

# Teachers' conceptions of active methodologies in science teaching in Bom Jesus - GO

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**ABSTRACT.** Active methodologies are a powerful tool in science education, promoting student-centered learning where students become the protagonists in constructing their own knowledge by connecting curricular content with real-life situations. In Brazil, discussions about active methodologies became more prominent in the 1990s and intensified in the early 2000s, partially overlapping with the initial training of many practicing teachers. Given this context, this study aimed not only to identify the understanding of 16 teachers from municipal and state public schools in Bom Jesus, GO, regarding active methodologies but also to assess the actual need for continuing education. The research considered potential gaps in teacher training, particularly for science and chemistry education. Using a mixed-methods approach with a questionnaire as the data collection tool, the results revealed that some teachers are unfamiliar with active methodologies or face difficulties applying them. This finding highlights a clear need for professional development focused on both understanding and implementing these methods. The study concludes that teacher training must be connected to the historical context of their initial education. As such, a crucial pedagogical intervention is to provide continuing education for these teachers on the use of active methodologies.

**Key words:** active methodology; science teaching; teachers; continuing education

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## INTRODUCTION

Society has undergone various changes that are reflected in our historical and social context. Consequently, it is observed that these changes impact the demand for a new teaching profile. <sup>1</sup>This new profile requires teachers to rethink their training, starting from the diversity of knowledge essential for their practice. This approach aims to transcend a purely technical rationality of instrumental action and move toward a perspective that seeks to re-signify, valuing existing knowledge through a <sup>2</sup> reflective, investigative, and critical stance (Diesel; Baldez; Martins, 2017).

Based on the above, it is clear that teaching has often been guided by a system of memorizing formulas, equations, and rules with no connection to the students' social context. This situation can be

caused by the lack of reflection on the teacher's own practice and a failure to seek transformation. In this sense, redefining teaching practice is a challenge for educators, especially those who teach science and mathematics. This is because, during their initial training, most teachers may not have been exposed to methods that encouraged them to reflect on the teaching methods to be used or the importance of contextualizing content (Wartha; Silva; Bejarano, 2013).

The contextualization of content in science teaching encompasses competencies aimed at integrating science and its technologies into the historical, social, and cultural process, as well as fostering the discussion of practical and ethical aspects of science in the contemporary world (Brazil, 2002). Teaching, in this sense, should be guided by the approach of social issues as possibilities for contextualizing chemical knowledge, making it socially more relevant (Brazil, 2006). This perspective is aligned with Freire's (2011) critical pedagogy, for whom learning must begin from the reality experienced by the student, as well as with the proposals of Delizoicov, Angotti, and Pernambuco (2009), who advocate contextualization as a structuring axis of science education.

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Often, it is noted that contextualized teaching has not been properly addressed with students. Content is often worked on in isolation, citing only one example from the content with a real-world situation without problematizing it. This situation usually occurs due to the high demand for curricular obligations that teachers are required to fulfill. This leads them to adopt methodologies that offer greater security and are closer to the real conditions their work environment offers, thus causing resistance to new methodologies and curricular initiatives (Bonadiman; Nonenmacher, 2007).

Therefore, it is necessary to create favorable and pleasant conditions for teaching and learning in science and mathematics. This involves considering students' life experiences, their daily routines, cultural traditions, and media, thereby seeking to reconstruct knowledge so that the student can re-read their world (Bernardelli, 2004). From this perspective, it is up to the teacher to become a facilitator of the teaching and learning process, abandoning traditional methods of transmitting concepts. The student then shifts from a passive position to assuming a protagonist role in their own learning, developing a critical sense, skills, abilities, and connections with the world they live in (Pinto et al., 2012).

In light of the affirmation of the aforementioned authors, who advocate for the re-signification of teaching practice and teaching based on students' social and historical context, Diesel, Baldez, and Martins (2017) corroborate this by proposing the insertion of the active method in teaching practice. This method proposes the inverse movement of the traditional approach, where students are understood as historical subjects and assume an active role in their learning, using their experiences, knowledge, and opinions as a starting point for constructing their knowledge.

