (Brasil, 2018; Paraná, 2018) a curricular component of Chemistry, but there is an understanding that chemical, physical and biological concepts are part of the Natural Sciences.

According to the BNCC (Brazil, 2018), the area of Natural Sciences is committed to the development of scientific literacy, involving the ability to understand and transform the world.

Thus, in the final years of elementary school, the area of Natural Sciences through the fields of knowledge seeks to ensure its students contact with scientific thinking, so that these students can have a new look at the world around them.

The practice of teaching Natural Sciences has been carried out according to various educational proposals, which occur as theoretical elaborations, expressing themselves in the most varied ways in the classrooms. Many of these practices are based only on the passage of theoretical contents, using the book and the blackboard as the only didactic resources. Others, on the other hand, are based on innovations that emerge over the years, new

methodologies that help teaching, as well as innovations in science and the way to pass on knowledge about it in particular (Brasil, 1998, p. 19).

> Showing Science as a human elaboration for an understanding of the world is a goal for teaching the area in elementary school. Its concepts and procedures contribute to the questioning of what is seen and heard, to interpret the phenomena of nature, to understand how society intervenes in it by using its resources and creating a new social and technological environment. It is necessary to favor the development of a reflective and investigative posture, of non-acceptance, a priori, of ideas and information, as well as the perception of the limits of explanations, including scientific models, collaborating to the construction of autonomy of thought and action (Brasil, 1998, p. 19).

Aiming at this goal and considering the mandatory nature of Elementary Education in Brazil, it is seen that it cannot teach students to act only in the future, but that teaching must contemplate the present so that the student can already act on social issues, expanding "his present possibility of social participation and mental development, in order to enable their full capacity to exercise citizenship" (Brasil, 1998, p. 23).

Thus, the teaching of chemistry should be valued by teachers in this phase of Education, because it is through it that we understand natural phenomena, from the composition of materials to their transformations. With this, it is possible to carry out experimental activities that encourage students to make observations and reach their own conclusions, thus awakening interest in scientific knowledge. Although the contents of the science area are often considered difficult due to their abstract character, many students face challenges in understanding them (Gonzaga; Joffe, 2022).

At the end of the 9th grade, students must "question reality by formulating problems and trying to solve them, using logical thinking, creativity, intuition, the capacity for critical analysis, selecting procedures and verifying their adequacy" (Brasil, 1998, p. 8), which is one of the objectives proposed by the National Curriculum Parameters for Elementary Education.

In the National Common Curricular Base (BNCC), ten general competencies of Basic Education are presented, which are articulated based on the construction of knowledge, the development of skills and the formation of attitudes and values, under the terms of the LDB. "These competencies are defined as the mobilization of knowledge, skills, attitudes and values to solve complex demands of daily life, the full exercise of citizenship and the world of work" (Brasil, 2018, p. 8), in which the student, by developing them, becomes a citizen able to get involved in social issues.

In view of this, working with investigative activities can be an excellent strategy to be used by teachers, making the student build their own knowledge.

For Carvalho (2010 apud Silva *et. al*., 2018, p.3):

> An activity can be considered investigative when it is not limited to memorization, but when it leads the student to reflection, discussion, problematization and questioning, in addition to offering a space for learners to share their ideas and opinions. Thus, it is possible to contemplate the methodology inserted in the classroom more effectively.

This type of investigative activity and practical classes arouse the interest of students, involve students in scientific investigations, develop the ability to solve problems, understand basic concepts, and develop the skills of their students (Gonzaga; Joffe, 2022).

With this, it is possible to perceive the importance of the educator's role in modifying the daily life of the classroom, because even without receiving extra financial aid in schools or external, many of them seek to vary and awaken the student to knowledge (Rosso *et al*., 2012).

2.1.3 Scientific Literacy through an inclusive bias

To understand the concept of scientific literacy, it is essential to initially understand the meaning of literacy. Although often associated only with the act of learning to read and write, literacy encompasses a much broader concept. Reading and writing represent only the first stage of this broader process.

