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USE OF ALTERNATIVE TEACHING RESOURCES AS A LEARNING FACILITATING AGENT IN CHEMISTRY TEACHING

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INTRODUCTION

To understand how students' academic performance occurs at school or university is a major challenge, not only for the education system as a whole, but for teachers, who are directly linked to students in teaching rooms. The chemistry teacher's challenge in teaching is to awaken student interest in the subject. Show him that chemistry is also life, as all reactions within the human body are part of chemical reactions. The composition of food, the manufacture of durable and non-durable products, are all part of chemical bonds. Therefore, it is often up to the educator to face the challenges of making the teaching of chemistry an interesting, attractive and thought-provoking study for the student.

Chemistry is a science that studies matter, the chemical changes it undergoes and the energy fluctuations that accompany these transformations. It constitutes an important portion in all natural, basic and applied sciences (Bueno et. al., 2007). Thus, providing practical classes in chemistry laboratories (Barberá and Valdés, 1996); carry out scientific experiments (Alves Filho, 2000; Bueno et. al., 2016; Pacheco, 2015), with the pedagogical objective of improving the teaching-learning process, making it interactive, in which students can participate actively; make field visits with students to other educational institutions; gives interactive classes with debates on important and fundamental subjects in the area of chemistry; hold science fairs, with prizes for the best work; make use of a variety of teaching resources, in order to show students the importance of studying chemistry, make it attractive, but much more than that, facilitate the understanding and learning of chemistry teaching. It cannot be forgotten that the nature of this science is, essentially, experimental.

The teacher has the great mission of developing students' interest in reading national and international scientific articles focused on chemistry subjects, but not only chemistry, but other subjects, so that students have a systemic and comprehensive worldview.

Therefore, the present research work aims to analyze the influence of the Use of Alternative Teaching Resources as a Facilitating Agent of Chemistry Learning based on the hypothesis that different uses of teaching resources can facilitate and improve learning in chemistry teaching.

SPECIFIC OBJECTIVES

- Investigate whether there is an impact of the different uses of teaching resources in the teaching of Chemistry;
- Evaluate the different teaching resources used in teaching Chemistry;
- Compare the efficiency and quality of using different uses of teaching resources in the education of high school students in learning chemistry;
- Know the factors external and internal to students, which interfere with learning at school, and especially in the subject of chemistry.
- Understand which chemical contents attract the most attention in the age group researched;

THEORETICAL REFERENCE

EDUCATOR TRAINING

The problem of student education begins at the structural basis of education, from the initial grades of education to higher education. The problem starts from limitations to the calamitous state of public libraries, lack of structure and support for cultural centers, and this intensifies on the outskirts of large urban centers, in rural areas, and the further away the location is from cities, this only gets

worse., but the truth is, everyone has the right to a top-quality education, regardless of their gender, social class or ethnicity (Aubert et. al., 2008; Fávero, 2011).

Before trying to understand why, some high school or higher education students have learning difficulties, and more specifically in the subject of chemistry. It is important to emphasize that in many cases, the professional educator does not have the appropriate qualifications to teach the subject he was selected to teach at the educational institution, and that in many cases, he needs to assume it because he does not have a professional truly qualified in the education system he works in.

Thus, one of the main strategies for achieving quality education, given that initial training is insufficient to meet the demands imposed by today's society, is to train the educator, with appropriate tools to teach in an attractive and motivating way, the discipline that proposed to teach, in addition to the professional having confidence in the area and subject he will teach, he needs to have pedagogical skills for teaching (Avigo et. al., 2008; Fainguelernt, 1999; Gondim and Mól, 2008; Maia et. al. 2011; Nunes et. al., 2010; Reis, 2012; Silva and Marcondes, 2015; Souza, Silva and Silva, 2013; Zanon and Palharini, 1995).

The teacher must seek continued training, take specializations, master's degrees, doctorates, participate in congresses, seminars, symposiums and other events where the contact network increases, as well as scientific and technological information that will help him and bring more knowledge and information to the classroom. of class. Another alternative for teachers is to participate in study groups, with professionals from the same area or even areas linked to their discipline, with discussions about the different possibilities for teaching chemistry, for example (Araújo and Viana, 2011; Veiga et. al., 2012; Voli, 1998).

Pedagogical practice in today's basic and higher education institutions requires a well-trained teacher prepared to work with students and also with the problems present in everyday society (Behens, 1996). It is important to emphasize that in all areas of teaching it is necessary to analyze the teaching and learning process, with the aim of detecting paths that interconnect everyone, respecting the way in which each individual connects with knowledge. However, when it comes to chemistry, unfortunately it is possible to notice the misconception that this is an extremely difficult science and that not everyone is able to learn it.