Regarding students' historical and social context, a study conducted by Coelho and Pisioni (2012) on historical-critical social pedagogy mediated by Vygotsky highlights that the school plays its fundamental role in education when its teaching is systematized and based on activities that are different from extracurricular ones, allowing the student to expand their knowledge. The school, in turn, must value students' prior knowledge, seeking to work from it, thus stimulating their potential and giving them the possibility to surpass their capabilities. For the teacher to do a good job, it is essential that they know their students, their discoveries, hypotheses, beliefs, and

opinions, fostering dialogue and creating situations where they can express what they know.

When we envision a classroom in an interactive process, we believe that everyone will have the opportunity to speak, raise their hypotheses, and, through negotiations, reach conclusions that help the student perceive themselves as part of a dynamic construction process. We are not referring to a classroom where everyone does what they want, but one where the teacher acts as a knowledge articulator and everyone becomes partners in a great construction. By acting this way, we value the partnership, mobilizing the class to think together and not to expect a single person to have all the answers. Interactions are fundamental in this process (Vygotsky, 1998).

The active method, in turn, refers to active methodologies, which enable learning to learn as well as learning by doing. These methodologies are student-centered, with students seen as subjects involved in the entire teaching and learning process. Active methodologies are also based on a critical and reflective pedagogical conception and have the active participation of the student as their central axis throughout the process, including all new and different scenarios of practice (Fernandes et al., 2003).

Discussions about Active Learning Methodologies emerged around the 1990s, disseminated by Professor Eric Mazur. Dissatisfied with the teaching methods adopted at the time, Eric Mazur decided to innovate, creating new strategies for learning acquisition. These methodologies, named Active Methodologies, have the fundamental aspect of making the student the main person responsible for their learning (Bartolomeu; Silva; Lozza, 2017).

According to Berbel (2011), active methodologies have the potential to awaken curiosity in the student as they are inserted into theorization and bring new elements that have not yet been considered in the classes or even in the teacher's own perspective. As students' perceptions are accepted and analyzed, thus valuing their contributions, they are stimulated and feel engaged in the process, resulting in a more active learning process.

In active learning, therefore, the student becomes the protagonist of their own learning. For this practice to happen effectively in the classroom, the teacher must have a clear understanding of the different teaching methods that can be used to create a productive and meaningful learning environment.

Thus, proactive teaching practices are fundamental in the teaching process and in the development of generations and the formation of autonomous, critical, participative, and creative citizens. To this end, teachers need a tool in the classroom that encourages the student to stop being a recipient of information and start building their own learning (Arão; Silva; Lima, 2018).

The active methodologies that can be used in the classroom are diverse, with the teacher acting as a facilitator of this learning process and students as co-participants in the construction of knowledge based on their interests and needs. Different active methodologies can be used in science teaching, such as Problem-Based Learning, Project-Based Learning, the Flipped Classroom, Case Studies, Peer Instruction, among others that show satisfactory results, highlighting the need for other means of teaching (Backes and Prochnow, 2017).

Regarding active teaching methods, "Problem-Based Learning," according to Ribeiro (2008a), is based on the construction of knowledge focused on real problems and integrated with the development of skills. This includes the autonomy of learning and stimulating teamwork to favor adaptation to changes, problem-solving skills, and the development of critical and creative thinking.

When referring to "Project-Based Learning" teaching method, Bender (2014) emphasizes that this methodology favors interaction between students and the teacher. It is necessary to develop strategies to monitor the progress of the project and extract the necessary information for the student learning assessment process. In this sense, this method becomes a knowledge promoter, and it is up to the teacher, along with the student group, to find and define the best ways to explore learning possibilities.

The "Flipped Classroom" method, according to Valente (2014), consists of inverting the actions that occur both inside and outside the classroom. In the process of choosing the extracurricular activities to be defined by the teacher, their preparation and the detailed lesson plan should be a priority. It is necessary for the teacher to prepare the materials and make them available to the students before the class, with the aim of making the in-person debate as qualified as possible. In this sense, this method becomes a knowledge promoter, and it is up to the teacher, along with the student group, to find and define the best ways to explore learning possibilities (Scheneiders, 2018).

