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The experience of learning chemistry in YAE: students' voices

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ABSTRACT

The teaching of Chemistry is often marked by challenges that intensify in the context of Youth and Adult Education (YAE), given the interrupted work routine and school trajectories of its students. Therefore, it is necessary to have an educational approach that goes beyond traditional methodologies, prioritizing a contextualized teaching and learning process, which considers the previous experiences, interests and needs of this audience. In view of this scenario, this study aims to analyze the learning experiences in Chemistry of YAE students in a public school located in the city of Areia (Paraíba). The research, with a qualitative approach, used two semi-structured questionnaires, with 21 (twenty-one) multiple-choice and essay questions, organized in two sections: socioeconomic profile of the students and their perceptions about Chemistry classes. The results showed a clear demand from students for the implementation of active methodologies and alternative approaches that promote the learning of chemical concepts in YAE. This implies the need to prioritize the student's reality, aspirations and learning capacity.
KEYWORDS: Young and Adult Education; Science teaching; Active methods.

A experiência de aprender química na EJA: vozes dos/as estudantes

RESUMO

O ensino de Química é frequentemente marcado por desafios que se intensificam no contexto da Educação de Jovens e Adultos (EJA), dada a rotina de trabalho e as trajetórias escolares interrompidas de seus/suas estudantes. Torna-se, portanto, necessária uma abordagem educacional que vá além das metodologias tradicionais, priorizando um processo de ensino e aprendizagem contextualizado, que considere as experiências prévias, interesses e necessidades desse público. Diante desse cenário, este estudo tem como objetivo analisar as experiências de aprendizagem em Química dos/as estudantes da EJA em uma escola pública situada na cidade de Areia (Paraíba). A pesquisa, de abordagem qualitativa, utilizou dois questionários semiestruturados, com 21 (vinte e uma) questões de múltipla escolha e dissertativas, organizadas em duas seções: perfil socioeconômico dos/as estudantes e suas percepções sobre as aulas de Química. Os resultados evidenciaram uma demanda clara dos/as estudantes pela implementação de metodologias ativas e abordagens alternativas que promovam a aprendizagem de conceitos químicos na EJA. Isso implica a necessidade de priorizar a realidade do/a estudante, suas aspirações e capacidade de aprendizado.

PALAVRAS-CHAVE: educação de jovens e adultos; ensino de ciências; métodos ativos.

INTRODUCTION

Chemistry teaching has long been identified as outdated. Several studies in the educational field have highlighted the difficulties faced in teaching this curricular component, especially regarding its acceptance by students. This subject is viewed as complex, requiring the understanding of formulas, rules, and calculations, often without a direct link to daily life (Gama *et al*., 2021).

Such limitations are even more accentuated for students of Youth and Adult Education (EJA), demanding special attention from teachers. The majority of these students are comprised of youths and adults who work during the day and seek better living conditions and self-esteem elevation through education (Ramo, 2019). In this sense, EJA includes various modalities aimed at those whose schooling was interrupted. Among them, the Center for Youth and Adult Education (NEJA) stands out, organizing classes in regular schools, seeking to integrate this audience into basic education in a contextualized manner.

In contrast to NEJA, the State Centers for Youth and Adult Education (CEEBJAs) constitute specialized institutions, linked to State Departments of Education, offering both the completion of school stages and professional qualification courses (Rosário; Maciel; Santiago, 2024).

Another historical modality, the so-called Supplementary Education, stipulated the possibility of concluding interrupted years or stages of schooling. Although the term was incorporated into EJA, it remains present in common sense (Albuquerque, 2020). Thus, even though they share the objective of offering educational opportunities, these modalities present historical, institutional, and pedagogical differences that must be considered.

One aspect contributing to the learning challenges of EJA students concerns the traditional approach adopted in Chemistry teaching, frequently based on expository and theoretical classes. Furthermore, the social, cultural, and economic aspects of these students influence learning, considering that many come from low-income families (Gama *et al*., 2021; Silva, 2024).

EJA requires an educational approach that goes beyond traditional methodologies, prioritizing contextualized practices that articulate the students' daily events to the scientific world, thus fostering critical and meaningful understanding (Silva, 2024). In this sense, in Chemistry teaching, this perspective has materialized in proposals which prioritize the relationship between school content and students' daily situations. Research by Bortoli and Nogueira (2023) and Oliveira, Calheiro, and Spohr (2024) demonstrates this perspective by developing activities addressing themes such as water, food, and self-medication, allowing chemical concepts to be approached in connection with concrete and socially relevant problems for EJA. Thus, by aligning teaching with students' realities, these approaches reinforce EJA's potential to promote meaningful learning connected to the social and personal demands of its audience.

Based on such reflections, we based this research on the following problem: what are the learning experiences of EJA students with the Chemistry subject?

Given the above, the objective of this study is to analyze the learning experiences in Chemistry of EJA students in a public school located in the city of Areia (State of Paraíba).

YOUTH AND ADULT EDUCATION IN BRAZIL

EJA began in the colonial period with the arrival of the first Jesuits, initially focused on learning basic knowledge such as reading, writing, and catechism teachings (Ramo, 2019).

