SCIENTIFIC LITERACY IN THE FINAL YEARS OF ELEMENTARY SCHOOL: MILK FERMENTATION AS A MEANS OF TEACHING SCIENCE

LA LITTÉRATIE SCIENTIFIQUE EN DERNIÈRE ANNÉE DU PRIMAIRE: LA FERMENTATION DU LAIT COMME MOYEN D'ENSEIGNEMENT DES SCIENCES

ALFABETIZAÇÃO CIENTÍFICA NOS ÚLTIMOS ANOS DO ENSINO FUNDAMENTAL: FERMENTAÇÃO DO LEITE COMO MEIO DE ENSINO DE CIÊNCIAS

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ABSTRACT
The following pages contain a qualitative case study designed and carried out to understand what the assumptions are. These are data from the voice recording research of classes in full and the written works and/or activities produced by the students, in addition to all the didactic material provided to them during the classes. We started our research by reviewing the theme “Scientific Literacy through fermentation in artisanal yogurt production” in the national and international literature on Science Didactics, through which we found information that allowed us to propose the structuring axes of Scientific Literacy. These axes are considered in our research for the analysis of the activities that make up a didactic sequence involving discussions in which the same theme is discussed considering scientific knowledge and technologies through local knowledge. The indicators are vital for the analysis that we carry out as they can provide evidence that Scientific Literacy is in process among the students at Elementary School Final Years observed in our research. After analyzing the didactic sequence, the oral arguments, and the written works and/or experimental activities carried out by the students, we found quite substantial evidence that Scientific Literacy is in process for most of the students in the studied class.

KEYWORDS: Literacy Scientific. Fermentation. Teacher Basic

ABSTRACT
Les pages suivantes contiennent une étude de cas qualitative conçue et réalisée pour comprendre quelles sont les hypothèses. Il s’agit des données issues de la recherche d’enregistrements vocaux des cours dans leur intégralité et des écrits et/ou activités produits par les élèves, en plus de tout le matériel didactique qui leur est fourni pendant les cours. Nous avons commencé notre recherche en passant en revue le thème « La littératie scientifique par la fermentation dans la production artisanale de yaourt » dans la littérature nationale et internationale sur la didactique des sciences, à travers laquelle nous avons trouvé des informations qui nous ont permis de proposer les axes structurants de


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la littératie scientifique. Ces axes sont considérés dans notre recherche pour l'analyse des activités qui composent une séquence didactique impliquant des discussions dans lesquelles le même thème est abordé en considérant les connaissances scientifiques et les technologies à travers les savoirs locaux. Les indicateurs sont essentiels pour l'analyse que nous effectuons car ils peuvent fournir la preuve que la littératie scientifique est en cours parmi les élèves des dernières années du primaire observés dans notre recherche. Après analyse de la séquence didactique, des plaidoiries, des travaux écrits et/ou des activités expérimentales réalisées par les élèves, nous avons trouvé des preuves assez substantielles que la Littératie Scientifique est en cours pour la plupart des élèves de la classe étudiée.


RESUMO
As páginas a seguir contêm um estudo de caso qualitativo projetado e realizado para entender quais são os pressupostos. Estes são dados da pesquisa de gravação de voz das aulas na íntegra e dos trabalhos escritos e/ou atividades produzidas pelos alunos, além de todo o material didático fornecido a eles durante as aulas. Iniciamos nossa pesquisa revendo o tema "Alfabetização Científica através da fermentação na produção de iogurte artesanal" na literatura nacional e internacional sobre Didática Científica, através da qual encontramos informações que nos permitiram propor os eixos estruturantes da Alfabetização Científica. Esses eixos são considerados em nossa pesquisa para a análise das atividades que compõem uma sequência didática envolvendo discussões em que o mesmo tema é discutido considerando conhecimento científico e tecnologias por meio do conhecimento local. Os indicadores são vitais para a análise que realizamos, pois podem fornecer evidências de que a Alfabetização Científica está em processo entre os alunos dos Anos Finais do Ensino Fundamental observados em nossa pesquisa. Após a análise da sequência didática, das sustentações orais e dos trabalhos escritos e/ou atividades experimentais realizadas pelos alunos, encontramos evidências bastante substanciais de que a Alfabetização Científica está em processo para a maioria dos alunos da turma estudada.