The "Case Study" is another method used that can be part of active methodologies and requires students to learn in a possibly non-traditional way. Instead of passively receiving information, they become active participants in the entire learning process. Sometimes, they will need to work with other colleagues. In this method, the attention is centered on the student. The teacher is merely a facilitator, sharing control of the learning process with the students, but without giving it up entirely. The teacher's duty is to awaken students' interest, stimulating active participation among them and encouraging them to contribute ideas, analyses, and conclusions. The student's role is to accept the responsibility of elaborating, contributing, taking risks, and expressing their own ideas (Graham, 2010).

"Peer Instruction" involves forming teams in certain classes and is a method where the teacher plans and organizes their classes with a focus on student action before and during the lessons. One of its main contributions is the mobilization of students for interactive activities with the purpose of deepening study topics. The teacher has a fundamental role throughout the process, as the essence of the proposal is for students to understand what they are studying as deeply as possible. Students are invited to dialogue as a way of expanding knowledge, which does not result only from the teacher's transmission. The method, in turn, is based on the elaboration of objective conceptual questions and their application by the teacher. By focusing on previously studied texts and student activities in the classroom, the classes become more participatory (Pereira, 2017).

As stated, one of the challenges for education is rethinking new educational proposals and teaching practice itself to overcome a teaching model centered only on the teacher's words and the student's passivity. It is necessary to consider social practices that are marked by participation, creation, invention, the opening of spatial and temporal limits of the classroom and formal education spaces, assimilating the different spaces of knowledge production, contexts, and cultures, everyday situations, and knowledge of various natures. For the exploration of these characteristics to occur, it is necessary to reconsider the curriculum and methodologies that place the student at the center of the educational process and focus on active learning (Valente, Almeida e Geraldini, 2017).

In this sense, the aforementioned research identified the teachers' conceptions of active teaching methodologies, whether teachers have been using any

method based on active methodology, and how they have been working on the contextualization of content in the classroom. This was done to ascertain whether the teaching and learning process has been conducted in a problem-posing manner, in which the student acquires an active and questioning posture, becoming the main agent in the construction of knowledge; or, on the contrary, if they remain in a passive posture, only receiving what is transmitted by the teacher, without questioning.

## MATERIAL AND METHODS

This research employs a mixed-methods approach, combining qualitative and quantitative methodologies. Data was collected via a questionnaire. The quantitative aspect involved organizing and tabulating the closed-ended responses from the questionnaire administered to teachers. According to Gibbs (2009), qualitative research considers the relationship between the real world and the subject. It is exploratory, encouraging the participant to express themselves and think freely about the topic.

The qualitative dimension sought to highlight the meanings present in the open-ended responses, allowing for a deeper understanding of teachers' conceptions and perceptions of active methodologies, beyond just the frequency of responses. For this, content analysis (Bardin, 2011) was chosen to identify emerging categories in the teachers' discourse, enabling a more profound interpretation of their meanings.

Regarding the use of questionnaires for data collection, Rudio (2002) notes that they consist of a set of questions, organized and systematized, designed to capture the conceptions of the research participants.

According to Marconi and Lakatos (1999), it is a data collection instrument that should be answered in writing without the researcher's presence. The choice of a questionnaire offered several advantages over other data collection techniques, including the ability to reach a large number of people simultaneously, reasonable cost, guaranteed anonymity, the use of objective questions, flexible time for participants to think about their answers, and easy conversion of data into computer files (Ribeiro, 2008b).

This research was conducted in public municipal and state schools in Bom Jesus - GO, from March to December 2020. The entire process, from questionnaire creation to its administration, was done remotely, adhering to COVID-19 pandemic protocols. This remote approach respected each teacher's availability, which facilitated a higher response rate. The city of Bom Jesus - GO, located in the state of Goiás, has a population of approximately 25,600. The city has two state schools (one recently becoming a military school) and nine municipal schools.

The questionnaire was administered via the SurveyMonkey application, a digital platform where questions are created, typed, and saved by the researcher, then sent via a link to participants. The link can be shared on various digital platforms like Facebook, WhatsApp, Instagram, or via email. One of the advantages of this application is that it allows for the creation of questionnaires with multiple-choice and open-ended questions, enabling participants to express their views freely. It also analyzes data by generating graphs and percentages for each response.