The practice of Scientific Literacy is configured as a fundamental model to enhance the alternative of a more open teaching and learning process to expand the didactics of Science and stimulate the effective participation of students in the construction of their knowledge, as the researcher Chassot (2003, p. 3) says, to become scientifically literate is to enable the student to "know how to read the language in which it is written in nature" and I add, It is also knowing how to interpret the social environment in which it is inserted.

According to Sasseron and Carvalho (2011), Scientific Literacy (CA) can occur in different categories, namely: functional CA, conceptual and procedural CA, and multidimensional CA. Functional CA is related to appropriating scientific terms and concepts used in science; Conceptual and procedural CA emphasizes the fact that the student perceives the relationship between concepts and experiments with daily activities, verifying the importance of science in his daily life. Multidimensional CA would be the junction of previous ideas, that is, the student appropriates concepts and knows how to apply them in their daily lives.

One of the challenges encountered in carrying out the process of scientific literacy from the perspective of inclusion is the mastery of their language.

> Scientific language is composed of laws, theories, concepts, principles and structures that other types of knowledge do not have, which, at first, makes the teacher's work difficult. Thus, mastering this language is essential for teachers and students to be able to establish the proper relationships between science, society and the environment (Vilela-Ribeiro; Benite, 2013, p. 782).

Without mastery of this language, teachers are unable to carry out an adequate transposition that guarantees all students an understanding of knowledge with meaning for their experience outside of school.

The development of Scientific Literacy is based on axes that lead to the practice of teaching by investigation and argumentation in the classroom. The promotion of science teaching by investigation requires the presentation of problem-situations, related to the daily life of students, which position them in front of a process of analysis and interpretation of data to solve the proposed problem through reflection, characterizing a didactic approach (Sasseron, 2015).

The search for new perspectives and methodological strategies in education have directed the school's profile towards the formation of critical individuals, who know how to consciously reflect on their actions and on the actions carried out by others (Chassot, 2010). Thus, teaching as well as society need new tools that prioritize the development of the formative process of all students, including students with specific needs.

Science literacy methods with an inclusive bias are essential to ensure that all learners, regardless of their abilities, backgrounds, or educational needs, can access and understand fundamental scientific concepts. These methods aim to create a learning environment that values diversity and allows all students to develop critical skills to interact in an informed manner with the world around them.

One of the most effective methods is the adaptation of content and methodologies. This involves modifying teaching materials and pedagogical approaches to meet the different needs of students. Using visuals, audio-visuals, and simplified texts can facilitate the understanding of complex concepts, while assistive technologies, such as reading software and assistive devices, help students with disabilities to fully participate in scientific activities.

In view of this, it is clear that in order to advance in the implementation of inclusive scientific literacy, it is important to reflect on how pedagogical practice can be adjusted to meet the needs of all students. The adaptation of methodologies and content is crucial to ensure that the diversity of skills and needs is considered in the teaching process. In this sense, as highlighted by Vilela-Ribeiro and Benite (2013), the ability of teachers to master scientific language and adapt their approaches is vital for effective inclusion. Without this

competence, the transposition of knowledge can become an obstacle to students' understanding, limiting the impact of science education on their lives.

2.2 METHODOLOGY

This work used a qualitative and descriptive approach, organized in structured stages for the planning, execution and evaluation of a pedagogical proposal aimed at intervention in Elementary Education. The steps are described below.

The target audience of this project was the children of the 6th grade of Elementary School, in the afternoon shift, of the Achiles Cruz School, located in the Cangalheiro neighborhood, in the city of Caxias-MA.

Chart 1 shows the five topics of this proposal to be worked on in a dynamic and inclusive way. Among these proposed subjects, the subject "What is Chemistry? - Exploring matter and the mysteries of its transformations".

