



## Contextualized methodologies to facilitate the learning of chemistry in high school

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### SUMMARY

Chemistry teaching has faced some challenges over the years, associated with excessive content, overly theoretical classes, memorization of formulas, and lack of motivation on the part of students and teachers. Even though there are so many innovative tools available in education, teachers still face challenges in the classroom. Based on these challenges and the need to overcome these obstacles in the teaching and learning process, research is being conducted to enhance chemistry teaching. Among all the teaching methods we can use to reach students, one of the most effective is contextualized methodologies, which utilize tools that spark curiosity and motivation in students. This article aims to cite and discuss contextualized methodologies, which utilize various tools that are part of students' daily lives and have yielded significant results for chemistry teaching. Finally, it is concluded that the difficulties in teaching chemistry are visible, but the teaching and learning process is something that is innovated over time to overcome these difficulties that students face.

**Keywords:** Methodologies. Contextualization. Chemistry Teaching

### ABSTRACT

Chemistry teaching has faced some challenges over the years, associated with excessive content, overly theoretical classes, memorization of formulas, and lack of motivation on the part of students and teachers. Even though there are so many innovative tools available in education, teachers still face challenges in the classroom. Based on these challenges and the need to overcome these obstacles in the teaching and learning process, research is being conducted to enhance chemistry teaching.

Among all the teaching methods we can use to reach students, contextualized methodologies are one of the most effective, utilizing tools that spark curiosity and motivation in students. This article aims to cite and discuss contextualized methodologies that utilize various tools that are part of students' daily lives and have yielded significant results for chemistry teaching. Finally, it is concluded that the difficulties in teaching chemistry are visible, but the teaching and learning process is something that is innovated over time to overcome these difficulties that students face.

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### Introduction

Considering the concept that chemistry is a branch of natural sciences that studies the matter, its properties, constitution, transformations and the energy involved in this process. This makes teaching this subject quite complex, due to the scope of its contents and also because it is a science with three fundamental levels, macroscopic, microscopic and symbolic. Based on these assumptions, the teaching of chemistry has been facing some difficulties over the years, which are associated with the excess of content, a language that the student does not understand, overly theoretical classes, memorization of formulas and demotivation on the part of students and teachers. " Chemistry is cited by students as one of the more difficult and complicated to study, and that their difficulty increases because they are abstract and



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complex. They claim the need to memorize formulas, properties, and equations chemicals".(SILVA, 2011, p.1) These factors already mentioned make the teaching of chemistry somewhat limited causing an increasing number of failures and school dropouts. " chemistry teaching has gone for moments of intense reflection, due to the high failure rates and evasion" (CALLEGARIO and BORGES, 2010, p. 1). Based on the difficulties faced and the the need to overcome these obstacles in the teaching and learning process is what is being research was carried out with the aim of enhancing the teaching of chemistry. In most of the research already carried out indicate that innovation in methodologies is the best way to achieve a result most significant. Among all the methodologies put into practice by various teachers and researchers who have had their articles published talk about the methodology contextualized with the support of a variety of support tools, as they report the need for which there is a need to make a connection between theory and practice, leading the student to associate the content learned in classroom with its daily life, that is, bringing theory to the student's reality. This article aims to cite and talk about contextualized methodologies using various tools that are part of the student's daily life, and which have brought significant results for teaching chemistry. It is also worth highlighting that the use of innovative and alternative methodologies, requires more intensive investment in teacher training and availability of resources didactic.

## **Development**

In this work we will analyze some important methodological practices and privileged that can be used in high school, as they have had a notable application for education and always aiming at the personal development of the student, based on some works that were carried out in this same line of thought, we can highlight; the Games pedagogical tools as teaching tools, The Use of Educational Videos in Chemistry Classes of High School for Historical and Contextualized Approach to the Theme of Glass and Contextualization of teaching Chemistry in a military school.