Hence the great challenge for the educator, having the constant mission of demystifying this concept (Da Silva, 2013). It cannot be ignored that it is necessary to pay attention to the chemical education of educational psychology to the learning process of the chemistry teacher and the multiformities of the teaching and learning process as contributors to the development of the student's self-esteem and its relationship with the learning of chemistry concepts. (Polsin and Pedroso, 2012).

CHALLENGES OF CHEMISTRY EDUCATION

INTERNAL FACTORS THAT INTERFERE WITH LEARNING

One of the first points to be highlighted as a set of guidelines for science teaching is that an interdisciplinary approach to the themes must be taken: "Earth and Universe, Life and Environment, Human Being and Health, and Technology and Society, and in these themes, concepts related to the areas of biology, chemistry, physics and geosciences must be discussed" (Reis, 2012).

After understanding that sciences are interconnected and must be taught by

correlating them. It can then be said that factors internal to the structure and functioning of the school constitute the environment where educational practices occur, where without a doubt, it interferes favorably or not in the results of these practices. Taking care of the physical structure of the school is also extremely important for the development of learning, because, as educator Eduardo D' Amorim states: "Everything at school must be done to educate. All. Thus, dirt miseducates, abandonment miseducates, disorganization miseducates. On the other hand, cleaning educates, organization educates, walls educate, paintings educate, plants educate. That's why the physical structure for me is important for visualizing the seriousness of the process and the conception we have of the school." (apud LUZ and JESUS, 2006, p. 46). This way, the pedagogical view of the classroom must not be seen only as a place aimed at receiving students and educators during the work of teaching, since it is, above all, an educational environment.

When looking at this scope, one must take into consideration, the physical and didactic resources that education systems generally have. In relation to teaching resources, it is necessary that they are actually used by teachers as teaching material and that students have access to them. For example: what is the point of having a computer laboratory if it is always closed, almost always and cannot be used? What's the point of having a computer or physical-chemical analysis laboratory if the teachers don't know how to carry out the methods or simply don't know the equipment in each of the different laboratories? Therefore, one of the steps is to carefully train teachers, so that they are capable of developing quality teaching (Luz and Jesus, 2006)

One of the major problems of the public education system in Brazil is low investment in education (Amaral et. al., 2019; Diel et. al., 2014; Giacomoni, 2010; Kroth and Gonçalves, 2020; Silva Filho et al., 2016; Souza and Davis, 2019). Currently, the misfortune is that we have a socially and economically dissatisfied student, who goes to school with the initial desire that, with studying, he will be able to improve his life (Diel et. al., 2014; Souza and Davis, 2019). However, upon entering the public education system, you are faced with a school that is not prepared to receive you and this leads to discouragement for many and even giving up on their studies.

Charlot (2000) tried to explain in his research in a broader and less prejudiced way, stories of school success and failure. He expressed in his investigations that the learning process takes place from birth (Costa, 2023; Fregni, 2019) and that this appropriation triggers three processes: hominization (becoming a man), singularization (becoming a unique exemplar) and socialization (becoming a member of a community) (Charlot, 2000).

With the information that revolves around the student, he begins to flourish or awaken to learn. It is this desire that drives not only children, adolescents, young people, but even adults and seniors towards knowledge (Reis, Meira and Moitinho, 2018; Cachioni et. al. 2015). In field research, it was identified that this "direction towards knowledge" presupposes a mobilization movement – and not simply motivation Charlot (2000).

The definition of mobilization refers to internal dynamics, brings the notion of movement and has to do with the web of meanings that the student presents to their actions. Motivation, however, has to do with an external action, highlighting the fact that one is motivated by someone or something (Charlot, 2000). Research by Charlot (2000) revealed that a large proportion of students, almost 80% of them, only see the point in going to school to get a diploma, have a good job and earn money and lead a peaceful life.

In this speech, the interest in learning is not perceived. These young people who relate school and profession without reference to knowledge, create a magical relationship with both. An interesting point to be observed is that the daily relationship with study is especially tenuous in the sense that what we propose to teach young people does not make sense in itself, but only in a distant future (Charlot, 2000).

Regaining the meaning of learning and the pleasure of studying is among today's greatest challenges for teachers. The school needs to present itself in a meaningful, pleasurable way, to do justice to the students' intellectual commitment to seizing the various fragments of knowledge produced by man. This is not a cake recipe. The circumstance cannot be resolved by justifying the lack of interest or failure of students because of the family's social class or the cultural deficiencies inherent to their origin (Charlot, 2000; Gatti, 2008; Esteban, 2001). Quality teaching is necessary, with psychological support, with financial assistance and that awakens interest in learning, in knowledge in the student (Gatti, 2008; Olivindo et. al. 2021).