Table 1

Subjects proposed to work on in the 6th year of elementary school, didactic sequence with the objective and teaching strategy

Subject	Objective	Teaching strategy
Lesson 1: What is Chemistry	Understand the concept of chemistry, understand its importance and how it facilitates everyday life.	Explain the concepts of atoms, molecule/substance formation, and chemistry using illustrative (self-explanatory) images from the story of the bricklayer Peter, a fictional character who represents chemistry. Bricks represent atoms and constructions are molecules. Activity of building molecules using Styrofoam spheres and conducting experiments to demonstrate the transformations of matter, from which we acquire new materials.
Lecture 2: Physical States of Matter	Understand physical transformations and their importance in everyday life, such as transportation, storage, framing, among others.	Use sensory experiments to feel, describe and differentiate the textures of each state. Perform ice melting, and use cold, warm water, dry sand, wet sand and pebbles, as well as other materials to expand the experience.
Lesson 3: The mixtures	Understand the concept of mixture, understand that substances exist in the form of mixtures, that mixtures are essential to obtain a multitude of materials and understand the danger of some combinations at home.	Build different homogeneous and heterogeneous mixtures to feel, observe and differentiate characteristics through touch and sight. Mixtures such as water and sand, water and beans, liquid milk and others. From these experiences, complete and/or assemble a small mental map of the children's observations as a complementary activity.
Lesson 4: Fluoride and health	Discuss and understand the role of fluoride in caries prevention and bone health.	Make a brief explanation of what fluoride is and where it can be found (water, toothpaste, food). Using visual resources such as images and short, accessible videos about fluoride and its importance. Encourage the creation of educational materials (drawings on posters, simple models and models, videos with images and subtitles and interpretation in Libras).

Lesson 5: Acids and alkaline bases	Understand what an acid and a base are, understand their role in daily life, such as health and cleaning, understand the dangers related to these substances preventing domestic accidents.	Experimental practices to observe through the senses some characteristics, such as textures, flavors and aromas characteristic of acidic and alkaline products that DO NOT offer risks, such as fruits, soaps, eggs and others. Conduct safe identification experiments on these products.

Source: Author, 2025.

One of the topics of the pedagogical proposal was applied in the classroom, seeking to observe the receptivity and impact of the strategies employed in the teaching-learning process. Visual resources were prepared, such as illustrations and tactile models, so that, through the various senses, students had greater clarity and understanding of the concepts and transformations. The class applied in the classroom intervention was Class 1 - What is Chemistry? - Exploring matter and the mysteries of its transformations.

The didactic sequence containing the classroom actions, described in Chart 2, refers to the applied class, which was planned to provide an inclusive, dynamic and interactive teaching experience for students in the 6th grade of Elementary School at the Achiles Cruz school. Each stage was designed to develop scientific skills, stimulate interest and curiosity about Chemistry content, while meeting the educational needs of all students, including those with disabilities.

Table 2

Actions of the class on "What is Chemistry"

Classroom actions	Objectives	Number of classes/timetable
Conversation circle	Probing of previous knowledge about chemistry.	3 Schedules
Introductory lecture on the concept of Chemistry	Understanding of the initial concepts of Chemistry, addressing the relationship between atoms, molecules and substances, from the use of slides and objects present.	
Collective reading of the Comic Story.	Understanding, through HQ, of the concepts of atoms as the basic unit that forms all matter.	
Practical activity: Construction of molecules with Styrofoam spheres.	Evaluation of learning about the formation of different substances and promotion of interest in playful practical activities.	
Sensory experiment on transformations of matter - CO2 production.	Recognition of a chemical phenomenon through volume change as visual evidence.	

Source: Author, 2025.

For the analysis of the suggested proposal, photos, pictures and images of the day of application in the classroom were used. Texts were used to present the results. Reports of

experiences argued in terms of the results obtained, based on experience and references from other authors.

3 RESULTS AND DISCUSSION

In this item, the results of the suggested pedagogical proposal will be discussed, as well as the reports of the experience of the intervention in the classroom carried out.