PALAVRAS-CHAVE: Alfabetização Científica. Fermentação. Professor Básico

INTRODUCTION

The teaching of science for the final years is a challenge and, in this, the training of teachers is an essential element. Paixão and Cachapuz [6] Propose and investigate a program based on history and philosophy of science with the aim of developing teaching practices in most innovative chemistry.

I consider that investigating my own practice is investing in my training for the sake of professional development and, at the same time, indirectly contributing to the training of other teachers who experience contexts close to mine.

I understand that it is necessary not only to point out problems that involve the teaching of Natural Sciences in the final years of Elementary School, but to propose improvements that allow changes in our practice. Thus, to meet the objectives of this research, I proposed to investigate the teaching of science from the approach of a topic of social relevance. The activities were designed to start from the students’ life experiences as part of the Science classes.

Thus, the production of yogurt and the study of milk fermentation was defined as a theme, which led to delimiting the necessary knowledge for its understanding. With the definition of the theme, I proposed to produce a didactic material from the activities developed in the classroom, to
help teachers who, want to carry out similar proposals, considering their professional contexts. In summary, my interest was to produce a didactic proposal for teaching Science for the Final Years as an alternative to the fragmented approach of science and a contribution to the Scientific Literacy of students, from the approach of a social theme.

This interest corroborates with that pointed out by Castilho, Silveira and Machado [1] when they say that “for learning to be meaningful, it is important that the student learns to relate the concepts to the situations experienced in their daily lives”, to contribute to their participation in the community in which they live.

Scientific and technological production is present in all sectors of contemporary society, causing a series of economic, social, and cultural transformations. In this context, scientific knowledge assumes a prominent role, given the relationship between society and chemistry, expressed in the use of chemical products, such as drugs, pesticides, food additives, in addition to countless influences related to people's quality of life, environmental issues and individuals regarding the use of new technologies.

In line with the thinking of Santos and Schnetzler [9], educating citizens in science and technology is now a necessity in the contemporary world: For a country to be able to meet the fundamental needs of its population, the teaching of science and technology is a strategic imperative [...] today, more than ever, it is necessary to promote and disseminate scientific literacy in all cultures and cultures, in all sectors of society, [...] to improve citizens' participation in taking decisions on the application of new knowledge. Gil-Pérez [3].

The role of science education would be to socialize and build information that enable citizens to make informed decisions and understand current issues that have been discussed in science and technology.

The BNCC for the final years of Elementary School will guide the curricula, among other aspects, on what to teach, with the aim of favoring access to historically and socially constructed knowledge for Brazilian students.

Considering the context in which I work as a teacher of Natural Sciences, a school located in the rural area of the municipality of Terra – Alta, State of Pará, I identified as a socially relevant theme the artisanal production of yogurt, in a cooperative that has 38 employees. All the employees are from the cooperative, which means they are all from families in the village. The closest school to the cooperative is the school where I am a teacher, and the students are mostly children of parents who work in the cooperative.

Thus, the problem of this research is defined: In what terms does the development of a sequence of activities on the artisanal production of yogurt contribute to scientific literacy in the teaching of Natural Sciences in the 9th year of Elementary School? In this research,

I seek to reflect on practices aimed at the study of Natural Sciences for the 9th Initial Year of Elementary School. The activities that constituted the research scenario are organized in such a way
as to allow teachers and students to discuss in groups on the topic of social relevance and on scientific content. The intention is that chemistry, physics, and biology interact with each other, for better science learning.

It is in this sense that having as general objective to investigate the development of a sequence of activities on the artisanal production of yogurt, through the fermentation of milk, in the 9th year of Elementary School.

MATERIAL AND METHODS

The present work is qualitative research, of the pedagogical intervention type, which according to Chassot [2], contemplates the “planning and implementation of interferences (changes, innovations) - destined to produce improvements, in the learning processes (...) - and the subsequent evaluation”. Intervention research seeks alternatives to concrete problems and should not be confused with teaching and extension projects or their reports with experience reports. It is applied research, in which academic production allows professors to investigate their own practice.

For the construction of the information in the research, we used the researcher's field diary and the oral and written records developed by the students during the activities. To organize the information, we initially read all the students' productions, identifying aspects in common in the answers, for the elaboration of axes of analysis. We proceeded to the analysis of the records - written and oral - of the students, due to their complexity and the inclusion of new elements in the records of the students.

The content of the students' written responses was also analyzed based on the distinction between description, explanation and generalization, aspects present in the analytical tool developed by Mortimer and Scott [5]. Descriptions are defined as statements that refer to a system, object, or phenomenon, based on its constituents or their spatio-temporal displacements. Explanations consist of bringing a theoretical model or mechanism to refer to a phenomenon or system.

