SCIENTIFIC AND TECHNOLOGICAL LITERACY (ACT) THROUGH CLASSROOM PROJECTS: BUILDING AN INTERDISCIPLINARY ISLAND OF RATIONALITY

ALFABETIZAÇÃO CIENTÍFICA E TECNOLÓGICA (ACT) POR MEIO DE PROJETOS EM SALA DE AULA: CONSTRUINDO UMA ILHA INTERDISCIPLINAR DE RACIONALIDADE

ALFABETIZACIÓN CIENTÍFICA Y TECNOLÓGICA (ACT) A TRAVÉS DE PROYECTOS EN EL AULA: CONSTRUYENDO UNA ISLA INTERDISCIPLINARIA DE RACIONALIDAD

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ABSTRACT: Educational research portrays the contributions of Scientific and Technological Literacy (ACT) to student training. On the other hand, there is a gap related to teaching strategies that enable teachers to work with ACT. Thus, partial results of a doctoral research will be presented, where a continuing education course was proposed to a group of teachers, in which the methodological proposal "Interdisciplinary Island of Rationality (IIR)" was worked on. In this proposal, the teacher proposes that the student uses knowledge constructed in different disciplines, to solve a situation - problem. In this way, the objective is to present the relative results, the understanding of the teachers participating in the course with regard to the conceptions about the concept of problem and problematization, the care necessary to elaborate a problem and the types of problems that can stimulate the participation of students so that the implementation of the IIR can be successful, as well as elements that include the ACT

KEYWORDS: Scientific and Technological Literacy. Teacher Training. Interdisciplinary Island of Rationality. Problem. Problematization.

RESUMO: *Pesquisas educacionais retratam as contribuições da Alfabetização Científica e Tecnológica (ACT) para a formação do aluno. Por outro lado, observa-se uma lacuna relacionada às estratégias didáticas que possibilitem ao professor trabalhar com a ACT. Desse modo, serão apresentados resultados parciais de uma pesquisa de doutorado, onde foi proposto a um grupo de professores um curso de formação continuada, no qual trabalhou-se a proposta metodológica "Ilha Interdisciplinar de Racionalidade (IIR)". Nessa proposta, o professor propõe que o aluno utilize saberes construídos em diferentes disciplinas, para solucionar uma situação - problema. Desse modo, tem-se o objetivo de apresentar os resultados relativos, a compreensão dos professores participantes do curso no que concerne às concepções sobre o conceito de problema e problematização, os cuidados necessários para elaborar um problema e os tipos de problemas que podem estimular a participação dos alunos para que haja êxito na implementação da IIR, assim como elementos que contemplem a ACT.*

PALAVRAS-CHAVE: *Alfabetização Científica e Tecnológica. Formação de Professores. Ilha Interdisciplinar de Racionalidade. Problema. Problematização.*

RESUMEN: *La investigación educativa retrata los aportes de la Alfabetización Científica y Tecnológica (ACT) a la formación de los estudiantes. Por otro lado, existe una brecha relacionada con las estrategias de enseñanza que permitan a los docentes trabajar con ACT. Así, se presentarán resultados parciales de una investigación doctoral, donde se propuso un curso de educación continua a un grupo de docentes, en el cual se trabajó la propuesta metodológica "Isla Interdisciplinaria de Racionalidad (IIR)". En esta propuesta, el docente propone que el estudiante utilice conocimientos construidos en diferentes disciplinas, para resolver una situación – problema. De esta manera, el objetivo es presentar los resultados relativos, la comprensión de los docentes participantes del curso respecto de las concepciones sobre el concepto de problema y problematización, el cuidado necesario para elaborar un problema y los tipos de problemas que pueden estimular. la participación de los estudiantes para que la implementación del IIR pueda ser exitosa, así como elementos que incluyan el ACT.*

PALABRAS CLAVE: *Alfabetización Científica y Tecnológica. Formación Docente. Isla Interdisciplinaria de la Racionalidad. Problema. Problematización.*

Introduction

It is nothing new that students show a lack of interest in knowledge related to the subjects of Physics, Chemistry, Biology and Mathematics. It is important to highlight that, in many cases, this is linked to the lack of articulation between the curricular contents covered at school and the student's daily life. On the other hand, it is also possible to highlight that the presence of traditional pedagogical approaches are the most used in everyday school life. And this scenario is no different in subjects related to Science Teaching. In this type of approach, the teacher is the person who has all the knowledge and the student only receives the content. This means that the student simply memorizes the curricular content.

