



Relations of the 7th art with science: a study on audiovisual resources with chemistry

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1 INTRODUCTION

Cartoons, anime, TV series and movies, that is, audiovisual resources, are among the types of entertainment that many teenagers and adults like. In addition to this, some chemistry contents can be contextualized, making use of these resources, so that students can learn in a playful and meaningful way the language permeated by these means that are shown to be the facilitating object of knowledge. Chemistry is often seen as a monotonous matter, because to this day the same methodology is used as years ago. With this, it is necessary to create methodologies for learning to become more effective. Therefore, one can build knowledge through some means, such as audiovisual, which are little used and which are allied to the daily life of students. When the teacher uses films, with the aim of making a comparison with the subject he is teaching, he may be able to attract attention by making the class more interesting. Based on what was exposed, the present work intends to combine excerpts from films, series, drawings and anime, as a way to contextualize the fictitious chemistry, that is, the chemistry that is present in these media and that few individuals notice, with real chemistry.

Given the possibility of using audiovisual resources and the ease of access to find and enjoy such entertainment means, this research is based on the following question: How can the teacher arouse the interest of the Alun taking new teaching tools to the classroom of to enable the construction of students' knowledge?

For this, the qualitative-quantitative research was used, two questionnaires containing mixed questions were applied as a data collection instrument. Internet and video conferencing software, known as Discord, was used as a tool for remote classes, because due to the covid-19 pandemic, face-to-face classes were not happening during the research application period.



2 METHODOLOGY

The investigation was conducted online (due to the COVID-19 pandemic), using discord software. It had as target audience 29 students of the class of the 1st year of the Technical course in Chemistry of the Federal Institute of Amapá (IFAP), Macapá campus.

The use of the investigative methodology has been greatly explored in order to improve the learning process, as we are prepared to learn only about what we want and at this stage we inquire, seek and pursue our curiosities. The investigative methodology can be used as a guided process that leads the learner to situations capable of awakening the need and pleasure of the discovery of knowledge.

According to ZÔMPERO and LABURÚ (2011),

The nature of the research was investigative, the characteristics of this type of teaching meet the needs disclosed by a learning giving the student a more close view of the sciences to their reality (ZÔMPERO and LABURÚ, 2011).

A qualitative and quantitative research was carried out, which brings as a contribution to the work a mixture of rational and intuitive procedures capable of contributing to a better understanding of phenomena. For this, two questionnaires were used and structured as a data collection instrument.

According to Marconi and Lakatos (2018),

The qualitative and quantitative methodology presupposes an analysis and interpretation of deeper aspects of the complexity of human behavior, providing more detailed analyses on investigations, habits, attitudes and behavior trends (MARCONI; LAKATOS, 2008).

The research was carried out in four stages. The first was the creation of a WhatsApp group to guide students about the software that would be used, as well as to provide other information pertinent to the research. The second stage consisted of the application of a preliminary questionnaire consisting of closed questions (Appendix A), as a way to verify the students' perception of the cinematic universe with chemistry. In the third moment, an online class was given using audiovisual resources, and the chemistry present in excerpts of films, drawings and series that were previously selected was discussed. The fourth part was the application of the second questionnaire, containing open and closed questions, as a way to verify development during the online class.

The data collected were tabulated through descriptive textual analysis (ATD), which provides the described interpretation and subsequent communication with the categories of tangential and significant learning theories (MORAES and GALIAZZI, 2007). Meaningful learning is one in which symbolically expressed ideas interact in a substantive and not arbitrary way with what the learner already knows (AUSUBEL, 2003). In addition to tangential learning, considers that somehow the films and series promote interest in understanding certain content, it is not uncommon for films and series to make their viewers (curious about the references and sources described in it) start to search and voluntarily start reading books or watching documentaries on these topics (PORTNOW and FLOYD, 2008).

Meaningful versus tangential learning

Tangential learning aims to engage the user in a given context in a way that is rewarding and encourages them to seek external resources to those used for engagement, in order to expand their knowledge about the subject presented. In films, this form of learning occurs when the viewer comes across a subject that is interesting to him during the plot, and decides to consult external sources to research more about it (IACOVIDES et al., 2014). An example of this would be a person who is watching the Chernobyl series to feel interested in researching more about radioactivity or about the city of Chernobyl.