The teacher's mission today is to stop being the one who only explains the content of the subject, his role, now, is to direct knowledge, proposing multiple, collaborative activities that strengthen the performance and interaction of students, making that they play a more active role in the learning process (Lima et. al., 2021).

EXTERNAL FACTORS THAT INTERFERE WITH LEARNING

Studies on the development of intelligence as an intrinsic factor in each individual have not eliminated the interference of the environment in the child's cognitive development (Piaget, 1974). On the other hand, the social environment is the matrix of models that the work must approach (Vygotsky, 1987). It is the mine of socially elaborated knowledge that serves as a prototype and compares the individual's constructions.

Learning and evolution are acquired through patterns and, obviously, through the child's motivation. Children are excellent observers of what adults and/or others say or express on a daily basis, because they say what they say, because they speak, internalizing everything that is observed and appropriating what they saw and heard. They reproduce and maintain what happens around them (Vygotsky, 1987)

The environment is a collection of substances or conditions in which a certain object exists or in which a certain action occurs. Many people call education a self-education environment (Taille, Oliveira and Dantas, 1992). The word environment is commonly conceptualized as a combination of conditions, substances, systems, in which man is part and an integral part. The bad or good development of this set is what defines man's quality of life, that is, the factors that manipulate his social, psychological, cultural, moral and school life, which in turn constitute different environments. The unveiling of social factors external to formal school education and the relevance of socialization processes in the formation of the individual, served to root and sublimate experiential learning and the formative potential of different social situations and different living environments (Candau and Sacavino, 2003).

It is possible to glimpse a variety of widespread educational modalities that are entirely different from the school model, which allow us to understand that the integration of educational action arises from the situation between the proportion of the subject, the time and the environment in which they live (Candau and Sacavino, 2003).

MATERIAL AND METHODS

The research was carried out at the Federal Institute of Education, Science and Technology of Acre (IFAC), in the city of Cruzeiro do Sul, Acre, Brazil. The research methodology used, in addition to a bibliographical investigation to substantiate the problem to be studied, field research was carried out to collect data, with male and female students on campus, aged between 14 and 16 years old, of the Technical Course Integrated to High School in the Environment, enrolled in the Chemistry discipline in the 1st Year classes.

The students who participated in the research were selected randomly, with no criteria for selection. The research instrument was a questionnaire, which was answered clearly and objectively. The research questionnaire was carried out with 41 students. Regarding the structure of the questionnaire, it presented questions of a descriptive nature, which aimed to identify the acceptance of the chemistry subject, and the factors that result in learning difficulties.

Data collection, application of the questionnaire and documentary research were carried out by the Coordinator of the Integrated Technical Course for Secondary Education in the Environment and teacher of the Chemistry discipline. According to Marconi and Lakatos (2003) the tabulation and arrangement of data in tables, making it easier to verify the interrelationships between them. It is a part of the technical process of statistical analysis, which allows the observation data achieved by the different categories to be synthesized and represented graphically. This way, they can be better understood and quickly interpreted.

RESULTS

The graph below shows that 92.5% of students like the chemistry subject and 7.5% do not like the subject. At **figure 1**, are the answers from students at the Federal Institute of Education, Science and Technology of Acre (IFAC), when they like or dislike the chemistry subject.

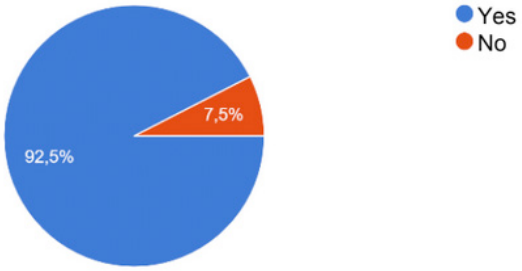

Figure 1: Response from students at the Federal Institute of Education, Science and Technology of Acre (IFAC), when they like or dislike the chemistry subject.

The **Figure 2** states that 80.5% of IFAC students are able to learn the content of the subject taught in the classroom. At the time, 19.5% have learning difficulties.

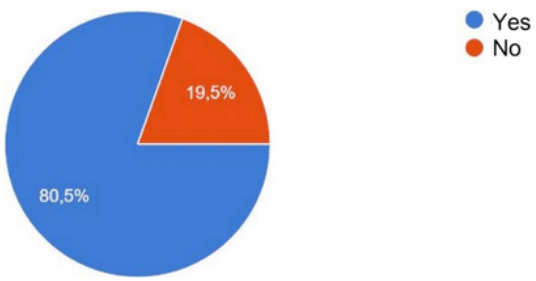

Figure 2: Response from students at the Federal Institute of Education, Science and Technology of Acre (IFAC), when learning the chemistry subject.