In view of the above, doctoral research was developed with the aim of answering the following questions: "How can a training action provide theoretical and methodological support for teachers to work from a problematizing and contextualized perspective through IIR? What subjects/themes should be covered in this training in order to avoid errors or conceptual conflicts? What challenges and/or obstacles prevent interdisciplinary activities from being carried out in the classroom? What is the perception of teachers regarding Problematization and Contextualization? How can problem situations contribute to enhancing Science Teaching and awakening student participation? What is the role of dialogue in problematizing practice?"

In view of this scenario of inquiries, the general objective of the thesis aimed to investigate the conceptions that a group of teachers had about the concepts of Problem, Problematization, Contextualization and Interdisciplinarity based on a continued training action called "*Working with projects in the classroom class: building an Interdisciplinary Island of Rationality*". The obstacles and challenges that prevented the adoption of interdisciplinary, problematizing and contextualized practices in the classroom were also analyzed. Furthermore, the contributions of this training action were investigated, to enhance the presence of interdisciplinary projects such as, for example, IIR in the school context.

Therefore, in this work, we wish to present the partial results of this research regarding the understanding of teachers participating in this continuing education course offered in the Distance Education (EaD) modality with regard to conceptions about the concept of problem and problematization, the care necessary to develop a problem and the types of problems that can stimulate student participation so that, in fact, there is success in the implementation of IIR in the classroom, as well as elements that include ACT.

Theoretical Reference

For the student to be scientifically literate, we consider it necessary to have pedagogical practices that enable the student to develop different skills. Therefore, these strategies cannot be based on practices that only value the transmission of information. It is important to remember that curricular content related to Science Teaching can help students develop different skills, including mastery of reading and writing techniques, as well as enhancing understanding of the relationship between Science and Society. (Fracalanza *et al.,* 1986). According to UNESCO (2005), Science Teaching not only enables the acquisition of scientific knowledge, but also helps the individual develop as a human being.

Therefore, it is urgent to rethink pedagogical practice in the classroom. Regarding this aspect, in this work we highlight the contributions of the articulation between the concepts of Science, Technology and Society (CTS) to enhance Science teaching. According to Auler (2007), when the teacher implements actions that value the STS approach, there is the opportunity to create spaces for discussions about the use of science and technology from perspectives, for example, social and ethical. Furthermore, actions are made possible that encourage the student to reflect critically on different subjects.

Now for Fourez *et al.* (1994), to change the current scenario of Science Teaching, it would be interesting to invest efforts to work on Scientific and Technological Literacy (ACT). For the author, ACT promotes scientific and technological culture, which means that the subject is able to act in a critical and reflective way in today's society. However, for this to happen, the teacher needs to propose actions that value problematization and contextualization. Given this, Fourez (2002) proposes the construction of an Interdisciplinary Island of Rationality (IIR) as a methodological strategy.

Through IIR, there is a problem situation in which the student has the opportunity to mobilize and use different knowledge to solve it. This IIR proposal is seen as a theoretical representation of a given situation and aims to promote learning through interdisciplinary action. To achieve this, the author proposes steps that can be deleted or revised. They are: a) The cliché; b) The spontaneous panorama; c) Consultation with specialists and specialties; d) Field Work; e) Opening and deepening of black boxes with the help of experts; f) Global layout; g) Opening black boxes without help from specialists; h) Synthesis/Presentation of final product.

In our bibliographic review it was possible to find different works that present the contributions of IIR to the educational context (Nehring *et al.* 2000; Pietrocola, *et al.*, 2003;

Schimitz, 2004; Luchesi, 2010; Regiani *et al.*, 2012). However, in this work it is also worth highlighting that, to implement it, the teacher needs to understand the meaning of Interdisciplinarity, since within this proposal it is seen as a mobilization of knowledge from different disciplines, as well as knowledge from everyday life. It is precisely through the articulation of this knowledge that the student has support to solve the problem situation (Fourez, 1997).