This learning method becomes valid because it does not use memorization or repetition of a specific subject, as the main action that the individual will perform, according to Mattos and Castanha (2008), the research should be the focus of the construction of the student's knowledge that aims at the formation of a critical, creative and innovative being.

For significative learning to occur, it is necessary to understand a process of modification of knowledge, rather than behavior in an external and observable sense, and recognize the importance that mental processes have in this development. Ausubel's (1982) ideas are also characterized by being based on a specific reflection on school learning and teaching, rather than trying only to generalize and transfer to school learning, concepts or explanatory principles extracted from other learning situations or contexts.

The more the new content is substantially and not arbitrarily related to some aspect of the previous cognitive structure that is relevant to it, the closer one is to meaningful learning. The less this type of relationship is established, the closer it is to mechanical or repetitive learning.

Therefore, both learning methods were valid, because the construction of knowledge took place in five stages: tangential learning, excerpt from the film, search for knowledge, reflection of the content to the object of study and significant learning (Figure 1).

Figure 1 - Tangential-Significant Learning Process



Source: Prepared by the author (2019).

Tangential learning Excerpt from the film Search for knowledge Reflection of the content to the object of study Meaningful learning

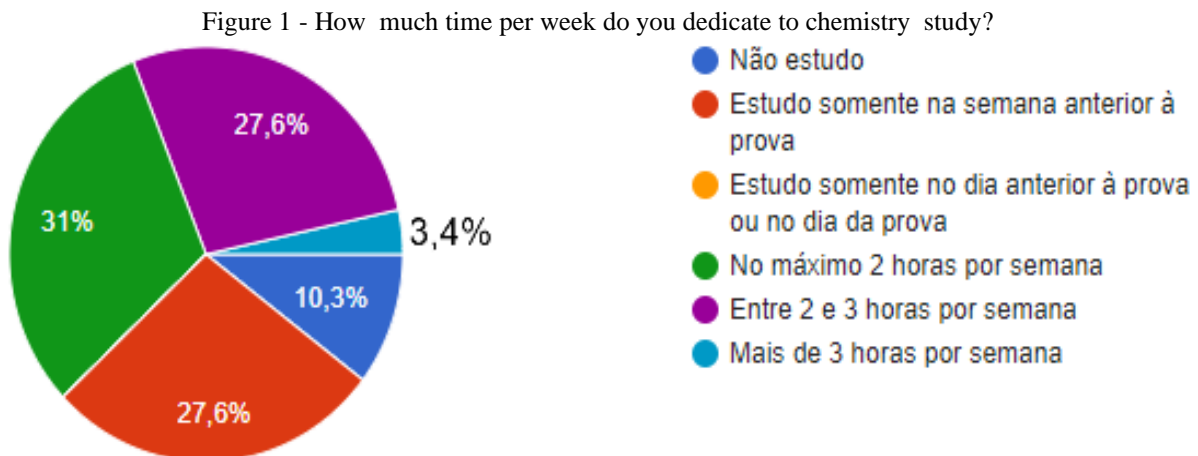
3 CONCLUSION

Of the 32 students of the Integrated Chemistry Technician course, 29 attended the remote class via Discord. The students were between 15 and 17 years old, 58.6% female and 41.4% male.

Diagnosis of questionnaire questions applied to remote class

A frequent issue in the speech of educators is that students generally do not have the habit of studying and do not use adequate strategies in performing school tasks. However, there is a multitude of reasons for this to occur, some related to the student himself, such as when he/she cannot solve problems proposed in the classroom, others related to the methodology used by the teacher who often does not know how he can offer proposals that seek to overcome students' difficulties, such as buying a text, completing a proposed homework assignment, or performing group work.

With this in mind, Graph 1 shows the results obtained when students were asked how much time they spent studying chemistry per week. It is necessary that, initially, the student learn to self-control their study, that is, plan and organize it in the most effective way, increasing their responsibility for their own learning. In a way the student who tends to study 2 hours or more per week, dedicating to only one discipline, tends to establish appropriate schedules and organize periods of study, so that it is possible that the student feels confident about his/her knowledge in the evaluations (LOPES DA SILVA; SA, 1993).