In the survey, 100% of students stated that the teacher uses alternative teaching resources that facilitate learning, with no contrary answer to this question. The **Figure 3**, clearly confirms that the IFAC teacher uses alternative teaching resources in chemistry classes, as a way of facilitating student learning.

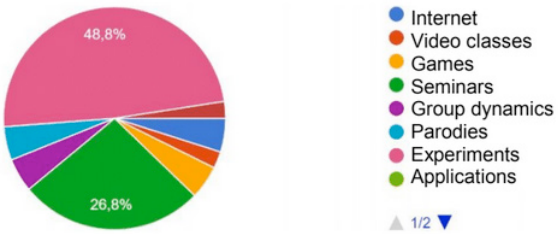

Figure 3: Response from a student at the Federal Institute of Education, Science and Technology of Acre (IFAC), regarding the use of alternative resources in chemistry classes.

The research carried out indicates that 92.7% of students consider that the uses and teaching resources in classes help in learning chemistry classes. 7.3% do not feel the influence on learning from the teaching resources used in the classroom. Of the subjects covered in the classroom, 55% of IFAC students have more affinity in experimental classes. 17.5% have an awakening in their attention, in subjects related to atomistics, history of atomic models. Observe the **figure 4.**

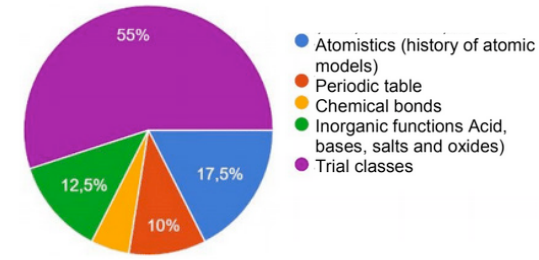

Figure 4: Response from students at the Federal Institute of Education, Science and Technology of Acre (IFAC), regarding their predilections to content taught in chemistry classes.

DISCUSSION

As seen in the **figure 1**, almost all students at the Federal Institute of Education, Science and Technology of Acre (IFAC) like the chemistry subject, but 19.5% (**Figure 2**) have learning difficulties. It is interesting to emphasize that during the research, students were also able to answer the reasons for their difficulties. Some find the subject content very complex and difficult to understand. Others said that even with the good explanation given by the teacher, they had difficulties with the subject. One student said: "I have difficulties with numbers, numbers scare me, they make me panic". Another said: "I learn a lot in class, but then I forget everything very easily." Another student reported: "I think it's a miracle that chemistry or computer subjects enter my head, it would be a miracle for that to happen"

It was instigating to realize through the research that 48.8% (**Figure 3**) of IFAC students, have a predilection for experimental work. This demonstrates that there is a considerable number of students who, with a little research encouragement, will be able to enter universities and become the researchers of tomorrow. 26.8% of students like applications more (resources from Google Drive, Pade Let, Canva, among others), which also greatly stimulate learning and make the class more interesting, attractive, managing to keep their attention in the subject, as well as the content taught in the classroom. Some students reported that they really liked seminars, group dynamics, parodies, video classes, the internet and others. The research revealed that students feel stimulated by the use of teaching resources (**Figure 3**).

In his studies, Piaget (1974) demonstrated that the development of intelligence is like an internal factor in each individual, however he did not rule out the influence of the environment on the individual's cognitive development. Learning and development are acquired by models and, of course, by the individual's motivation (Vygotsky, 1987) in intellectual development. So, based on the concepts and research of the philosophers mentioned, it can be inferred that teaching resources can influence student learning.

The research showed that IFAC students have predilections for the contents of

experimental classes and subjects related to atomistics, history of atomic models (**Figure 4**). The students explained that the experimental classes allow them to move from theory to practice, which encourages them to study and enjoy chemistry. Other students expressed that they enjoy subjects related to the history of atomic models more, because they have always been curious to know how they were discovered. Atoms, who created them, what they were used for and what they are still used for today. What can be seen from the students' comments is that they are stimulated by new things, by discovering things. They have curiosities that have no answers, and when they realize that one of their curiosities will be answered or unraveled, they feel instigated and encouraged to learn and seek more knowledge.

FINAL CONSIDERATIONS

This research demonstrated that it is necessary for the teacher to have a pedagogical vision of the school environment, that the four walls of the classroom cannot be seen only as a space assigned to accommodate students and teachers during school hours, as it is, first and foremost, an educational environment. Therefore, the alternative physical and didactic resources present in educational institutions must be considered as extremely important tools that will help the teacher, not only to convey the content of the subject, but will also facilitate the process of understanding and learning for the student. Not forgetting that teaching resources must actually be available to be used by teachers as teaching material, and subsequently to students so that they feel motivated to research and are able to better capture and process the information given by teachers.

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