After the expulsion of the Jesuits in the 18th century, Youth and Adult Education was consolidated with the reorganization of the educational system, especially during the Brazilian Empire era (Ramo, 2019). Throughout history, different approaches and public policies for EJA emerged, highlighting initiatives such as that of Paulo Freire, who defended a popular, consciousness-raising, and liberating education. Initially, his methodology, developed in the 1960s in the city of Angicos, State of Rio Grande do Norte, brought literacy to 300 people in 45 days, in process which valued the students' daily lives, history, and experiences. The success of this experience influenced groups throughout Brazil, transforming the paradigm of teaching and learning in EJA and originating a new conception of literacy based on dialogue and interaction between educator and learner (Gonçalves, 2020).

Promulgated in 1996, the Law of Guidelines and Bases of National Education (LDB 9.394/96), in its Art. 2, resumes the principle established in the Federal Constitution (CF, Art. 205), according to which all education aims at the full development of the person, preparing them for the exercise of citizenship and work. With this, the law guarantees the right to free and quality basic education for all who need it. In this context, EJA, as a strategy of national effort towards equality of access to education as a social right, participates in such principle and must be considered from this perspective (Gomes, 2019).

LDB 9.394/96 addresses Youth and Adult Education in Title V, Chapter II, recognizing it as part of basic education, overcoming the dimension of supplementary teaching and regulating its provision to all those who did not have access or did not conclude their schooling. According to Article 37, "Youth and Adult Education will be destined for those who did not have access to or continuity of studies in elementary and high school at the appropriate age".

Therefore, the education offered by EJA needs to go beyond schooling, allowing students to find a form of social insertion and awareness in the school space, thus promoting their participation in society more autonomously (Gonçalves, 2020).

TEACHING CHEMISTRY IN YOUTH AND ADULT EDUCATION

Due to its specificities, EJA differs significantly from regular education (Gomes, 2019). This causes Chemistry teaching in this modality to face additional challenges. Many students abandon their studies for reasons such as early marriage, pregnancy, lack of incentive, the need to work, and lack of time to attend school, in addition to the precariousness of school infrastructure. In this scenario, Chemistry teachers must adopt dynamic methodologies, connecting contents to the students' reality so that learning is seen as more relevant. For this, teachers must know the students' profiles, their prior knowledge, and the motivations that led them to return to studies (Ramo, 2019).

Gomes (2019) points out that Science teaching involves abstract concepts, making the understanding of contents challenging. Bortoli and Nogueira (2023) add that for EJA students learning Chemistry is even more difficult, as the contents are seen as complicated and abstract. Mezacasa (2020) indicates that one of the biggest challenges for teachers is to spark students' interest and stimulate their curiosity, especially in Chemistry classes, where contents are frequently perceived as complex.

Araújo (2022) states that many EJA students consider learning Chemistry difficult, mainly due to the diversity of ages and lack of time to study, as many of them have to work. Moreover, many face a series of family and financial responsibilities, which causes distancing from studies. Lack of motivation is also often linked to feelings of guilt and shame for not having completed the school phase at the appropriate age (Pitano; Noal; Brignol, 2021).

To prevent these students from giving up again, teachers must conduct classes that bring them closer to the subject and demonstrate the relevance of didactic contents (Gomes, 2019). Sousa *et al*. (2019) highlight that pedagogical methods have great relevance for the inclusion of EJA students, being essential to promote the teaching and learning process in Chemistry. However, it is interesting to note that not only students face obstacles; teachers also encounter resistance when teaching Chemistry in this modality (Araújo, 2022).

Studies indicate the existence of various challenges related to the adequacy of contents and teaching methodologies in EJA (Sousa *et al*., 2019). The traditional method does not promote meaningful learning. Besides the students' lack of interest, time limitations and inadequate infrastructure also represent obstacles. Thus, it is up to teachers to seek methodologies that adapt both to their possibilities and the students' reality (Gama *et al*., 2021).

Araújo (2022) also emphasizes that teachers face challenges related to planning, school structure, and the adequacy of didactic materials to the reality of EJA. Cardoso (2022) highlights the importance of initial teacher training in this context, as courses that address the reality of students and use methods appropriate to the EJA context can help break the stereotype that Chemistry is a difficult subject based only on memorization.

Alternative strategies, such as active methodologies, can help students overcome learning obstacles in Chemistry. The use of experiments and games, for example, can stimulate autonomy, spark curiosity, and promote decision-making. Gomes, Bilessimo, and Silva (2020) state that Chemistry is traditionally a science based on experimentation, and practical activities can increase motivation and learning capacity, regardless of schooling level.

Cardoso (2022) points out that Chemistry teaching should prepare students to face 21st-century challenges, empowering them for social, political, environmental, and economic participation. Contextualization of content, especially when related to students' daily lives, is essential to maintain their interest in classes. This way, Chemistry teaching can help in the development of the decision-making capacity, relating content to the students' social reality (Sousa; Ibiapina, 2021).