Source: Prepared by the author (2021)

Translation:

I don't study

Study only the week before the test

Study only the day before the test or on the day of the test

Maximum 2 hours per week

Between 2 to 3 hours a week

More than 3 hours a week

It was observed that 3.4% of the students claimed to study more than 3 hours per week, 27.6% between 2 and 3 hours per week and 31% study a maximum of 2 hours per week. It is perceived the need for planning for study schedules in order to establish the most appropriate periods for performing school activities, also involving leisure and recreation schedules. They claimed that they study only in



the week prior to the tests, which may imply that they are only "obliged" because they have to make an evaluation instrument at the end of the bimester. While 10.3% do not study at any time, this may be related to the lack of interest in the discipline.

Severino (2002) points out that the study outside the classroom has two moments: the first moment would be a form of preparation of the class in which the student would make previous contact with the subject that will be taught in the classroom, thus acquiring preliminary indications and elaborating questions that should be concluded with the help of the teacher, enhancing its content assimilation. The second moment is the review of the subject demonstrated in the classroom, as a way of apprehension of knowledge.

As mentioned earlier, it is important that the active study that begins at home, after due and necessary mental rest, occurs at the first moment, before the next day's classes, so that content retention is more effective. In the second moment, being more appropriate weekends and / or holidays, a second review, where the objective is the integration of knowledge earned from classes/ subjects treated during the week. And finally, and as important as the other reviews, the preparation for tests / evaluations, which should pay attention to the content in its entirety, in order to achieve the best possible use and reward all the effort spent, reflecting, consequently, in stimulus for the continuation of studies and, thus, giving rise to a virtuous cycle of studies outside the classroom.

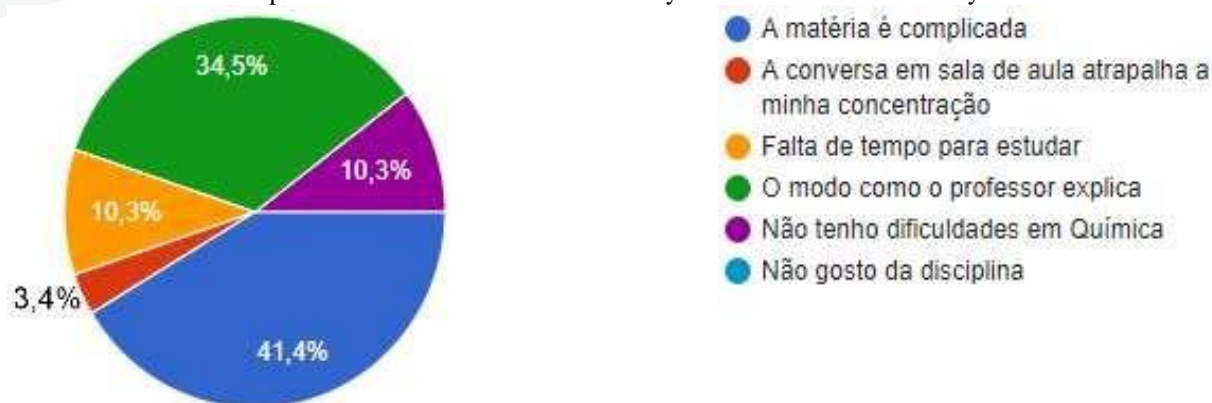
According to Morgan (1980), studying and keeping their studies up to hand requires the student to plan their time, establishing in advance a study plan for the day, week and even for the school year, something that involves an integral effort in the pursuit of learning. The few hours dedicated to the study of chemistry can be explained due to the number of subjects ranging from 12, for regular education, up to 16, for high school integrated to the technical course.

But using a good schedule, one can increase both the hours of study to chemistry, as well as for the other disciplines.

The main difficulty of students in teaching chemistry is due to knowledge, memorization of information and formulas, abstraction of concepts, understanding and interpretation of theoretical models that is a gradual construction intrinsic to each human being (PACHECO E SCOFANO, 2009). The importance in the study of chemistry lies in the critical analysis of the world, constructed knowledge, understanding for the resolution of current and relevant problems for society. In this way deconstructing the idea and that teachers and students do not understand the real reasons for teaching and learning chemistry. Based on this context, we asked what were the main reasons for the difficulties of the students in Chemistry, Graph 2 shows the results obtained.



Graph 2 - What are the main reasons for your difficulties in Chemistry ?