The questionnaire (Table 01) was administered to teachers who teach science subjects in grades 6-9 of elementary school and grades 1-3 of high school.

**Table 1.** Questionnaire for teachers who teach science subjects.

### QUESTIONNAIRE

- 1) What is your age?
- 2) What is your educational level? ( ) Undergraduate ( ) Specialization ( ) Master's ( ) Doctorate
- 3) In what year did you complete your degree?
- 4) For how long have you been teaching, and at what level are you currently teaching? Elementary I, Elementary II, or High School?
- 5) During your training, did you ever hear about or study active methodology? ( ) Yes ( ) No
- 6) Do you know any active methodology methods? If so, briefly describe one.
- 7) How do you believe the use of active methodology in science teaching can promote more meaningful learning for students?
- 8) Do you use a social themes approach in your classes?
- 9) What teaching resources do you use when preparing a more interesting lesson for your students?
- 10) Regarding the previous question, do you encounter any difficulties during lesson preparation or delivery? If so, what are they? Briefly describe.

The questionnaire aimed to gather information on teachers' conceptions of active methodologies, their use of them, and how they incorporate daily life issues into their lessons. In order to gain a deeper understanding of the open-ended responses, a discursive textual analysis was conducted based on Bardin's (2011) content analysis. This procedure allowed for the construction of categories from the teachers' statements, highlighting not only the presence or absence of knowledge about active methodologies but also the difficulties and perceptions associated with their practice.

## RESULTS AND DISCUSSION

The research was conducted remotely with 16 teachers who teach science at the elementary and high school levels. This included 12 teachers from the municipal network (teaching science in elementary school) and 4 teachers from the state network (teaching chemistry, biology, and mathematics in high school). The questionnaire sought to identify data on the participants' training, prior knowledge of active methodologies, the difficulties they encountered, and the resources they used most often.

According to questions 1 and 3, the teachers' ages ranged from 22 to 47, and they completed their last degree between 1996 and 2020. This indicates that some of them completed their initial training before the popularization of the term "active methodologies" in Brazil in the 1990s and early 2000s. This data is relevant because it shows that many educators did not encounter these methodologies during their undergraduate studies, reinforcing the importance of continuing education.

Regarding qualifications, seven teachers had only an undergraduate degree, seven had a specialization, and two had a master's degree. This information aligns with Libâneo (2004), who highlights that continuing education should be understood as an extension of initial training, allowing for the improvement of pedagogical practices and updating to meet current demands. In Bom Jesus - GO, there is a perception that the offer of continuing education focused on science teaching is still limited. The courses promoted by the Municipal Department of Education, often in partnership with the state government, tend to prioritize administrative or management aspects rather than regularly addressing the discussion and application of active methodologies. This low

frequency of specific training contributes to the persistence of more traditional practices.

In response to the question about teaching experience and level, it was found that five teachers taught at more than one level. Some teachers only mentioned the teaching level, while others only mentioned how long they had been teaching.

When asked if they had heard about or studied active methodologies, 11 teachers responded positively, while five said they were unfamiliar with the topic, falling into the category of "Lack of Knowledge and Resistance." Bruini (2016) emphasizes that the quality of education is directly related to teacher qualification. The more updated and capable a teacher is regarding new teaching methodologies – through continuous education courses, professional development, and other means – the better they can offer students an education that meets the competencies and skills required today.

Considering the importance of active methodologies for science teaching, which aims to make learning more meaningful and active for the student by promoting reflection on various topics and correlating them with students' social context, it is necessary for teachers to become increasingly involved with new educational themes that have gained prominence over the years.