The use of IIR in the classroom also allows the teacher to propose practices based on Problematization in Contextualization. It was verified through research by Schimitz (2004) that Problematization makes significant contributions to the initial stages of IIR, as it expands the discussion on the topic, enhances the creation of questions in the cliché and spontaneous panorama stage. For Praia, Cachapuz and Gil-Pérez (2002), problematization can help the student to build a coherent vision of the role of science in society. Viecheneski and Carletto (2013), highlighted in their research that problematization generates a space that "enables thinking, sharing and confrontation of ideas, in addition to favoring the learning of attitudes essential to the exercise of citizenship [...]" (p. 538, our translation).

The bibliographic review also demonstrated that the works mentioned address the problematization from a Freirean perspective (Ruas, 2017). However, it is common to find teachers who reduce Problematization to solving lists of exercises (Delizoicov, 2000) or even use it to check students' previous conceptions. On the other hand, the work of Ricardo (2003) presents Problematization as a way of stimulating dialogue. In this scenario, it is important to remember that the role of the teacher undergoes a change, as he adopts the role of a problematizer and the student assumes the role of critical investigator, through constant dialogue with the educator (Freire, 1987).

Methodology

The research carried out was exploratory in nature, as it allowed the researcher to increase his experience on the problem investigated (Triviños, 1987). It also had a qualitative bias and, on this aspect, Marandino *et al.,* (2009) emphasize that in this type of research the methodological approach that guides scientific knowledge seeks to privilege interpretative information over reality. It is also important to understand that, in qualitative research, the notion of subjectivity is present. However, we consider that this presence does not imply putting knowledge on the sidelines, as in qualitative research the researcher has "sufficient theoretical basis to support their analyzes and interpretations" (Ricardo, 2001, p. 18, our translation).

Therefore, in qualitative research, the researcher assumes a prominent role, as he must adopt strategies, methods and techniques that enable him to have a more critical and reflective view of his work. Regarding data collection, this type of research allows different instruments to be used. However, it allows the researcher to adopt other strategies that help him understand the phenomenon studied in its entirety.

From this, the creation and implementation of the course *"Working with projects in the classroom: building an Interdisciplinary Island of Rationality"* was used as a methodological strategy. With this action it was possible to achieve the proposed objectives, in particular to verify the teachers' understanding of the concepts of the concept of problem and problematization, the care needed to develop a problem and the types of problems that can stimulate student participation, so that, in fact, there is success in the implementation of IIR in the classroom.

The course *"Working with projects in the classroom: building an Interdisciplinary Island of Rationality"* was registered as a university extension, in the form of Distance Education (EaD) through the Virtual Learning Environment (AVA) Moodle, with a workload of eighty hours and had the participation of twenty teachers in the first edition and twenty-two teachers in the second edition. It is worth highlighting that the participating teachers worked in the public and private education network in the cities of São Paulo and Minas Gerais. The pedagogical approach was "Being Together Virtually".

In the first week of the course, the theme of "Distance Education" was worked on, bearing in mind the need to discuss the potential and limitations of distance learning; its history in Brazil and around the world; and mainly to provide the teacher – student with a moment of familiarity with the VLE that would be used during the course. In the second week we addressed the concept of Problematization and, later, that of Contextualization. As a practical activity, teachers were invited to participate in the discussion forum "Problematization and Contextualization" and carried out the activity related to the elaboration of a situation – problem. This situation – problem was later used in the Interdisciplinary Island of Rationality (IIR) developed in the last week of the course. Therefore, it would be essential to consider the concept of Problematization and Contextualization previously discussed in the forum through the suggested theoretical reading. In the third week, we worked on the concept of Interdisciplinarity. And to this end, we emphasize that interdisciplinary work would not be limited to carrying out collective work or the mere juxtaposition of different disciplines.

Therefore, teachers should be careful not to confuse the concept of interdisciplinarity with Multidisciplinarity, Pluridisciplinarity and Transdisciplinarity.

During the implementation of the course, it was found that the activities that most allowed teachers to understand the topics were the discussion forum. It is worth noting that the forum is a space in which you have the freedom to argue and build knowledge collectively. We chose to always propose this activity, after the activity related to reading. This allowed the teacher to use the suggested text as a theoretical resource to support his arguments. It was also in the forums that teachers were invited to express their opinions, to argue, to counter-argue, to debate and reflect on the proposed topic. In this context, as in any other context that aims to promote learning, our purpose was to create possibilities for the production and construction of knowledge (Freire, 1996).