METHODOLOGICAL PATH

CHARACTERIZATION OF THE RESEARCH

The research in question adopts a qualitative approach, as its objective is to describe and interpret phenomena without the intention of quantifying them (Gil, 2022). In terms of objective, it is classified as descriptive, as it aims to analyze students' perception of Chemistry teaching in EJA. According to Gil (2022), descriptive research primarily aims to describe the characteristics of a certain population or phenomenon or establish relationships between variables. Many studies can be categorized as descriptive through the use of standardized data collection techniques, such as questionnaires and systematic observation.

Regarding procedures, this study is characterized as a field research, as it seeks to deepen a specific reality through direct experiences with the context and subjects involved (Gil, 2022). According to Siena *et al*. (2024), field research consists of seeking information directly from the studied population, requiring a closer contact from the researcher. In this case, the researcher needs to go to the place where the phenomenon occurs, or occurred, to gather a set of information to be documented.

LOCATION AND PARTICIPANTS OF THE RESEARCH

The study was conducted in a public school located in the city of Areia (Paraíba). This educational institution covers elementary, high school, and EJA levels, with the following schedule distribution: elementary and high school are taught in the morning and afternoon shifts, while EJA is offered in the evening.

The school was selected due to the researchers' familiarity with this environment and the activities carried out in the Pedagogical Residency Program (PRP) and Supervised Internships.

The research included 60 students enrolled in cycles V and VI of high school Youth and Adult Education, aged between 18 and 56 years.

On the topic of gender, 55% of participants are female. Regarding place of residence, 62% live in rural areas. Considering marital status, the majority of students (45%) are single, while 35% are married, 3% are widowed, and 17% have another marital status. Among participants, 55% have children.

About housing type, it was found that 59% of students reside in their own homes, 24% in rented properties, 10% in residences provided by family members, and 7% in other types of housing. Regarding occupation, 48% are employed, 38% are unemployed, 4% are self-employed, and 10% have another occupation. When asked about monthly family income, 48% of the participants stated that they have an income equivalent to 1 minimum wage, 28% earn between 1 and 3 minimum wages, and 24% have no income.

ETHICAL PROCEDURES

Following fundamental ethical principles and aiming to guarantee the protection of the identity, dignity, and integrity of participants, the research project was initially submitted to the Research Ethics Committee of the Federal University of Paraíba (UFPB). This process respected the guidelines established by Resolutions 466/12 and 510/16 of the National Health Council, which regulate research involving human beings.

Only after Committee approval, under the identifier CAAE: 78154524.8.0000.5188, on March 22, 2024, the research process began. Initially, we sent an invitation to the classes, requesting participation in the research. The invitation contained information about the study objectives, the guarantee of confidentiality of any information provided, the commitment to ensure anonymity, and the participants' right to withdraw from the research at any time.

The questionnaires were proposed after the signing of the Informed Consent Form (ICF) by the students. For the development of the research, we used two semi-structured questionnaires, covering 21 multiple-choice and essay questions, divided into two sections: socioeconomic profile and students' perception of Chemistry classes.

The data obtained during the study are confidential and individual; therefore, students' identities were not revealed at any moment, including in the reporting of results. Only the researches responsible for the study had access to the full records produced. To maintain anonymity, participants were identified by alphanumeric codes S1, S2, S3, S4, S5... S58, where "S" stands for "student".

DATA ANALYSIS

This research resorted to the principles of content analysis proposed by Bardin (2016) as a methodological path to analyze the data obtained. According to the author, content analysis presents itself as:

> a set of communication analysis techniques. It is not an instrument, but a range of tools; or, with greater rigor, it will be the only instrument, but marked by a great disparity of adaptable forms and a very vast field of application (Bardin, 2016, p. 31).

This analysis is widely used in areas such as communications, social sciences, psychology, and education, being employed in qualitative research to explore and understand the meaning of data present in textual materials, whether written, verbal, visual, or audiovisual. Content analysis presents three distinct phases of organization: pre-analysis, exploration of material, and treatment of results (Bardin, 2016).

The first phase turns to the organization and formulation of hypotheses regarding the obtained material. Next, in the material exploration stage, data are coded and units of meaning are established, originating categories of analysis. Finally, in the treatment of results, the established categories are explored based on the adopted theoretical framework (Bardin, 2016).

Considering the stages proposed by content analysis, we started with the organization of data obtained through a scan read of the questionnaires, aiming to

trace the first units of meaning. In the material exploration phase, we performed data coding and categorization. Aiming to approach the outlined objectives, we constructed three analytical categories, which are presented in Chart 1.

Chart 1

Categories adopted for the analysis and discussion of results.

OBJECTIVES	CATEGORIES	DEFINITIONS
Identify EJA students' perceptions regarding the relevance of chemistry topics in their daily activities	"Doing experiments helps me learn chemistry better": the relevance of chemical knowledge in daily activities	Understand how students relate chemistry topics to their daily lives
Investigate the approximations and distances of EJA students in relation to the Chemistry subject	"There are too many substances and calculations that make learning difficult in a short class time": perceptions about the Chemistry subject	Explore the potentialities and limitations of the Chemistry subject in EJA
Reflect on the changes required by EJA students for the Chemistry subject based on their individual experiences	What can the Chemistry subject (still) do in EJA?	Reflect on the changes requested by students regarding the Chemistry subject

Source: the authors, 2024.