In light of this, Pappis, Magalhães e Costa (2024), in a study on teacher training and the use of active methodologies, highlighted that one of the great challenges of education in this century is the search for innovative methodologies. These methods should favor a pedagogical practice that transcends the limits of purely technical and traditional training to achieve the formation of the student as an ethical, historical, critical, reflective, transformative, and humanized being

In an effort to better understand whether teachers were familiar with active methodologies and how they applied them in the classroom, question 6 was posed directly to this situation. Below are the responses from the teachers:

*"Flipped classroom, technologies like Kahoot!" (P.01).*

*"No" (P.02).*

*"Yes. Flipped classroom. Peer instruction, PBL" (P.03).*

*"Gamification. Using elements of games to promote the teaching-learning process" (P.04).*

*"Hybrid learning, which allows for studying in-person in the classroom with the teacher and colleagues, and remotely and autonomously outside of the school environment, using digital resources" (P.05).*

*"Yes, rotation by learning stations, problem-based learning among others" (P.06).*

*"No" (P.07).*

*"Flipped classroom" (P.08).*

"Yes. Application of games or some different dynamic during class. Group work too" (P.09).

"No" (P.10).

"Yes. Inquiry-based teaching. It is an approach based on problematizing content, that is, students develop the construction of their own knowledge through problem situations, from which they will formulate hypotheses that can answer the investigated theme. This methodology encourages learning through research and with activities being done in groups, fostering shared action" (P.11).

"Development of projects that put the student as the protagonist of learning. Case studies: which promote learning through experience" (P.12).

"Yes. Learning station rotation, hybrid learning" (P.13).

"Rotating class, integrated classes, flipped classroom" (P.14).

"Yes. Problem-Based Learning (PBL), flipped classroom, Project-based learning, gamification" (P.15).

"I don't know" (P.16).

As you can see, of the teachers who responded to the survey, 4 stated they were not familiar with this learning method, while 12 teachers affirmed that they were and mentioned some methods that are aligned with active methodologies, such as Problem-Based Learning (PBL), Flipped Classroom, Hybrid Learning, Case Study, and Gamification. However, the content analysis of the open-ended responses showed that the reported knowledge was often superficial, limited to isolated mentions without theoretical depth or clarity about its practical application. This revealed another category in the responses: "Conceptual Knowledge without Structured Practice," which shows recognition of the term but difficulty with systematic implementation.

In question 7, teachers were also asked how active methodologies could lead to more meaningful learning for students. To this, the teachers stated:

"By encouraging students to seek more knowledge, like in the use of the flipped classroom" (P.01).

"By bringing the content closer to their reality" (P.02).

"By making science less abstract and bringing it closer to the student's reality" (P.03).

"It motivates students and enriches the classes. It improves interpersonal relationships and favors the formation of the individual" (P.04).

"Students assimilate studied content better through practice" (P.05).

"It makes teaching more attractive and the student more participative" (P.06).

"Classes become more dynamic because there is more interaction between groups" (P.08).

"Through scientific literacy related to the student's social context" (P.11).

"By putting the student as the protagonist of their learning" (P.12).

"Incentive for research, reading, and the use of technologies" (P.13).

"In the format of placing the subject as the protagonist of the teaching process; the diversity of activities, for example, in a flipped classroom and/or didactic sequence" (P.15).

Based on the teachers' statements above, they affirmed that learning through active methodologies tends to favor the teaching and learning process, as it

allows the student to experience the relationship between content and social context, and to become a protagonist in the construction of their own knowledge and to develop group relationships, interacting and communicating with each other. Here, the category "Critical and Applied Appropriation" is suggested, revealed by the effort of practical application and the understanding that the methodology favors student protagonism and meaningful learning.

In agreement with the above, Diesel, Baldez, and Martins (2017) affirm that, in contrast to the traditional method where the student assumes a passive posture of merely receiving theories, the active method proposes the inverse process. Students come to be understood as historical subjects assuming an active role in learning, collaborating and sharing their experiences, knowledge, and opinions as a starting point for knowledge construction. Thus, "The curriculum needs to be connected to life, to daily routines, to make sense, to have meaning, to be contextualized" (Moran, 2007, p.23). For Moran (2018, p. 04), active teaching methodologies are those that "emphasize the student's protagonist role, their direct, participative, and reflective involvement in all stages of the process."

In this sense, active methodologies contribute to direct participation in the social development of students, as they promote the student's active participation in the entire learning process and interaction among peers. Similarly, teamwork contributes to a better understanding of information. In the process of group work, students experience the content and at the same time stimulate self-confidence in decision-making, developing skills to cooperate with the group, and expressing themselves better both orally and in writing (Souza, Vilaça, and Teixeira, 2020).