Even though we know that there are so many innovative tools that we can use in this area of education, such as: introduction to computing, educational games, simple experiments everyday life and etc., which are so important and predominant today, the teacher still faces difficulties in the classroom. It is known that a more dynamic and elaborate class also requires more work on the part of the teacher; in return, the response can be more expressive and gratifying when the teacher adapts to the student's reality and prepares for new ways of teaching, leaving aside the archaic classes that have not brought significant results in the process



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of teaching and learning.

Among all the teaching methods we can use to reach students, we can highlight contextualized methodologies as one of the most effective, using means that awaken curiosity and motivation in students. Games, simple experiments, brochures, videos and etc., are examples of tools that in most cases arouse curiosity and motivation, because such tools instigate the competitive instinct, and the need to know more about the topics that are being addressed and also motivate some students who previously did not have interest in the subject.

However, Fialho states that:

Exploring the playful aspect can become a facilitating technique in the development of concepts, in reinforcing content, in sociability among students, in creativity and in spirit of competition and cooperation, making this process transparent, to the point that the mastery over the objectives proposed in the work is assured (FIALHO, 2007, p. 16)

“Educational games with pedagogical purposes are of great importance, as they enable new perspectives for the teaching-learning process and assist in the construction of knowledge” (FIALHO, 2008, p.2).

When a student's interest is awakened, he goes from being a mere spectator to a field of author of their own knowledge, they become capable of taking initiatives and acting, of being more active and motivated. According to the same author, it is important to highlight the use of games pedagogical means that can be used as a support tool, composing subsidies important in reinforcing previously studied content. On the other hand, this tool teaching aims to guide, awaken competition and dispute in the student, thus making also the most fun classes and directing the student to the right path.

The author worked as research objects on two games which were carried out in the classroom. class, in High School with the main focus on approaching chemistry content already had been studied previously. These are games that were made with alternative materials and students' daily lives, with easy access and low cost. The need for new tools as such that enhance the teaching of chemistry in basic education.

According to Fialho:

The first game to be worked on was **Chemical Dominoes**, which focused on getting the student to memorize the symbols of some chemical elements and their respective names; carry out an exercise in memory and reasoning; working with limitations; learning to live with existence of rules and improve your group relationship. The second game which was worked on is the so-called **Inverted “L” Game**. This game aims to: stimulate memory; develop the ability to transfer content; lead the student to analyze and interpret problems; reinforce organic compounds; promote learning



playing; encourage the student to deal with challenging situations and establish limits on winning and losing.(FIALHO, 2008, p.5-6)

FIALHO (2008) states that both games brought significant results for teaching of chemistry, as it made it possible to understand the importance of the applicability of games in the process educational, as a facilitating body for integration, sociability, playful awakening, play and especially learning. Remembering that, when we bring a game into the classroom it is necessary to take some precautions, such as the importance of using rules and scores. It is worth emphasize that games should be used as teaching support tools and that this type of pedagogical practice, directs the student to explore their creativity, offering conditions for an improvement in behavior in the teaching and learning process and consequently an improvement of your self-esteem.

According to some studies carried out, the difficulties related to the teaching of Chemistry are associated with traditional methodologies. This traditional model does not come over the years times bringing significant results without the help of innovative methodologies, which can be used and added to the traditional teaching method, always taking into account the needs and the reality of their respective students, thus awakening in the student a new vision regarding discipline. A broad vision and not limited to concepts, theories and ready-made formulas, because when takes a ready-made object of study which cannot be explored, investigated or which arouses curiosity and desire to know more, teaching becomes in a way a dogma.

According to Callegario and Borges:

Chemistry teaching has been going through moments of intense reflection, due to the high failure and dropout rates, as chemistry classes are seen by students as something boring, with memorization of concepts and formulas presented in textbooks. In addition Furthermore, we know that the school must work with the students' reality and transform them into conscious citizens and that the learning process can be mediated by the action of teacher using new methodologies, which can spark interest in learning every day. (CALLEGARIO AND BORGES, 2010, p. 1)

When we talk about innovative methodologies, chemistry teaching becomes focused on formation of citizens and their role in society, with this teachers are challenged not only by changes in methodologies but rather by the search to meet the need for new resources and teaching materials capable of making teaching more attractive, "taking into account the new trends in teaching chemistry, which seek to emphasize social, economic, political and historical issues, high school teachers are faced with a shortage of teaching materials, especially for historical aspect of chemistry" (PIRES et al. 2010, p. 1).