In the class on "What is Chemistry", a class that was applied in the classroom, visual resources were used, such as self-explanatory illustrative images that represented fundamental concepts of Chemistry. The construction of Styrofoam spheres was carried out, as an inclusive tool, to assist in the understanding of the content worked. These materials were complemented by the story of the fictional character Pedro, who, through a comic book, made the concepts more understandable to the students. Materials and resources

In the application of the proposal developed in the school, the theme "What is Chemistry" was addressed, aiming to probe the students' previous understanding of Chemistry, understand the concept of Chemistry, its importance, how it facilitates daily life and introduce fundamental concepts. Through a conversation circle, complemented by images, texts and illustrations in the form of slides, we sought to engage the participants. A brief theoretical explanation about atoms, molecules and substances was reinforced using the story of the fictional character Pedro, the bricklayer (Figure 1) as a didactic resource promoting understanding through analogies, a strategy recognized for its effectiveness (Andrade, 2000; Santos, 2018).

Figure 1

Story of the fictional character Pedro

Source: Author, 2025.

For the creation of the comic book (HQ), first, the plot of the story was elaborated. This included establishing the main conflict, the setting, and the characters, and planning the beginning, development, and outcome of the plot. After the script, the layout was created, where the page outlines were drawn. At this stage, each frame was positioned to optimize reading and ensure that the scenes followed a logical and engaging sequence. Then, it was time to illustration, where the characters, scenarios and elements of the story were detailed and finalized. At this stage, the strokes and colors were also defined, which helped to create the atmosphere of the comic. Finally, dialogues and balloons are added, essential to give voice to the characters and to advance the narrative. In this story, the bricks represented the atoms and the constructions symbolized the molecules, making the concepts more accessible and easier to understand.

Figure 2 shows the students attentive to Pedro's story, showing that the resource used aroused their interest and, therefore, being a good choice and having satisfactory support. Historically, there was a time when comics were not allowed in the classroom by teachers. However, this view has changed over time, and comics have come to occupy a prominent place in education. More than pedagogical tools, they were incorporated as part of educational policy, especially after the enactment of the Law of Guidelines and Bases of National Education (LDB), which opened the doors of teaching to innovative resources such as comics (Vergueiro, 2015).

Figure 2

Photo of the moment of the theoretical explanation of concepts and collective reading of the comic

Source: Author, 2025.

During the theoretical presentation, illustrative images were used (Figure 3), which helped to visualize the relationship between atoms and molecules. These images were crucial in clarifying the concepts in a visual and clear way. According to Toyama (2019), the use of visual resources in teaching is essential to ensure adequate access to information,

especially in contexts of inclusion. In addition, studies on inclusive pedagogical practices indicate that adapted methodologies, such as visual representations, are effective in overcoming learning difficulties in disciplines that require abstraction, such as Chemistry (Lima, 2016).

Figure 3

Slides containing the illustrative images used to visualize the relationship between atoms and molecules

Source: Author, 2025.

Then, the students participated in a practical activity, where they built molecules using Styrofoam spheres (Figure 4). Styrofoam spheres were customized to represent atoms, a tactile resource to meet the needs of visually impaired children. With this in mind, printed materials were produced and beads were glued to the Styrofoam spheres to identify the atoms in Braille, in addition to another identification in Libras. Adaptations like this are necessary to meet the needs of inclusion students (Pereira, 2018). The different colors of the spheres, on the other hand, aim not only to differentiate the chemical elements, but also to make the representations of everyday elements such as carbon, hydrogen and oxygen more visually attractive. According to Balbinot (2005), the use of physical models favors the understanding of more abstract concepts, being more attractive and fun.

The colors red, black, white, green, light blue, and blue represent, respectively, the atoms of oxygen, carbon, hydrogen, chlorine, sodium, and nitrogen. This playful activity allowed students to apply the concepts of substance formation in a practical way, promoting an interactive and fun experience. As evidenced in innovative pedagogical practices, the use of colored and tactile models reinforces visual and motor perception, essential to fix complex content and engage students of different profiles. This approach not only improves the understanding of scientific concepts, but also stimulates critical thinking and creativity by

allowing students to explore chemical properties and relationships in an intuitive and meaningful way (Silva; Souza; Filho, 2012; Silva; Yamaguchi, 2023).

Figure 4

Photo of the moment of the construction of molecules, carried out by the student

Source: Author, 2025.