They are theoretical when they go beyond the phenomenon, inserting entities or terms from the theoretical language of science, which are not directly observable.

Description of the Activity Developed in Class

The sequence of activities on the artisanal production of yogurt included in the curricular component of science was composed of stages, as described below. The other proposed activities that will emerge from the experience in this first stage will be presented as suggestions for the didactic product, in the form of an e-book.

Thus, to meet the research objectives, it is proposed to teach Science from the approach of a topic of social relevance. The activities were designed to start from the students' life experiences as part of the Science classes. Thus, the artisanal yoghurt manufacturing and the study of milk fermentation was defined as a theme, which led to delimiting the necessary knowledge for its
understanding.

Next, the first sequence of activities was planned based on the recognition of the research context and the students’ daily experiences, which will be described below.

The sequence of activities was developed according to the development of the artisanal production of yogurt theme. The theme was chosen due to the economic and social importance of a cooperative that works in the village of Getúlio Vargas (Mocajubinha) in Terra Alta - PA and which operated, at the time of the research, with the production of yogurt.

The students who attend the school are, for the most part, children of the families that are part of the cooperative, and artisanal yogurt is very popular in the village and surrounding areas. In addition to economic and social aspects of the students’ life context, this theme has the potential to address Science content related to transformation, fermentation and yogurt manufacturing technology and its stages in the Natural Sciences curriculum.

RESULTS

A priori, a public assessment was defined for the survey and the target, students of the year of the Initial Years. In the first class, a step was shown on the production of yogurt, as the transformation process, as the desired product, the video, which did not pass the production, but explaining the transformation concepts and during the transformation process, as the desired product. milk of milk.

The following data shows the students’ evaluation in relation to the yogurt production class:

- **Use of video lessons in yogurt production**
  - Question 2 Categories %
  - How do you evaluate a video lesson held in the classroom? Regular 2.9%
  - Good 26.8%
  - Excellent 70.4%

The school year is only for the aggregation of knowledge at the introductory level for 9th grade, to prepare them for the subsequent grades. learning the subjects of interest”.

Interest of students in relation to classes with experimental practices in the classroom.

About practical classes Penick [7] states that “adopting experimental procedures is an innovative practice in learning, as it breaks the paradigm of traditional learning, such as more procedures and progress in learning”. The student as a target can become an investigative agent, explore, and research a subject, taking from the formulated hypotheses their conditions capable of making a determined fact.

From the analysis of the questionnaire data, it was possible to establish some considerations regarding the students’ answers, enabling the proposition of new strategies that could improve the development of science in the form of experiments in the school environment.

- **Students’ conception of science with experimental practices.**
  - Question 1 Categories %
What do you understand by science through experimental practices? They are associated with the learning procedure 60%

It is not related to the theory, being only the experimental methods and processes performed 35%

Procedures that relate only to processes developed in the laboratory 5%

It was possible to observe that most students know the importance of experimental practices in classes and agree with the proposition of mandatory experiments to consolidate science teaching.

The relevance of learning is efficient when it is verified that students have an interest in a particular science subject from the introduction of experimental methods in classes. This fact is proven in the results below, where the answers referring to the students’ level of interest are found when practical classes are introduced in the school project:

Index of students’ interest in practical classes.
Question 5 Categories %

Do practical classes arouse your interest in the subject of Natural Sciences? Yes 94.4%
No 0%
Partially 5.6%

The results showed that most students are more interested in each science subject when they are submitted to practical classes. On this subject, Leite [4] states that:

Practical classes arouse interest in students by virtue of arousing hyperactivity and not passivity, as it appears that in the traditional model, the structuring of teaching occurs through the figure of the teacher, making students passive in activities and written assessments, already in the classes developed. Through experiments, the class is motivated to remain more active, carrying out the stages of the experiment with attention and agility, which provides a greater level of interest and commitment to the classes developed.

Undoubtedly, some were more motivated, dedicated and more reflective than others. There was also a difference in the depth of the answers to the questionnaire, as some were more detailed than others, with greater clarity of the proposed theoretical approach, with reflections and interpretations more directed to the investigations that the work proposed, showing a richer and richer experience. shocking.

Report of Activities Developed in Class

Initially, we present the theme to students by reading the text “The chemistry behind yogurt”, GREENWOOD, which discusses aspects of the food production process.