SILVA, et al (2012) Based on the need and search for new resources and materials



didactics that promote education focused on citizenship, one possibility is the use of audiovisual resources, since the current moment in which contemporary society lives is characterized by the multiplicity of languages and by a strong influence of the media.

MANDARINO (2002) In this contemporary society where technology innovates every day the teacher needs to be a visionary, be aware of the emergence of new technologies, understand the languages of film, TV and video, and how these technologies can be used. In this way, It is desirable that the teacher be prepared to use audiovisual language with sensitivity and critical sense in order to develop, with their students, audiovisual literacy.

According to RESENDE (2008), despite collections of educational audiovisual materials, scientific dissemination or even commercial fiction films have been accumulated over too long for a century, these collections have not been used for purposes other than the best known as well as to illustrate, present or discuss scientific ideas and concepts. Within this same context, Resende argues that

“[...] old films and videos as a teaching resource for teaching the history of science, or as a historical source for the latter, it has not yet been explored sufficiently”. (RESENDE, 2008, p. 1-2)

According to some research, in the view of students, teaching the history of science and its nature, has been seen as a way of contextualizing content and discussing although other research reports that in general science teaching is still facing some challenges such as the reproduction of a traditional and limited teaching which does not intend to expand the field of study, leaving the teacher hostage within four walls, with tools such as; board, books and most of the time an excess of content, thus making teaching a system closed, without possibilities of new perspectives is like becoming a routine every day the same situation.

“With a view of science as something absolutely true and finished, students will have difficulty in accept the possibility of there being more than one alternative to solve a given problem.” (SANTOS and MORTIMER, 2000, p. 138). Therefore, the use of audiovisual resources as auxiliary pedagogical practices in teaching of chemistry, makes it possible to use not only words, but also images, making this connection occur between theory and practice. In this aspect, classes with the support of new tools become more attractive, as they move away a little of classes that, in the eyes of students, are routine and tiring. “The aesthetics of images can be attractive and also enable understanding more easily (MANDARINO, 2002, p.8).

The video brings a new perspective on understanding and faster access to content covered, fills in the gaps left by the presentation of the content presented in the table or explanation made by the teacher, as the video is a resource that works in a connected way with all the senses, thus enabling more productive and faster performance on the part of the student.

“Audiovisual language develops multiple perceptive attitudes, as it constantly requests the



imagination".(MORÁN, 1995, p.3).

Regarding the possibility of problematizing concepts and cognitive development of students through the use of audiovisual resources by educators.

Vasconcelos and Leão state the following:

The education professional who uses audiovisual resources in his methodological practice and of the students' daily lives, allows for the encouragement of problematization of concepts, satisfying students' curiosities and real or imagined needs. The change provides the creation of more attractive activities with greater involvement of students, whether in the production of materials for use in the classroom or in the presentation of situations experienced outside the school environment, enabling cognitive development, thus allowing new interests in them. (VASCONCELOS and LEÃO, 2010, p. 2)

Although video or television are some of the tools that facilitate the process of teaching and learning, they are not exclusive and are also subject to misuse. For this reason reason it is important to remember that videos, television, games, laboratory practices, and others, can be useless if they are not used correctly to achieve significant results with the application of new methodological practices, the presence of a creative teacher is essential, who has good sense, skill, experience and is able to perceive appropriate occasions for the use of the video and how to work according to the student's needs and reality.