These categories were established through differentiation and grouping of the obtained data. Considering the research objectives, we outlined three axes of discussion: (I) “Doing experiments helps me learn chemistry better”: the relevance of chemical knowledge in daily activities; (II) “There are too many substances and calculations that make learning difficult in a short class time”: perceptions about the Chemistry subject; and (III) What can the Chemistry subject (still) do in EJA?.

Once the categories were defined, we began the last stage, which aimed at interpreting these groupings based on the adopted theoretical framework. This stage resulted in the analytical texts that make up the next chapter of this research.

RESULTS AND DISCUSSION

"DOING EXPERIMENTS HELPS ME LEARN CHEMISTRY BETTER": THE RELEVANCE OF CHEMICAL KNOWLEDGE IN DAILY ACTIVITIES

It is essential to provide EJA students with diversified and engaging classes aimed at sparking their interest and curiosity. This is justified by the fact that many students face considerable challenges related to calculations in the Chemistry subject, which can result in comprehension problems and lack of motivation.

In this context, the teacher's role is paramount, since the way contents are approached can directly influence the development of students' affinity with Chemistry.

According to Cardoso (2022), the use of activities such as experimental practice stimulates discussion, argumentation, and questioning about knowledge, contributing significantly to the learning process and strengthening the teacher-student relationship.

Given this context, we sought to investigate the participants' perception through the following questions: "how do you feel about Chemistry classes in EJA? Do you consider them relevant to your daily activities?" The answers obtained are presented below:

> I think it is very important because this subject helps me both in my knowledge inside the classroom, as well as in my personal and financial life. This subject is very important at my work and in my home (S10, 2024).
>
> It is a good subject, because through some teachings we can take it to our daily lives (S25, 2024).
>
> I don't think it's an easy subject, however, I think it's very important for our learning (S17, 2024).
>
> I feel a bit confused, I confess, because the subject is very complicated. Yes, they are relevant in day-to-day life, at work, in our home, in various ways in our day there is chemistry (S25, 2024).
>
> I like it, but unfortunately we have few classes and we have no access to a laboratory and no advanced resource to benefit us beyond the classroom (S8, 2024).
>
> I feel lost; it is a difficult subject to learn (S21, 2024).

Analyzing the students' responses, we s varied perceptions about the Chemistry subject, highlighting both its relevance and the challenges faced in the learning process.

Many students recognize the importance of chemistry in different aspects of their lives. For example, S10 affirms the impact of the subject not only on their academic life but also on their personal and financial development, evidencing the practical utility of acquired knowledge in daily situations and the workplace. Similarly, S25 reports the application of the subject's teachings in everyday life, reinforcing the practical character and the connection between school contents and real life.

As pointed out by Ramo (2019), Chemistry teaching frequently demands abstract thinking, which, when approached in isolation, can hinder content

comprehension, especially among EJA students. To overcome this situation, it is necessary to consider students' prior knowledge and work with everyday themes.

Still considering the answers, some learning challenges can be observed. S17 states that, despite seeing the subject as essential for learning, it is not easy, reflecting the cognitive barriers associated with the study of Chemistry. S25 reinforces this view by confessing to feel confused, recognizing the complexity of the subject, but at the same time emphasizing its relevance in various daily activities, whether at work or in domestic life.

According to Sousa *et al*. (2019), EJA stands out as an inclusive teaching modality, allowing the target audience to return to school to obtain basic training. Therefore, it is of paramount importance that EJA teachers work together to prevent these students from feeling incapable of learning, which could lead them to give up on their studies again.

Another relevant point emerging from the accounts is the lack of adequate resources for Chemistry teaching. S8 laments the scarcity of classes and the absence of access to laboratories or other advanced teaching resources, which limits learning potential. The absence of experimental practices impairs deeper understanding of the subject, hindering the link between theory and practice. This problem can be particularly detrimental in a field like Chemistry, which relies heavily on visualization and experimentation to enable the understanding of abstract concepts.

For this reason, introducing new methodologies in the school environment is extremely important, especially for EJA students. In this modality, the challenges for a more effective Chemistry teaching practice become even more challenging. These adversities are often related to the methodologies employed by teachers, since adherence to traditional methods alone does not achieve the objectives of relevant learning. When facing these obstacles, we may encounter not only a lack of student interest but also limitations related to time and teaching infrastructure. Therefore, it is up to the teacher to seek methodologies that align both with their possibilities and the students' reality (Santos; Brito, 2024).

Finally, the sense of frustration of some students, like S21, who feels "lost," suggests the need to rethink pedagogical strategies. This challenge may be the result of a combination of insufficient methodology and the absence of practical activities, elements pointed out in other answers.