This type of approach is echoed in other inclusive educational experiences, such as a workshop reported at the 57th Brazilian Congress of Chemistry, where tactile molecular models were used to help visually impaired students. The Styrofoam spheres were differentiated not only by color, but also by textures, to facilitate the identification of elements and chemical compounds. In addition, the construction of these models has also been shown to be attractive to students without disabilities, promoting integration and collaborative learning (Alves; Mendes; Ferreira, 2016).

Another work that aligns with this perspective is the study by Silva and Yamaguchi (2023), which describes the development of inclusive teaching materials for the teaching of chemistry, using resources that are also accessible and low-cost. Among the materials developed are three-dimensional models representing atoms and molecules, a periodic table adapted for sign language and braille, as well as sensory experiments on the separation of mixtures.

Additionally, to illustrate the transformations of matter, an experiment was carried out using sodium bicarbonate, vinegar, dyes and water. An experimental script was devised to clearly demonstrate evidence of a chemical reaction perceptible by the senses of sight, smell, and touch, such as changes in volume, aroma, and temperature. The students observed the chemical changes during the reaction, which helped them understand how atoms and molecules interact to form new materials.

The experiment generated the production of CO2 by the reaction between vinegar and bicarbonate, which resulted in the inflation of a bladder, offering a fun and economical demonstration of the process. According to Borges (2002), the experimental activities developed in science classes are a way to overcome the learning obstacles that the student

may have in relation to the content, in addition to being dynamic, motivating and challenging, resulting in learning in a way that is meaningful to them. It is evidenced that these activities offer opportunities for experience, observation and investigation, connecting theory to everyday reality. They promote more active and reflective learning, which is essential for developing scientific skills and relating science, technology, and society (Sondré, 2018). Figure 5 shows photographic records of the moment the experiment was carried out in the classroom.

Figure 5

Photos of the moment of the experiments, proving the chemical phenomenon between bicarbonate and vinegar

Source: Author, 2025

As observed in the images mentioned above, the class was successful because it effectively integrated theory and practice, stimulating the students' interest in Chemistry and its application in everyday life. Thus, it is up to chemistry teaching professionals to seek alternative didactics that promote the improvement of learning, showing students that chemistry is a science whose concepts and laws are a direct consequence of the behavior of nature (Silva; Souza; Filho, 2012).

In the context of inclusive education, it is essential to highlight that the commitment to inclusion must be continuous and start from early childhood education, providing a solid foundation for the integral development of students. Inclusion promotes not only academic learning, but also respect for differences and appreciation of diversity. In this sense, the continuing education of teachers is crucial to enable them to meet the demands of an inclusive classroom and to ensure that all students, regardless of their needs, have equal learning opportunities (Neves; Rahme; Ferreira, 2019; Ferreira *et al.,* 2024).

4 FINAL CONSIDERATIONS

In view of the objectives proposed for the research, it was possible to conclude that the implementation of the pedagogical proposal focused on the teaching of Chemistry to

students of the 6th year of Elementary School, through dynamic, accessible and inclusive strategies, satisfactorily met the initial expectations. The approach adopted, using resources such as conversation circles, comic books, playful materials and practical experiments, allowed the introduction of chemical concepts in an engaging, contextualized way that considered the different needs of the students.

The interaction between theory and practice, combined with inclusive strategies, such as the use of Styrofoam spheres for the construction of molecules and adapted experimental activities, favored the students' learning. The active participation of students, both with and without disabilities, in the proposed activities, demonstrated the effectiveness of methodologies that value diversity and promote a collaborative environment.

The results showed that the use of visual, tactile and interactive resources actually contribute to the understanding of abstract concepts, such as atomic structure and the formation of molecules, in addition to stimulating students' curiosity and critical thinking. The realization of practical experiments, such as the reaction between baking soda and vinegar, made it possible to experience chemical phenomena in a concrete way, promoting the connection between the content learned and everyday situations.

Thus, the pedagogical proposal developed not only achieved the planned objectives, but also demonstrated the potential of inclusive practices in the teaching of Chemistry, making the concepts more accessible and meaningful for all students, regardless of their limitations. This approach contributes to the construction of a more equitable and richer chemical education, which can serve as a model for future pedagogical practices in science education.

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