Based on the teachers' responses, from question 8, it was identified that among the 16 teachers, 12 mentioned using questions focused on students' daily lives by inserting them through the content, and 4 said they did not make this connection.

The recognition of the importance of incorporating social issues by teachers is notable, as 75% of them use the social approach. As a result, the relationship between social themes and content can greatly contribute to an active, participative, and reflective learning process. It favors student autonomy, awakens their curiosity, and stimulates decision-making, both individual and collective when such activities are related to the student's practice and social context (Camas and Brito, 2017).

Berbel (2011), in turn, emphasizes that the development of active methodologies in the teaching and learning process must be based on students' real or simulated experiences, aiming to solve problems and challenges linked to the essential activities of social practice in different contexts.

Knowing the importance of using teaching resources in the classroom that go beyond the whiteboard, notebook, pencil, and eraser, teachers were also asked (Question 9) what teaching resources they usually use when approaching content. Based on the teachers' responses, most of the resources presented were heavily based on technology, such as video lessons, data shows, computers, cell phones, and educational apps (11 teachers). Other teachers reported using laboratories for experiments (3 teachers) and textbooks, scientific articles (2 teachers). Among the 16 teachers, 2 of them reported using more than one teaching resource, namely: textbook, video lessons, and experimentation.

Regarding teaching resources, these are tools that contribute greatly to diversification in the classroom, attracting students and engaging them in activities. As active methodology places a high value on the student being the protagonist of their knowledge and being actively, reflectively, and critically involved in the entire process, diversifying the teaching resources used in the classroom tends to attract students' attention to the activities and encourage them to become increasingly involved in the construction of knowledge.

*To help overcome some of the prevalent simplistic views in science teaching, it is necessary for laboratory classes to include theoretical discussions that go beyond definitions, facts, concepts, or generalizations, since science teaching, in our view, is a very rich area to explore various methodological strategies, where nature and the transformations occurring in it are available as teaching resources, enabling the construction of scientific knowledge in a meaningful way (Ramos, Antunes; Silva, 2010, p.8).*

However, it is necessary for the teacher to keep in mind what objectives they intend to achieve with each resource used and to define the possible difficulties presented during class so that they can incorporate new strategies in their use. In agreement with Castoldi and Polinarski (2006, p. 985), "the use of teaching-pedagogical resources is thought to fill the gaps that traditional teaching usually leaves, and with that, in addition to exposing the content in a different way, it makes students participants in the learning process."

As can be seen from the analysis, the most used teaching resources by teachers in the classroom are digital resources. Regarding the use of teaching

resources and considering the period of the pandemic, it is clear that the high use of digital resources in this research is due to the fact that teaching at that time was completely remote. In this sense, we cannot fail to mention the importance of these resources in the teaching process with active methodologies, because ICTs (Information and Communication Technology) "the use of technologies associated with the construction of knowledge with new forms of communication and language expand and give meaning to the school space, making it more pleasant, motivational, seeking interest and efficiency from students and teachers (Otto, 2016, p. 11)".

To conclude the research, teachers were asked (Question 10) if they encountered any difficulties when preparing the lesson or even when delivering it to the students. For this question, the following statements were obtained:

"Yes, it's more work to prepare than normal, but it's easier to deliver" (P.01).

"No" (P.02).

"No, there is an infinity of ideas and resources on the internet" (P.03).

"Yes, lack of specific teaching material, students' lack of interest" (P.04).

"No" (P.05).

"No" (P.06).

"No" (P.07).

"Yes. There is not enough time to plan the activities" (P.08).

"Yes. Lack of reagents in the school and a large number of students per class. (P.09). Lack of school resources" (P.10).

"Yes. Students are still too used to getting everything "chewed," they are reluctant to get their hands dirty" (P.11).

"No" (P.12).

"Yes. Especially with apps in English. It made understanding difficult because I don't speak the English language" (P.13).

"It needs to be a theme and a methodology that can be used and included for all students. In some classes, you also need to have a Plan B because it doesn't always go as planned. And the school also needs to have space, adapted classrooms, and necessary materials and resources for this class to happen" (P.14).