When asked about the most captivating aspects of the Chemistry subject, all students directly or indirectly mentioned experimentation as the main factor sparking interest in classes. Some of the answers obtained are exposed below:

> For me, the most interesting parts are the experiments as a whole, also what catches my attention is the organic part (S4, 2024).
>
> The variation of organic compounds... It is interesting to talk about chemical substances, how they act and mix to form something (S25, 2024).
>
> I find the mixtures and experiments interesting (S17, 2024).
>
> When there are experiments, new discoveries (S21, 2024).
>
> I find the experiment interesting, the questions too, despite my difficulty in understanding, but the class is really cool (S5, 2024).
>
> When we do an experiment, that is more interesting (S15, 2024).

Based on the students' responses, we observe a preference for experimental activities in Chemistry classes, highlighting the essential role these practices play in the learning process. As pointed out by Silva (2024) and Malheiros (2016), experimentation stands out for its highly productive effects, as it not only sparks student interest but also enables the observation of various phenomena, facilitating both explanation and understanding.

Several answers show that experiments are the most interesting and motivational moments of classes, as mentioned by S4, who considers experiments the most engaging part of the subject, in addition to demonstrating a particular interest in Organic Chemistry. As observed by Gomes (2019), practical activities encourage students to explore new knowledge, promoting the development of logical reasoning and criticality, while increasing the incentive to stay in school. Experimental activities are one of the strategies employed to motivate individuals to continue studying, by providing a form of learning adapted to their skills.

The idea that the variation and complexity of organic compounds and the interaction between chemical substances spark curiosity in students can be observed in S25's speech. This interest is related to the dynamic nature of chemical reactions, especially in mixtures and combinations resulting in new substances, an aspect also highlighted by S17. These statements show that the understanding of chemical transformations is more effective when students can visualize or manipulate them directly, evidencing the importance of practical experiments to make learning more concrete and meaningful.

S21 and S15 are categorical in pointing out that experiments promote discoveries and make classes more interesting. These answers highlight the investigative character provided by experiments, which allow students to explore chemical phenomena actively, contrasting with passive and theoretical learning contexts.

Even among students who mention limitations in understanding content, like S5, there is recognition that experiments and related questions make the class more interesting. This suggests that practical activities help mitigate understanding obstacles, as students can see and apply in practice what is discussed theoretically, which can facilitate the internalization of more complex concepts.

Undoubtedly, including experimentation in EJA classes brings numerous benefits to the teaching and learning process of the Chemistry subject. However, it is important to emphasize the need to make this resource meaningful for students. This implies evaluating the benefits and complexity of experimentation for the content to be worked on, to prevent the practice from becoming even more complex and difficult to understand. Gomes (2019) claims it must be made evident that simply using experiments in Chemistry classes does not produce positive impacts regarding learning. There needs to be a strong relationship between theory and practice.

"THERE ARE TOO MANY SUBSTANCES AND CALCULATIONS THAT MAKE LEARNING DIFFICULT IN A SHORT CLASS TIME": PERCEPTIONS ABOUT THE CHEMISTRY SUBJECT

According to Mezacasa (2020), it is essential for the teacher to seek ways to promote student learning, helping them understand Chemistry contents with greater clarity and ease, something even more indispensable in the context of EJA students. In this sense, we asked the participants: "have you been adequately understanding the contents taught by the Chemistry teacher? Justify your answer." Some of the accounts received are described below:

> I haven't been understanding properly because there are few classes, little time, we don't have practical classes, but the teachers are very competent because they care about our learning (S8, 2024).
>
> No. Because I have missed classes a lot in the last weeks (S19, 2024).
>
> Not all, because I found the subject and contents dense (S34, 2024).
>
> Yes. They are great teachers and explain with a lot of patience to us students, because EJA is very tiring (S25, 2024).
>
> No. Because I have always had difficulty learning the subject (S21, 2024).
>
> Yes. I like this subject very much because with these classes I have improved my attention with chemical products both inside my home, at work, etc. (S10, 2024).

The responses presented by the students reflect a variety of experiences regarding learning Chemistry, evidencing both the challenges faced and the positive aspects related to teaching and teachers.

S8's statement highlights important points: the insufficiency in the number of Chemistry classes and laboratory practices. Such aspects are seen as significant obstacles to a deeper understanding of contents, mentioned in previous answers. Even so, S8 praises the teachers' competence, recognizing they show concern for student learning, indicating a teaching effort to overcome structural barriers. This suggests that, despite the existing barriers, teacher dedication is a positive point valued by students.

In S19 and S21's answers, we can recognize the limitations they have in following the content, although for different reasons. S19 mentions a lack of attendance in recent weeks, which naturally impacts comprehension. S21 highlights a pre-existing obstacle in learning the subject, something that seems to be a continuous challenge. These two cases indicate that, in addition to factors related to the course structure, individual issues, such as attendance and specific student difficulties, also affect the learning process.

S34 brings an interesting perspective by mentioning that the subject and its contents are "dense". This suggests that the cognitive load and complexity of themes may be difficult to handle to some students. This comment may be related to the lack of experimental practices, mentioned by S8, which would help make the subject more accessible and less abstract.

On the other hand, there are also positive perceptions, like S25's, who values the teachers' patience and care, especially in the EJA context. This answer highlights the essential role of educators in making teaching more accessible, even in a challenging and tiring environment for adult students, who usually accumulate other responsibilities besides school.