Source: Prepared by the author (2021)

Translation:

Matter is complicated

The conversation in class interferes with my concentration

lack time to study

How the teacher explains

I have no difficulty in Chemistry

don't like the discipline

Among the difficulties presented, 34.5% of the respondents pointed out the teacher's explanation, that is, the "bad teachers". This can be explained by the fact that in their training courses they may not have been adequately prepared for the education, may not know how to plan a class, show resistance to listening to students and/or unaware of the learning steps. In summary, they do not realize that students are different, have different forms of learning, and that the teacher must show flexibility to be able to reach the largest number of students in the teaching process. Another 10.3% of the respondents indicated a lack of time to depart in studies, which is a reality for many young people without the organization with schedules or routines studies. In addition, 3.4% cannot concentrate in the room because of parallel conversations that take place during the teacher's explanations. Combined with a lag in basic content, parallel conversations are recurring challenges for teachers. Still, 41.4% of the students claimed that the subject is complicated. Therefore, the challenge to improve the teaching of chemistry involves the improvement of the capacity of interpretation and contextualization of the subjects addressed, for the construction of the reflection and subsequent curricular performance.

According to Lindeman (2010), the observation of the daily school, of high school students of education, allows us to observe that they present numerous difficulties in learning chemistry, in addition to little affinity for discipline. Therefore, the act of teaching should consider such aspects, given the responsibility assigned.

Teaching science, in the chemical case, is not simply pouring knowledge about students and waiting for them to arbitrarily come to dominate the body (CANTO, 1993). It is up to the teacher to direct the learning, and it is largely because of it that the students come to know - or ignoring - chemistry.

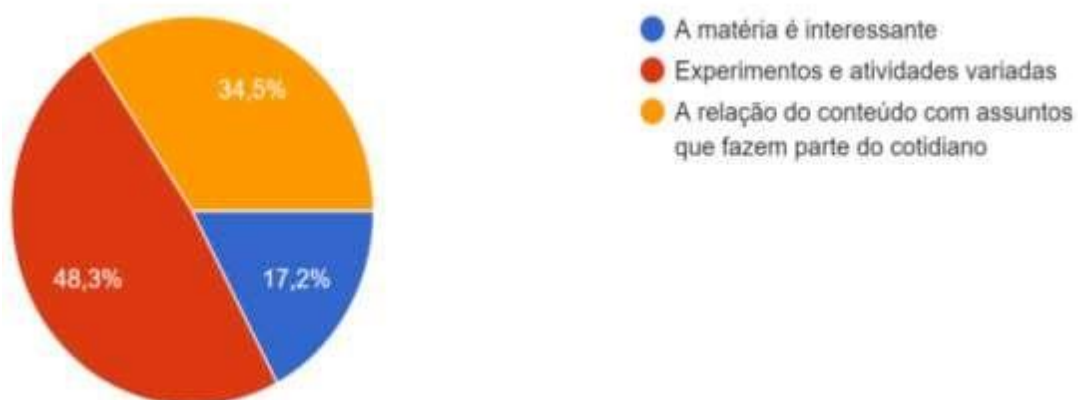


The search for new teaching methodologies can motivate learning and promote the interest of the student for what he supposes to be an unimportant discipline in his daily life, that is, dynamic classes, with exhibition practices and conducting experiments help to bring the chemistry seen in the classroom closer to the students' daily lives, enabling a greater understanding of the world and nature.

When asked about what drew attention in chemistry classes (Graph 3), most of the students (48.3%) said that experiments and varied activities were the one that attracted the most attention. Machado (2015) reports that students need to experience situations in which they are encouraged to create connections with the world, so that they can achieve learning. The students' sense of curiosity should be prioritized, and he asked them to question socially pre-established concepts. Thus, the need to develop research related to the use of experiments in teaching and learning processes to deepen and prove scientific theoretical constructions that can be explored in education, therefore, according to Wilmo (2008), experimental activities should generate reflections to identify important aspects related to the experiment developed, in order to make the occurrence of motivation and cognitive development more likely students.

34.5% of the students related the content to their daily lives. The most worked way by teachers to relate the contents to daily life is through examples, because as they explain the subject, they seek to seek in daily life something with which it is related to mention in the classroom, because they believe it is a way to facilitate the understanding of the student. 7.2% claim that the matter is interesting, because the students already have affinity with the discipline, and have a certain frequency of studies with chemistry.