The students’ written records were organized around the study theme. In this first moment of the sequence of activities, the objective was to identify what they thought about the topic, explore their ideas, and then find, in other moments of their written production, evidence of learning in the context of the approach developed on the topic in focus. During the class, the students commented on
different aspects regarding the topic of yogurt production and, specifically, fermentation. They mentioned scientific language terms such as fermentation, substance, mixtures, when discussing and writing about the origin and artisanal production of yogurt:

Yogurt is made from milk and other substances, but mainly from milk (Student 1 – written record).

From milk extracted from cows, some substances, and microorganisms (Student 2 – written record).

It is made from cow’s milk and with some other substance (Student 3 - written record).

Animal milk and fruits with honey, strawberry, chocolate (Student 4 – written record).

The students’ written records demonstrate that it is possible to converse with them using scientific language terms, even though the systematization of knowledge has not yet taken place, or the scientific meaning of words has been developed. For this it is important to explore the initial ideas, such as that milk is a substance (Yogurt is made from milk and other substances; it is made from cow’s milk and with some other substance), without evaluating these answers as right or wrong, at first.

When researching the teaching of Chemistry in the Early Years of Elementary School, Zanon and Palharini [11] emphasize that it was possible to introduce, through language, basic chemistry terms, such as substance and acid. The authors comment that the use of these terms by the children occurred in contexts of discussion in which in-depth studies in terms of formulas, symbols and theoretical models were not used. In the case of the Final Years of Elementary School, it is desirable that students have some level of contact with such theoretical or microscopic aspects of Chemistry, such as particle models. The point is that scientific literacy as a process presupposes that entry into scientific language occurs at different times, in which students learn new meanings for the terms used in class.

In this regard, according to Vygotsky [10], the word has an internal history of development, that is, they are not learned immediately by students, insofar as when a child starts to use a word, their development has only just begun.

Regarding yogurt production technology, initially students 1 and 2 referred to the manufacturing location and mentioned the existence of many manufacturing procedures or processes, however, without specifying which processes they were commenting on.

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It (the milk) is taken to the industry and many procedures are carried out there (Student 1 – written record).

At the dairy factory, where the entire manufacturing process takes place (Student 2 – written record).

It is taken (the milk) from the cow and from there it goes to the factory where it is taken to a temperature that kills its bacteria and after that it is mixed with good bacteria, and they stay there for 20 hours to make the yogurt (Student 3 – registration written).

Bringing the animal milk removed and transported to the dairy, there begins the pasteurization process, a process to remove bad bacteria, right after adding non-corrosive bacteria (Student 4 – written record).

On the other hand, students 3 and 4 referred to the yogurt pasteurization process (it is brought to a temperature that kills its bacteria; the pasteurization process begins, a process to remove bad bacteria), which consists of a heat treatment which eliminates microorganisms sensitive to certain temperatures. Regarding fermentation, students initially recorded that:

This is when some bacteria that do not cause harm to humans are placed, and these microorganisms carry out the process there at 20:00 (Student 1 – written record).

Student 2: they are substances made in laboratories so that the milk lasts a long time (Student 2 – written record).

Student 3: Fermentation is when something is left to rest with something and after some time it peats or is in a thick state (Student 3 – written record).

Student 4: process for placing yeast (Student 4 – written record).

In the answers about fermentation, it was possible to observe the presence of scientific language terms, even though the records do not constitute theoretical explanations. In his answer, student 3 basically resorted to perceptible aspects that, according to him, are associated with fermentation: it is when something is at rest with something and after some time it becomes peat, or is in a thick state, which can be classified as an empirical description.

Some of the questions in the questionnaire put us in a better position in relation to the research object, with the interest of knowing the knowledge of students in relation to the topic of homemade yogurt production, aiming at an interdisciplinary approach (chemistry and biology) in the
Final Years of Elementary School.

The text and the questionnaire made it possible to mobilize the students' initial ideas on the subject, which, from the perspective of cultural-historical psychology, is an important starting point for learning in the classroom. This is because, by exposing their understandings, students can confront them with other points of view, helping them to confirm, expand or even set aside some ideas about the subject worked in the classroom.

During the morning visit to the factory, the teacher asked the students to recall what had been discussed in the text and in the questionnaires used in the previous stage. He asked them to write down their observations of the steps in the yogurt production process and any details they felt were important. At that moment, the teachers left the students free, without intervening in the registration of the groups.