S10 also presents a positive view, stating that classes have contributed to improving their attention to chemical products, both at home and at work. As observed by Ramo (2019), teaching Chemistry to EJA students requires considering the life knowledge they bring to the classroom. The teacher must establish interactions with students, bringing the studied content closer to daily life, in order to evidence the applicability of Chemistry as a science.

It is fundamental to emphasize the great relevance of pedagogical methods and practices in the process of inclusion and permanence of students in EJA. It is through these methodologies that the teacher, as a mediator of knowledge, seeks to promote the teaching and learning process in Chemistry. Therefore, didactic-pedagogical methods and practices developed in EJA must have as their main objective prioritizing and valuing student learning, thus allowing autonomy in the classroom (Sousa *et al*., 2019).

Furthermore, another issue was addressed: "what are the resources or activities that help you understand chemical concepts the most?" Some of the students' answers to this question are presented below:

> I understand better when there is an experiment (S42, 2024).
>
> I found it very interesting when the intern put on a game, it became easier and fun to understand the subject (S35, 2024).
>
> The resources and activities that I understood chemical concepts the most with were review classes, classes with chemical experience, and classes with the teacher's interns (S10, 2024).
>
> It helps when the teacher brings a game; also brings a video to help the student understand (S51, 2024).
>
> I think it's better copying them (S47, 2024).
>
> The resources that help me understand chemistry concepts are games, playing activities, and the explanation (S43, 2024).

Students recognize the importance of varied teaching methods to facilitate understanding of Chemistry contents. The emphasis on interactive resources and activities, such as experiments, games, and videos, suggests that traditional teaching, based only on expository classes and copying content, may not be sufficient to engage everyone.

For S42, comprehension improves significantly when there are experiments. Experimental practice is an essential component in science teaching, as it allows students to visualize and manipulate theoretical concepts, making them more concrete. This is particularly important in subjects like Chemistry, where many processes are abstract and difficult to visualize. Experimental classes, therefore, stimulate learning by facilitating the understanding of complex concepts and providing a more comprehensive view of phenomena (Cardoso, 2022).

S35's answer, praising the use of games by an intern, highlights the role of playful activities in learning. The use of games as a pedagogical tool has shown to be effective in making the teaching process more engaging, helping to decrease anxiety regarding the subject's complexity. By transforming learning into a more fun and accessible experience, games allow students to connect more easily to concepts, which can be especially useful for those who find restrictions with traditional methods.

According to S10, the activities that contributed most to their understanding were review classes, chemical experiences, and interaction with interns. This suggests that the diversity of approaches, whether through practical activities, focused reviews, or the involvement of different teachers, expands learning opportunities. The presence of interns seems to have a positive impact, possibly through the introduction of new didactic resources or more creative pedagogical approaches.

S51 mentions the positive impact of videos and games on learning. The inclusion of audiovisual resources is a proven strategy to cater to different learning styles, mainly to more visual students. Videos help illustrate complex and abstract concepts, while games encourage active participation, making the learning process more dynamic and interactive.

On the other hand, S47 prefers more traditional methods, such as copying content. Although less innovative, this method still has value for some students, who may benefit from repetition and the reinforcement of writing to appropriate concepts. This shows there is a diversity of learning preferences within a class, and different approaches can meet individual needs.

Finally, S43 reinforces the idea that games, playing activities, and detailed explanations are the resources that help them the most in understanding chemical concepts. The combination of these playful and expository strategies seems to be the most effective for connecting students to contents.

From Sousa's (2019) perspective, the use of games in the classroom generates positive pedagogical benefits directly linked to student learning, especially in Chemistry teaching, such as: cognition, affection, socialization, motivation, and creativity. Thus, playful activities enable students to build a critical and self-reflective view of their own learning, so that it becomes more meaningful.

We observe the need to include experiments, games, videos, and clear explanations, given that such resources tend to be more effective for learning Chemistry. The diversification of methodologies helps to make learning more accessible and engaging, allowing students with different learning styles to connect to content in ways that best suit their needs.

Throughout the study, the importance of using new methodologies during Chemistry classes became evident, especially regarding experimentation. We believe that in EJA, the employment of these didactic resources is even more effective in the teaching-learning process, considering the needs and limitations of the students composing this teaching modality. Therefore, incorporating experiments and playfulness in Chemistry classes is of extreme importance to motivate these students to learn.

When asked about the obstacles they face, the students described:

> There are many varieties of substances and calculations that make learning difficult (S25, 2024).
>
> My biggest difficulty is the calculations part because unfortunately my return to classes was late, I didn't have much patience to study and now the mind is already failing (S35, 2024).
>
> I have a lot of difficulty in solving calculations (S21, 2024).
>
> Sometimes the tiredness of everyday life (S37, 2024).
>
> Everything (S55, 2024).

Memorizing the rules (S28, 2024).

The answers indicate that students face significant challenges regarding Chemistry learning, especially on topics that include calculations and memorization of rules. These factors seem to be the main barriers to student success, in addition to issues related to fatigue and motivation.