In view of the above, it is noteworthy that the "Distance Education" forum had 107 contributions; that of "Problematization and Contextualization" 131 collaborations; and the one relating to "The concept of Interdisciplinarity" registered 155 participations; and "The IIR and the steps for its construction " 235 contributions; and, the last, "Sharing the results of applying IIR at school" 101 participations. In this way, the course forums *"Working with projects in the classroom: building an Interdisciplinary Island of Rationality"* aimed to generate an environment that enabled an asynchronous conversation, with an intentionality and pedagogical purpose which allowed the construction/reconstruction of knowledge (Oliveira; Filho, 2006).

Based on the discussions in each of the forums, the analysis categories were defined. Regarding these aspects, Ludke & André (1986) argue that they "[...] arise, initially, from the theoretical framework on which the research is based" (p. 42, our translation). However, this initial set of categories changes throughout the investigation. This action "[...] gives rise to new conceptions and, consequently, new focuses of interest" (Ludke; André, 1986, p. 42, our translation). Dialoguing with this idea, Bardin (1979) argues that, in addition to the categories that use the theoretical framework as a basis, it is possible to construct categories *a posteriori* through the analysis of the collected material.

Therefore, based on the data collected, it was verified that the categories could be created *a priori* considering the guiding questions raised in each of the selected forums. In the case of the "Problematization and Contextualization" forum, the discussion began with the following questions: *" What is problematization? What is your understanding of the concepts of problems and problematization?"* These initial questions allowed us to analyze the perception of teachers – course participants in relation to the concept of Problem and

Problematization. Throughout the week, other questions were suggested to deepen the topic of discussion, including: " *What precautions do I, as a teacher, have to take/adopt to prepare a good problem* ?" and " *Given our current context (science, technology and society), what type of problem can stimulate student participation*"?

Results and discussion

In the category ***" What is problematizing? What is your understanding of the concepts of problems and problematization?"***, regarding the participants of the 1st edition of the course, we only had the contribution of two teachers. However, unlike what we expected, the teachers chose to transcribe the definition of the concept of problem available in the dictionary. You can verify this through the [3]following statements:

> *"According to the Aurélio dictionary:* **A problem** *in mathematics is a question to be resolved by a scientific process; and it is also everything that is difficult to resolve, explain and treat.* **Problematizing** *is formulating a certain fact, concept, analyzing and discussing the most complicated or difficult aspects; develop a set of articulated questions; question, invent provisional questions".* [P1]

> *"Problem according to the dictionary means 1. mathematical question proposed to give you the solution. 2. Unresolved issue, or difficult solution. Problematization for me would be compared to a role play, that is, as an educator I will lead the student to act out a problem situation, making them feel like they are playing the main role, thus leaving them ready to solve their respective problems."* [P2]

On the other hand, P17 and P18, who were participants in the 2nd edition of the course, adopted a different stance and managed to present their own ideas about the concept of Problem:

> *"[...] Problems: create a situation that leads the student to mobilize and use their knowledge to solve it. In this resolution, the student can reflect on situations faced by man in the past, raise hypotheses and even create another problem situation. [...]"* [P17]

> *"[...] The problem in my humble opinion is to free the individual from inertia. To disturb. So that the person can be led to think, go against the acquired knowledge".* [P18]

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[3] The statements transcribed here have not undergone any modifications, as we aim to ensure the reliability of the data.

P17's speech is close to the discussion presented in our theoretical review (RUAS, 2017). Furthermore, P17's speech is related to the argument presented by P18, when he highlights that the problem can *"[...] take the individual out of inertia [...]"*. Regarding problematization, different from the idea presented by P2, for some colleagues, it can be considered as a strategy to help students understand that curricular content can dialogue with reality. One of the entries from the 1st edition can illustrate this:

> *"[...] problematization is also to awaken the student's interest in understanding how a concept learned in the classroom is part of their daily life, how what they learned can change their life. And after this first phase of awakening, the next stage would be for the student himself to have the ability to pass on to his colleague the situation he visualized".* [P3]

P3 also considered problematization as a resource that provides the student with support to "pass on" their interpretation of the problem to their colleague. Still regarding the concept of problematization, P3 argued that its use can help the student to share their discoveries with other colleagues. This understanding is similar to P4's speech when he highlights that:

> *"Problematizing is challenging students about the object of study that they want to know, encouraging them to reflect on it, to relate their ideas with those of their colleagues, trying to understand in the statements they make in relation to this object, if it exists, or not, there is a contradiction between them".* [P4]

P4's speech also highlights that for him the act of problematizing can be used to encourage the student to reflect on the object of study. Regarding this aspect, P5's speech also presents an approximation:

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> *"[...] Ex : Problematizing a historical topic such as the Second World War and getting students to reflect on the consequences of the conflict, the thousands of orphans the students' age who would certainly give anything to have the privilege they have of go to school."* [P5]

Regarding the importance of reflection, when using the didactic strategy of problematization, Freire (1987) points out that this helps the subject to think about their own condition of existence; and from this, he understands that he is also involved in this situation. In addition to reflection, P6 also highlighted that problematization allows the student to think about a subject.