Graph 3 - What draws your attention in chemistry classes?



Source: Prepared by the author (2021)

Translation: The subject is interesting

Experience and different activities

The relationship with content with subjects that are part of everyday life

Experimentation played an important role in the development of a proposal for scientific methodology, based on rationalization, induction and deduction, starting in the 17th century, breaking with the idea that man and nature had a relationship with the divine (GALIAZZI et al., 2001).

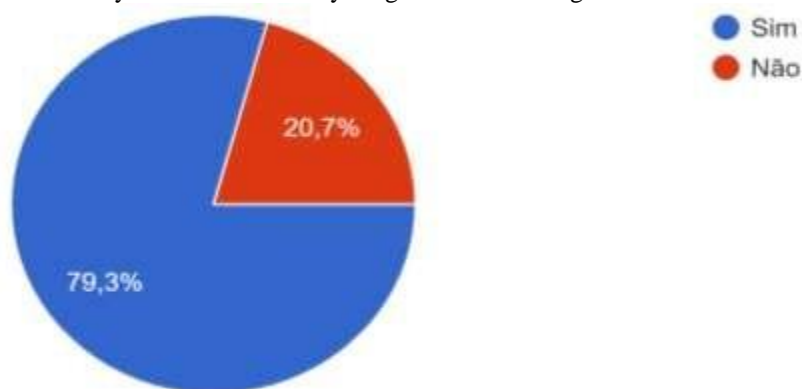


The experimental activities were inserted in schools, due to the strong influence of works developed in universities whose objective was to improve the learning of scientific knowledge application of what has been learned (GALIAZZI et al., 2001). The investment in research in Chemistry Teaching also brought results that show the importance of experimentation for the teaching-learning process of Chemistry and Sciences (GIORDAN, 1999).

Due to the stereotype created, naturally students say they have difficulty learning chemistry, since discipline is seen as a "seven-headed monster" as a way to changing this type of thinking, it is necessary to use the most varied instruments and theories focused on education as a way to solve this problem. One of the instruments adopted may be the use of audiovisual resources, it is worth noting that they have a very important function within the classroom, as they help the teacher and promote a greater interest on the part of students (FIALHO, 2013). Thinking about it, it was asked if the students learned something in school through an audiovisual resource (Graph 4). It can be observed that the vast majority of respondents said yes (79.3%), while some answered no (20.7%).

The new technologies applied to teaching, including audiovisual resources and sophisticated tools that are still under development such as robotics and virtual reality, allow greater flexibility, creativity, dynamism, interaction and communication in the teaching-learning process, stimulating the active participation of the student in a constructivist perspective (PERES; KURCGANT, 2004).

Graph 4 - Have you ever learned anything at school through an audiovisual resource?



Source: Prepared by the author (2021)

Translation:
Yes
No

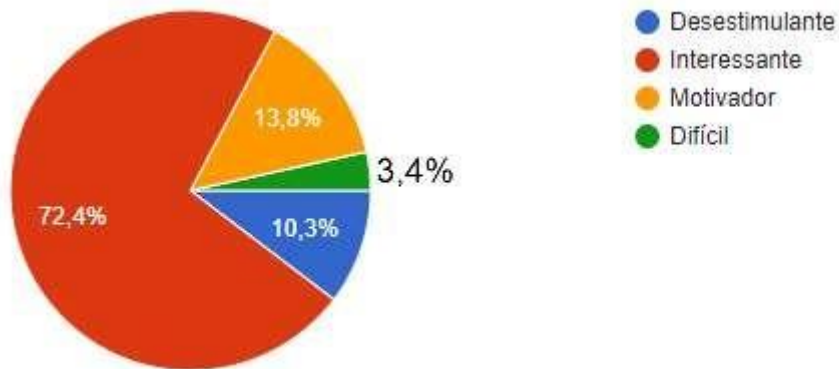
According to teaching Perrenoud (2000), the mastery of new technologies should be one of the competencies that the contemporary teacher must possess. Therefore, the use of these technological resources covers from the simplest to the most sophisticated, with a view to the development of learning.

However, given the popularization of mobile devices and other digital technologies, using technological tools during teaching approaches is increasingly gaining ground with the aim of having a more dynamic class, with the intention of awakening the attention of students in relation to the content being taught.