Obstacles in developing mathematical calculations are pointed out by several students, such as S25, S35, and S21, who highlight this aspect as the most challenging. Chemistry involves many quantitative concepts and the application of formulas, which can be intimidating. This challenge is even greater to those whose mathematical training was limited or who returned to study after a long period, as in the case of S35. This specific barrier can be aggravated by a lack of confidence or patience in dealing with complex problems, requiring a more careful pedagogical approach, with reviews and reinforcement of mathematical skills.

S25 also highlights the variety of substances and calculations as a complicating factor, suggesting that the excess of information and the complexity of the themes treated can overload students. This statement points to the need for a more gradual and focused teaching, which can help students process contents better, reducing anxiety related to the amount of information to be memorized.

S37 answers an important issue: the impact of tiredness on learning. Daily exhaustion, whether due to work, family responsibilities, or other factors, impairs the capacity for concentration and content assimilation. This is especially relevant for EJA students, who often reconcile studies with an exhausting routine, affecting their academic performance.

S55's comment, considering all aspects difficult, reflects a sense of helplessness regarding the subject, suggesting that cognitive overload represents a challenge. When students cannot identify a specific area of difficulty but feel that the content as a whole is inaccessible, it may be a sign that teaching methods need to be adapted to address any evidenced deficiencies gradually and personally.

Finally, S28 mentions the memorization of rules as an aspect deserving attention, something that may be related to the quantity of abstract information and formulas that need to be memorized in Chemistry. This reflects the importance of not only teaching rules but also contextualizing and applying them in practical situations.

Based on these responses, we recognize the need for a differentiated pedagogical approach for Chemistry teaching, focusing on strategies that address the mathematical deficit and help students learn content more meaningfully. It is also necessary to take into account the students' living conditions, especially regarding tiredness and lack of motivation, thus promoting more interactive classes connected with reality.

According to Gonçalves (2020), the public seeking EJA is generally composed of men and women from the poorest social strata, with diverse origins and professional experiences, established ethical and moral values, and various speaking and thinking styles. Many were forced to abandon studies early, either due to lack of opportunities or the need to work to survive; others abandoned school due to lack of motivation, learning difficulties, or failures.

According to Silva (2024), EJA students are individuals returning to school with the goal of completing high school but face adversities along this journey, such as lack of time to reconcile work and study, obstacles in the learning process, tiredness, lack of support to care for their children, among others. Given this reality, it is essential that the school community observes these students' needs with sensibility, preventing them from quitting studying again.

WHAT CAN THE CHEMISTRY SUBJECT (STILL) DO IN EJA?

To make Chemistry learning more motivating, research participants indicated alternatives such as:

> Group work (S43, 2024).
>
> Less calculation, more experiments, group activities, and games (S12, 2024).
>
> Having classes in the laboratory, which I am curious to see (S21, 2024).
>
> Having more classes in the laboratory, this would help me understand a little more and also do the calculations (S8, 2024).
>
> In my opinion, things would improve a lot if there were more practical classes and classes in the laboratory (S10, 2024).
>
> With games, group activities, and practical classes I think it becomes easier to understand (S23, 2024).

The students' accounts point to the need for more dynamic and interactive teaching methodologies that go beyond traditional approaches centered on calculations and theoretical classes. The emphasis on group work was mentioned by S43 and S12. This practice not only promotes interaction among students but also encourages the exchange of ideas and mutual support. When students collaborate, there is a greater opportunity to overcome comprehension gaps together and learn from peers' explanations and experiences. Furthermore, this approach can make the learning environment more inclusive, allowing students with different levels of understanding to help each other.

Moreover, S12 highlights the need for fewer calculations and more experiments and games. This statement suggests that calculations, although important, can be excessive or demotivating if not associated with practical contexts. The insertion of experiments and games, on the other hand, seems to be recognized as a way to make learning more accessible and interesting, which could improve student engagement and concept retention.

The desire for laboratory classes is highlighted by S21, S8, and S10, reflecting student interest in practical experiences. For many students, chemistry becomes more understandable when they can visualize and manipulate the materials and processes they study. S8 suggests that laboratory classes would not only facilitate concept comprehension but also help in applying calculations more concretely. This demonstrates that, for some students, theory and practice must be closely linked for learning to be effective.

S10 also reinforces the importance of practical classes and laboratory use, emphasizing that this type of activity would significantly improve the teaching process. This desire for more practical experiences may indicate a disconnection between the theoretical content taught in the classroom and the practical application of knowledge, which is essential in subjects like Chemistry.

S23 summarizes clearly the general feeling by stating that games, group activities, and practical classes make learning easier to understand. This reflects a demand for more active and engaging teaching methods, which not only transmit content more playfully but also offer opportunities for students to actively participate in the knowledge construction process.

Regardless of age group, the teaching and learning process requires methods that make teaching more effective and pleasant. It is known that EJA students need positive stimuli for better learning.

According to Silva (2024), the use of active methodologies facilitates the learning of chemical concepts, since the contextualized and dynamic approach to daily themes in the classroom motivates and sparks student interest, stimulating curiosity and making classes more pleasurable.