Vasconcelos and Leão present some precautions and aspects to be considered when the teacher intends to use the video as a teaching resource:

And it should be kept in mind that the teacher who makes himself available to use the video as a resource The didactician must be careful when displaying them. The interaction that students can having the resource will depend on how the class will be developed after showing it, what impacts (positive or negative) will be created on students and the main objective, if they managed to learn the concepts worked there, or if at least there was a mobilizing them to work on these concepts in subsequent activities. Therefore, it is up to the teacher to know how to best use the visual resource to achieve the objectives, pre-defined by him, to be achieved by the students. (VASCONCELOS and LEÃO, 2010, p. 2)

According to (SILVA, et al 2012) It can be concluded that videos represent a good teaching resource to the teaching of concepts and history of chemistry, as long as the selection of videos and the language adopted are appropriate for the type of target audience to be served. In the case of videos, it is very important that the language is close to the student's reality. This encourages greater interest in learning a determined content by the student. We consider that, for these technological resources to be consciously incorporated into pedagogical practice.

Another methodology that is quite effective is contextualization. To talk about



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this theme is based on the work developed in a basic education school with the theme; Contextualization of Chemistry teaching in a military school. For the development of this work presented some contextualized practical activities of chemistry laboratory developed at the School and worked simultaneously with the theoretical subject already studied previously in the classroom. The activities covered involve the contents of two branches of Chemistry, Chemistry Organic Chemistry, Physical Chemistry are widely studied in high school, and the content covered in these activities are related to the student's daily life.

According to Frasson:

Contextualization is considered as a methodological strategy or an artifice facilitator, when applied correctly for juxtaposition and for better understanding of current facts or situations in students' daily lives and formal school knowledge. Due to its potential, the treatment of knowledge in a contextualized way shines mutual significant learning between the student and the object of knowledge, supplanting the conceptual scope. (FRASSON, 2010, p. 1)

Some simple activities are carried out by students and aim to enable they provide a practical overview of the application of some easy-to-apply techniques, materials and experiments whose results are significant enough to spark greater interest in the discipline.

When teaching is contextualized according to the individual's reality, teaching ceases to be properly theoretical and becomes pragmatic, thus causing effects on the student, because in addition to already having studied on the present subject which is being addressed during the activity it also can count on the help of the concrete object which he can see, touch, admire, reflect and imagine what is happening, that is, the student is full of questions to which they want answers. And when the human mind is loaded with unanswered questions, two attitudes can be taken; The first is to go in search of the answers or keep them hidden until you forget, but in this case, due to the fact of being teenagers and where curiosity often prevails, the individual goes after the answers. And when you look for something because you want to know more, it's because you're not satisfied with what you have. knowledge which he has and wants to obtain more and this search for knowledge is what the educator seeks to find in the student. But this can only happen if the classes manage to awaken interest and This will only be possible if the educator breaks out of the routine and makes his classes different and dynamic, only This way you will be able to touch the most intimate part of your students' minds.

Frasson states that:

That there is greater interest and motivation among students, interacting with the activities, moving from from mere spectators to active agents, developing their ability to observe, analyze, synthesize and act promptly and appropriately in different situations. The use of practical laboratory activities and the contextualization of chemistry teaching, in addition to motivating student participation are preponderant factors that contribute to a growing



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increase in grade point averages in the subject in recent years. The contextualization of teaching is an important tool to instigate interest in science and empowers students in development of critical logical reasoning. (FRASSON, 2010, p.7-8)

It is concluded that the author of this article obtained a significant result by applying contextualized laboratory practices, as he reports “It is not uncommon for students to remain in the laboratory after classes end to debate the concepts developed, sacrificing even the breaks between classes” (FRASSON 2010, p. 8)

## Conclusion

We can conclude that the difficulties in teaching chemistry are visible, but the process of teaching and learning is something that is innovated over time to overcome these difficulties that students face. By analyzing some articles, it was observed that sometimes, despite the limitations which the system faces, yet there are diverse and facilitating methodologies that enhances the teaching of chemistry, for this it requires a harmony of wanting to do and wanting knowledge between teacher and student. To develop innovative methodologies, the teacher must be prepared to develop, as it requires a lot of effort, experience and common sense.

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