Some students were amazed at the amount of material used and the care needed in the process to avoid interference or contamination by external agents. There was a concern on the part of the teachers in not just wanting to hear the correct answer about the steps of yogurt production, but to provide additional information so that students could know the reason for each process.

We consider that this is a fundamental aspect that enhances scientific literacy and students' interest in science knowledge, given that it relates scientific information to their social context and to the technological process of producing a food, yogurt.

We have separated excerpts from reports that four groups of students presented about the visit. We will use numbers for groups instead of student names.

The view of the yogurt factory was good, we learned how to make yogurt and its parts, first, take the milk from the cattle and put it in a large bowl and leave it there with the microorganisms to ferment, wait a day and a night for the animals to transform the milk in the curd. It separates the hard part of the liquid and puts the beaten fruits of different types and flavors. The factory is in a large warehouse and has large aluminum funnels and bowls and various metal tubes. After everything is prepared, put it in plastic yogurt bottles. Everything ready for consumption (Written record of the visit – group 1).

The visit to the yogurt factory was interesting and taught how to make yogurt in an industrial way. Each step and step were showing the whole process, from the storage of milk to the product that is yogurt. The technician responsible for explaining the process said that there is little care so that there is no contamination from the outside to the inside, it is very interesting what happens to the matter or compound, they change their visible physical state. Very easy to make yogurt, just have cow's milk and fruit (Written record about the visit – group 2).

The visit to the factory was very useful, as we observed each step of the stages, from cow's milk to the yogurt product. From the collection of milk by the community on the farm to the packaged yogurt, the care with storing the milk in metal vats, the temperature prepared for microorganisms and the selection of fruits such as: banana, bacuri, cupuacu, guava, murici collected by the community.
About the chemical phenomenon that occurred was the change from liquid milk to curdled milk. Everything being used as the whey, the solid for mixing the yogurt. Also, microorganisms help in the process through fermentation. I could see and hear the technique and write it all down (Written record of the visit – group 3).

We went to the factory to see how yogurt is made on a large scale, a place like a shed with some machines, where they put the milk to rest and wait a few days to ferment through microorganisms to turn it into curds. Then it takes what has been separated liquid and solid and will be used to make the yogurt, beat it all in a beater and mix it with fruits of different flavors, pack it and it is ready for sale and consumption (Written record of the visit – group 4).

In the excerpts above, it was possible to notice that the students observed different aspects in the technology of yogurt production: separation of mixtures (take what was separated liquid and solid and will be used to manufacture the yogurt), transformations involved (About the chemical phenomenon that occurred was the change from liquid to curdled milk) and utensils used (funnels and large aluminum bowls and various metal tubes, metal vats, beating machine) and their role in the process.

After visiting the yoghurt factory, another step was taken in the classroom, now addressing the students’ scientific knowledge in relation to the milk fermentation process, not only what they knew about the phenomenological part of fermentation, but now what happened in the microbiological part of it. This step was developed from a video about the production of yogurt. After the class, the researcher and the teaching biology teacher asked the students for additional elaborations to justify or expand their answers.

The activity proposed to the students focused on establishing the relationship between the level of the phenomenon that occurred during classes, visit to the factory and the milk fermentation process.

We guide students to represent, through formula, the chemical reaction that occurs during the fermentation of milk, always guiding and interacting with each student. Then, we invite students to share their productions with the whole class. At that moment, when necessary, we asked the students to answer some questions in writing, including: 1. What is the difference between substance and mixture? 2. Why was yogurt added to warm milk? 3. If we added very hot or iced milk, would the experience have happened? 4. What is the role of microorganisms in the process? The answers to these questions constituted the written records analyzed in the present study. Afterwards, we returned their written records to the students so that they could review their answers after watching the video and discussing the subject in class, with the help of the text given to them.

The difference between substance and mixture was a question presented to the students, as we observed that in the initial written record, the students considered milk as a substance and not as a material composed of water, fat, proteins, lactose, vitamins, enzymes, and minerals. In general, it was possible to identify that the students were able to distinguish between substance and mixture.
Students 2 and 3 mention that substances are characterized by their physical properties, which are constant, in addition, student 4 mentions physical properties: such as melting point, boiling point and densities.

The substance is formed by only one component, they can be simple or compound, since the mixtures are formed by two or more substances, the mixtures can be homogeneous, which have only one phase, we can see the substances mixing, since the heterogeneous ones have two or more phases and we cannot see them mixing, like water and oil (Student 1 – written record). Well, substances and mixtures are different because substances are formed by a single component and have constant and defined properties, while mixtures are systems formed by two or more compound or simple substances that react differently (Student 2 - registration written).