> *"I understand how to problematize, lead to situations that lead students to think about the suggested themes. Problematization is creating ways to resolve*

> *conflicts, and looking for solutions, a method, challenges for students to find answers and look for ways [...]* ". [P6]

From this perspective presented by P6, problematization stimulates and challenges the student to solve the problem that was proposed. According to Freire (1977), challenge is a fundamental element for the constitution of knowledge. The author highlights that the more the student feels challenged, the more encouragement they will have to solve the problem, as well as the support they will have to reflect critically on it. This last aspect also appeared in P7's speech:

> *"I understand how to problematize, lead to situations that encourage students to think critically about a given topic. Such situations can be news available in the media or an image. The important thing is that the situation makes sense to the student and also provides support for the teacher to prepare his class. Physics, in particular, allows the teacher to explore different situations such as global warming or the use of radioactive materials that can be the starting point to initiate a problem situation"*. [P7]

In P7's speech, it is important to note the fact that the problem situation has real meaning for the student. For P16, problematization can already enhance reflection on the problem situation:

> *"Problematizing for me means provoking the capacity for reflection and argumentation, thus providing the construction of knowledge. Make the student autonomous in building this knowledge. A practice based on dialogue between teacher and student. This practice in the classroom is very important, as the teacher becomes a mediator of knowledge, bringing more meaning to learning "*.[P16]

In addition to reflection, P16 highlights that problematization can be worked on in a dialogical way, as it will stimulate argumentation. It is important to remember that, through dialogical practice, at certain times, the student will feel the need to seek new knowledge, this aspect was presented in P20's speech:

> *"Problematizing here we can understand how to provoke, cause discomfort, make the student feel the need to search for new knowledge in order to solve a problem, question, doubt, and need answers that temporarily satisfy them. The way to make the student become a co-author of their knowledge would be to ask questions, make the knowledge they already have insufficient to answer them, not give ready-made answers, which often not even the teacher has.[...] "* [P20]

From data analysis, it was found that the other teachers did not explicitly mention the importance of dialogical practice in the problematization process (Ruas, 2017). However, in

both editions of the course we emphasize that it is precisely through dialogue that one has the possibility of critically analyzing the problem situation. Therefore, we consider it essential that the teacher adopts this methodological strategy in the classroom.

Now in the category ***"Necessary care to solve a problem"*** The data revealed that the first care was related to the fact that teachers knew their students, as illustrated in the following statement:

> "[...] *first get to know my students and their reality, because working in reality the work will certainly be much more productive".* [P2]

In our theoretical discussion, we consider that the elaboration of a problem situation occurs both on a pedagogical and epistemological level (RUAS, 2017). Therefore, it becomes important to know the reality of students. Such arguments were present, for example, in P2's speech. However, for this to happen, the teacher must adopt some precautions, and the statements of 9 and P13 presented considerations about this:

> *"[...] if the problems are clear, precise and understandable to students [...]".* [P9]
> *"The student's knowledge on this topic will influence the development and resolution of the problem [...]".[P13]*

Still on this topic, P14 considered that it was important to value the student's prior knowledge, as well as for the teacher to propose problems that are really challenging [4].

> *"As Piaget says, the teacher must start from the student's assimilation schemes (prior knowledge), proposing challenging activities that cause imbalances and successive rebalancing, promoting the discovery and construction of knowledge [...]" [P14]*

We also wish to draw attention in P14 to the use of the concept of assimilation, present in Piaget's theory. In our understanding, the teacher tried to base his speech on knowledge built in other stages of his professional life. Still in the forum about precautions when preparing a problem, another teacher highlighted that:

> *"[...] we must always be careful to ensure that the problem involves all students and even more so that the problem is stimulating, the challenge is great ".[P3]*

The speeches presented valuable aspects about the care that a teacher must take when developing a problem. In the classroom, it is always necessary to value students' prior

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[4] The analysis of challenging problems was carried out in the category "Conceptions about the concept of problems and problematization".

knowledge, as well as each one's skills. Therefore, we understand that the ideas presented can be used, for example, in the development of teacher training courses.