"Yes. The lack of initial and even continuing education on Active Methodologies can directly influence our practice. The lack of planning time can also be one of the factors that interfere with the difficulties. Because an activity with an active focus needs to be well-structured, planned, and have accessible materials" (P.15).

"Yes. The difficulty would be related to keeping the students' interest during class" (P.16).

It is noted that even though some teachers stated that they did not find difficulties when planning or applying the lesson, other teachers mentioned finding difficulties to teach, often due to a lack of school resources, unsatisfactory student behavior, lack of continuing education for teachers, and the use of teaching methods that can serve all students.

In this sense, regarding the time available for the teacher to prepare the lesson and rethink the methods and resources to be used in it, Oliveira et al., (2012) reinforce that there is often a great demand for

curricular activities to be fulfilled by the teacher, which ends up demanding all their efforts, performing an intense amount of tasks, without them being able to think and discuss them.

Regarding students' performance in the activities to be carried out in the classroom, it is necessary for the school to provide and offer all the necessary resources that will contribute to a pleasant teaching and learning process for the student. As stated by Gomes and Boruchovitch (2008), a school that does not offer the necessary teaching resources that will serve its students in the process of executing the activities prepared by the teachers ends up contributing to their demotivation and disinterest.

All these needs presented by the teachers directly influence the thinking about active methodologies in the classroom. A teacher's lack of training can lead to the preparation of a monotonous lesson and the student remaining in a passive position regarding the content and activities; the lack of resources can lead teachers to be stuck in a totally traditional teaching method where only the board and a book are used.

The analysis of the forms and the categorization reveal that the majority of teachers are between a state of lack of knowledge and superficial knowledge. Only a smaller group already mobilizes active methodologies in a more structured way. This finding reinforces the argument of Libâneo (2004) and Berbel (2011) about the need for continuing education that overcomes technical rationality and favors critical and reflective pedagogical practices.

Thus, the results point to the need to expand and systematize continuing education programs in the municipality, specifically focused on science teaching and the use of active methodologies. Such actions could contribute not only to teacher updating but also to overcoming traditional practices, favoring a more participatory, critical, and connected teaching to the students' reality.

## CONCLUSIONS

Science education has been undergoing several transformations over the years. In the search for quality, innovative teaching that meets current educational trends, the school needs to have support to be able to fulfill all these expectations to the students, through classes that favor critical and reflective thinking and the relationship between content and their social context.

In addition to a school with a structure to offer this quality education, there is a need for the teaching staff to always have continuing education, to rethink their pedagogical practice in the classroom and innovate in the methodologies to be used with the objective of favoring an education based on the student as the main agent of the construction of their knowledge.

Therefore, active methodologies tend to contribute greatly to a teaching style that makes the student the protagonist of their knowledge. However, for this to happen, it is necessary for teachers to be updated on how to use them and the objectives they intend to achieve and what path to take with the students to reach the final objective.

There are many teaching methods used in active methodologies, involving reading, problem-solving, group work, the use of audiovisual resources, games, and others. All of them contribute effectively to the active and reflective teaching and learning process, but it is necessary that they are not used in isolation from the context in which the students are inserted, which often makes teaching abstract and inaccessible to their understanding.

Based on the analyzed results, it can be noted that most teachers, even knowing about active methodologies and their importance for student formation, often find difficulties in working with them in the classroom due to a lack of resources and even student engagement in the activities. As for social themes, these are very important in this process, as they allow the student to understand the relationship between the content and their daily life and propose solutions to problems that they can already solve through reflections addressed in the classroom. However, it was noted in this research that some teachers do not use social themes in the classroom, which can compromise learning and formation for the student's socio-cultural context.

Regarding teaching resources, these are very important for diversifying classes and complementing activities, as they allow for innovation and moving away from the totally traditional method. Most teachers reported using digital resources, such as the internet, applications, and videos, which helps the student interact and engage with the content more effectively through resources that are already widely used by the public today.

The analysis of the content obtained from the forms reveals a scenario marked by weaknesses in initial training and the need for investment in continuing education. It is also highlighted that, although some

teachers demonstrate critical appropriation, the majority reveal difficulties in implementation, which points to the urgency of educational policies that support teachers in terms of time, resources, and training.

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