Another question raised was: "how do you evaluate the support offered by Chemistry teachers in EJA? Are they available to clarify your doubts?" Below are the answers that stood out the most:

> Yes, they always leave space for you to ask questions (S22, 2024).
>
> I think it's important because in EJA we don't see the complete subject matter and since the teachers are very helpful, they teach and answer our questions (S8, 2024).
>
> I think both the teacher's classes and those of his interns are very important, they have been putting on a show in their classes, mainly in practices (S10, 2024).
>
> Yes, they are always bringing the best for us (S27, 2024).
>
> Yes, he is a good teacher and is always available to clarify our doubts (S34, 2024).
>
> Great. Because they always care about our learning (S19, 2024).

The students' responses reflect positive perceptions regarding the role of teachers and interns in the teaching process. Such aspects were observed in the speeches of S22 and S34, which emphasize the teachers' availability to clarify doubts, an essential element for learning success, especially in an environment where students may have educational weaknesses or gaps. This space for questions demonstrates that teachers are attentive to student needs, creating a more inclusive and accessible learning environment.

It is essential to establish a good relationship between the student and the teacher, as both are active subjects of the educational process, always growing together. For this reason, the teacher must be able to listen, feel, and observe the needs of each student in order to articulate their actions. This interaction plays a significant role in the teaching and learning process, as it is the educator who mediates the connection between the student's prior knowledge and the new information presented in the classroom.

S8 affirms that, in EJA, it is often not possible to teach all content completely, due to time or structural limitations. However, their speech demonstrates the teachers' effort to fill this gap, being helpful and assisting them in understanding the content taught. This is fundamental in the EJA context, where many students return to studies after long periods of absence and need additional support to regain a good learning rhythm.

In S10's answer, we can observe the importance of both classes taught by the teacher and by interns, with special praise for practices conducted by the latter.

This speech suggests that the participation of interns has been beneficial, especially for bringing a more dynamic hands-on approach to teaching. These kinds of activities seem to be an important differentiator, helping students connect theory with practice more directly.

For S27, there is a continuous effort by teachers to improve the teaching process and offer students necessary support. This view reinforces the idea that teachers are committed to student success, seeking to adapt content and methodology to the specific needs of the class.

The harmonious relationship established in the school environment brings numerous benefits. This atmosphere provides the student with more freedom to ask questions and express ideas, resulting in a deeper understanding of the contents taught. According to Araújo (2022), the student's good relationships in the environment they are inserted in not only are indispensable for their understanding of Chemistry but also constitute the social context needed for them to exercise their role as citizens.

Finally, S19 praises the teachers' concern for student learning, demonstrating a positive bond. This relationship of care and attention is especially important in the EJA context, where many students may feel insecure about their ability to follow content or adapt to the school environment after long periods out of school.

The main objective of Chemistry subject is making students recognize the importance of science in the search for knowledge and understanding of reality, by applying it in their daily lives. Therefore, learning Chemistry provides a better understanding of phenomena occurring around us, and when there is positive collaboration between teacher and student, learning can become more fluid (Ferreira; Silva; Lira, 2021).

FINAL CONSIDERATIONS

Based on the results obtained throughout this research, it is possible to conclude that the diversification of methodologies in Chemistry teaching, especially in the EJA context, is essential to promote more effective and inclusive learning spaces. Student accounts demonstrate that, although Chemistry content presents considerable challenges, such as the presence of many calculations and the memorization of rules, the use of dynamic pedagogical approaches, such as experiments, games, group activities, and practical classes, significantly facilitates concept comprehension.

The presence and support of teachers and interns were also highlighted as fundamental factors for the teaching and learning process. Students recognize the educators' effort to clarify doubts and adapt classes to their needs, demonstrating the importance of a welcoming and accessible educational environment. Furthermore, experimental activities and laboratory use were widely valued, with students emphasizing that these practices not only make content more interesting but also help in applying calculations and concepts more concretely.

Another relevant point mentioned by students was the positive impact of group work and playful strategies, such as educational games, which make the learning process more interactive and less intimidating. These approaches help

mitigate the sensation of cognitive overload caused by the complexity of themes addressed in class and promote a collaborative environment where students can exchange experiences and learn from each other.

The absence of laboratories and the limitation of material resources were mentioned as barriers to the learning process. These limitations indicate that, although teachers' efforts are recognized, there is a clear need for investment in didactic resources and conditions that favor the realization of practical activities, which are essential for effective Chemistry learning.

In summary, this research highlights the importance of a pedagogical approach balancing theory and practice, recognizing the particularities of EJA students, who often face additional challenges such as tiredness, lack of mathematical background, and time limitations. The adoption of interactive methodologies, the appreciation of experimental practices, and constant support from teachers and interns are factors that can contribute significantly to improving Chemistry teaching, making it more accessible, interesting, and relevant to daily life.

Therefore, it is fundamental that Chemistry teaching in EJA continues to evolve, seeking new forms of engagement and adaptation to students' needs. Providing a more dynamic and practical learning environment can not only improve academic performance but also raise student interest in the subject and its application in daily life, both in personal and professional contexts.

NOTE

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