Regarding the analysis of the category "***Types of problems that can stimulate student participation",*** the aim was for teachers to reflect on the importance of problems and to value the student's life context. However, in our analysis, we found that this aspect was considered in the speech of only one teacher:

> " *[...] The problems must be current, things that involve their world and the work will certainly be more productive [...]".* [P2]

For P2, when proposing the problem, it is necessary to consider the "world" in which the students are inserted, that is, the teacher must value, for example, the use of technological resources. However, it is worth remembering the difficulty that teachers have in articulating these resources to their classroom context. Regarding this aspect, P12 considered that:

> "*[...] Technology, modernization, as they are topics that practically the entire society is involved in, can be a suggestion for elaborating a problem in the classroom, since its discussion is broad and there will always be something to discuss in relation to to the topic. [...] ".* [P12]

Likewise, P14 also considered the importance of problems articulating the use of technological devices. He needs:

> "*[...] Propose an activity where the student is led to learn, for example, how an image is constructed (biology and physics classes) using a cell phone, tablet, etc. He uses these resources mechanically (films, sends messages, takes photos, creates videos) but how the process of creation and formation of these elements takes place is the problem to be solved".* [P14]

For P9, in addition to the use of technology to encourage student participation, it is necessary to propose methodologies that enable students to play a leading role:

> "*[...] In our social context, students are stimulated by technology, but also the use of methodologies that take students out of the classroom, encourage students to participate, produce, speak, show their knowledge, or that is, to involve the student so that they feel productive of their knowledge [...]".* [P9]

As we have already mentioned in this work, pedagogical practices based on the transmission of information do not encourage student participation and this aspect was also present in P9's speech. Therefore, we warn that it is necessary to use methodologies that, in fact, encourage students to be protagonists within the classroom. However, as we highlighted in our thesis, for this to happen it is essential to propose problems with ***innovative themes*** that are

related to the student's *daily life (Ruas, 2017).* Furthermore, we understand that addressing current issues and enabling the use of technological devices can really spark **interest**. However, from the beginning the student needs to understand that they are also part of the problem.

Conclusion

Given the data, it is observed that teachers find it difficult to present considerations about the concept of problem. This lack of arguments or reflection on the definition itself makes us understand that there is a gap in understanding this concept. We consider that this may be linked to the fact that during their training process, the teacher is not invited to develop problems. However, in training courses, there is only a proposal of lists of exercises to be solved. On the other hand, it is still possible to find teachers, such as P17 and P18, who presented arguments that were in line with the discussion proposed in the course.

Our analysis also revealed that this difficulty extended to the concept of problematization. However, through the discussion in the forum, it was possible to locate aspects in the speeches that were close to the problematizing practice among them, the following being highlighted: the use of reflection, dialogue and argumentation. However, it is important to remember that the problematizing practice requires the teacher to construct new pedagogical practices and that the problem situation has a relationship with the student's life context.

Given this, we asked them about the precautions they would take to solve a problem. We had aspects such as: considering the student's prior knowledge and proposing activities that allowed the development of skills. Furthermore, they also considered that the use of technological resources has the role of stimulating student interest, as they are in contact with these resources on a daily basis. Another aspect mentioned is related to the student's leading role.

The analysis also showed us that, for strategies or resources to initiate problematization, the use of cartoons, newspapers, books and experiments could be interesting resources. However, as P27 rightly argued, it is necessary to keep in mind that, regardless of the resource, the problematizing practice takes place through dialogue. It is precisely in this interaction that the relationship between teaching and learning is consolidated. Therefore, through this work we highlight the importance of problematizing practice, as through it is possible to enhance the presence of ACT.

To conclude, from carrying out this research, we suggest that teachers seek to build teaching strategies that value the students' context, articulate the use of technology resources in their classes, that enable students to explore their skills and that propose situations - problems that, in fact, have real meaning. We consider that IIIR is a pedagogical proposal that can help teachers work on ACT, as well as bringing students closer to the Science context, but to do so it is necessary to break with old practices and build innovative actions in the classroom.

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