The substance is formed by a single type of component, presenting itself as simple or composite and having as point of well-defined physical states and filters. The difference between the two is that the mixture needs a simple or compound substance to develop a mixture, and it does not have well-defined and physical properties, but rather undefined and variable physical properties that already in the substance it meets with. well-defined and physical properties. And in the mixture, it is presented as homogeneous or heterogeneous (Student 3 – written record).

Substance is when a certain material is formed by only one type of component and, as a result, have physical properties, such as melting point, boiling point, and densities. Mixtures are systems formed by two or more different substances, these mixtures can be heterogeneous when the two substances do not mix being divided by bases or layers and homogeneous is when the two substances do not mix being divided by bases or layer and homogeneous and when the two substances mix perfectly and do not present these phases or layers (Student 4 – written record).

As for the explanation about the yogurt being produced with warm milk, the students answered that: Because when it is added to warm milk, the beneficial conditions of temperature and the availability of the food make the bacteria reproduce, making it not sour easily (Student 1 – written record).

So that all the microorganisms were mixed in the yogurt making the transformation that happens by the bacteria Streptococcus Thermophilus and the bacteria-colos bulgaricus (Student 2 – written record).

For it to have a balance between the bacteria and it is necessary to keep the yogurt acidic, aromatic, stable about inhibiting other bacteria that are harmful to health and that could have a certain growth (Student 3 - written record).

It was added to the milk so that the bacteria feed on the milk's nutrients and make the yogurt more flavored (Student 4 – written record).

As for the question asked about what would happen if we put very hot or iced milk, the students answered, constructing theoretical explanations for the question, with students 3 and 4 presenting constructions according to what the teachers had worked in class, regarding the
fermentation:

Yes, because the ideal temperature is 40º C (Student 1 – written record).

Not because microorganisms are placed in very hot or very cold, iced milk, they will not play their role, which is to transform milk into yogurt, so the temperature is (+40ºC) for the availability of food (Student 2 – written record).

Yes, because the chemical transformation that would even occur, would cause a kind of thermal shock on the microorganisms and having a benign stimulation and with a good development to the microorganisms good for digestion (Student 3 - written record).

Not because if the milk is too hot or too cold, the bacteria could not proliferate, they would die, fermentation would not take place (Student 4 – written record).

As for the role of microorganisms in the process, as with the other questions, students resort to terms from the scientific discourse in their answers, in addition to mentioning that microorganisms act in the transformation of lactose into lactic acid:

They feed on the lactose present in milk, eliminating lactic acid (Student 1 – written record).

They are responsible for transforming milk into yogurt so that there are several nutrients present in yogurt (Student 2 – written record).

Keeping itself very well for digestion through processes that lead to benign multiplication towards microorganisms and are very aromatic and reducing the acidity found in milk (Student 3 - written record)

Increase yogurt acidity, flavor it and be responsible for yogurt fermentation (Student 4 – written record).

Analyzing the content of these questionnaires, we were able to assess that the students contained very important information and that they were directed to imprint a significant value on the students’ learning knowledge.

FINAL CONSIDERATIONS

The proposal to overcome the vision of schooling as a mere flow to be staggered, valued only as a preparation for the future, and not as an effective potentializing of the processes of integral development of children and adolescents in the middle of the formation process, with which we live together each cycle of school life, in their specific sociocultural insertions, extrapolate the dimension of preparation for professional life.

We want our students to have possession and know how to use explanatory concepts/models of biology and chemistry, as a valid form of thought/language that proves appropriate to describe, represent, comment, and understand, beyond appearances, everyday situations. in their physical-material aspects, acting with responsibility, that is, with wisdom, in the environments where they live [8].

Through understanding and discovery, this leads to the need that students increasingly need
to be provoked to solve concrete problems of everyday life, developing scientific and technical literacy.

On the contrary, methodological strategies like this one and others of the same nature and intention make possible the development of a science.

We are increasingly convinced that, through instigating approaches to learning processes, it is possible to problematize existing knowledge in search of the constitution of ideas, concepts, models and specific contextualized languages that awaken the student to active and responsible participation in society., moved by the processes of learning to learn, to know and to change, committing itself in solidarity in the interaction with the other subjects of the interventions, mediations, constructions and changes.

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