According to Kenski (1996), the audiovisual and technological resources available must be planned with great discretion, they have to be appropriate to the content addressed in so that they have results in the student's learning.

Graph 5 shows the results obtained when students were asked about the use of audiovisual resources aimed at teaching.

Graph 5 - For you teaching using the audiovisual resource was :



Source: Prepared by the author (2021)

Translation:
discouraging
Interesting
motivator
Difficult

It was observed that 72.4% of the respondents considered the use of visual audio to be interesting, 13.8% felt motivated about the use. These responses can serve as a stimulus for the teacher to use the resource again. It is worth mentioning that for a successful class it is necessary to associate the appropriate didactic resource with the relevant form and content.

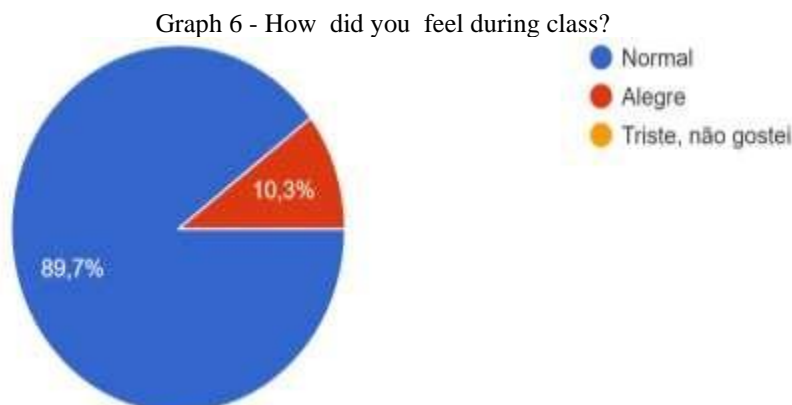
Continuing the observations, 10.3% claimed to be dissimulating because there is difficulty in engaging students in the new formats and dynamics of remote classes. For the 3.4% who consider it difficult, the technical difficulty to deal with digital technologies, especially the processes of production and manipulation of images and sounds.

In addition gens and texts, one can also work with videos and sounds as resources in the learning process. The videos add a certain realism to this process and allow demonstrations that still images can never replace. They offer thus, a learned more significant for the student.

For Tavares (2008), when using this type of multiple (audiovisual) representation, all the nuances of a given information will be transmitted through the two channels, which enhances the transmission capacity on the one hand and facilitates the possibility of retrieving information on the other, i.e. at the time the learner receives a certain information through various nuances, the construction of his knowledge will be much more effective than if it were received only through a single form of transmission

Graph 6 shows the results obtained when students were asked about how they felt during class. And 89.7% declared a sense of normality, that is, there was no change in feeling when observed at

presentation. While 10.3% felt cheerful with the presentation shown, showing interest in relation to the subject observed.



Source: Prepared by the author (2021)

Translation:
Normal
Happy
Sad, I don't liked

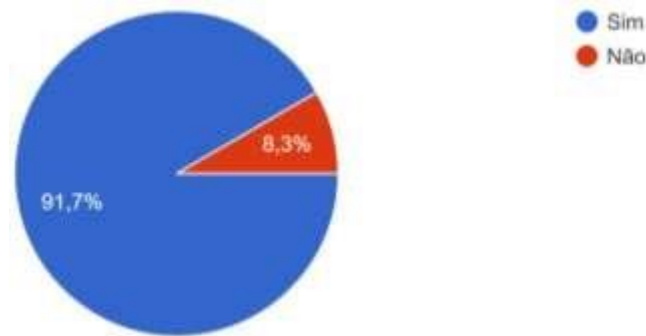
Audiovisual media being used in the educational context is not an imposition, but a methodology that can complement teaching. Several would be the reasons that point to the meaning of the use of these means, among them we can mention the fact of arousing curiosity and maintaining the interest of students. According to the teaching Perrenoud (2000), the mastery of new technologies should be one of the competencies that the contemporary teacher must possess. The use of technological resources can be from the simplest, such as slides, to the most sophisticated, such as interactive videos or virtual experiments, aiming at the development of new learning.

The audiovisual and technological resources used must be selected with discretion and must meet the content that will be addressed in so that they have results in the student's learning.

Diagnosis of questionnaire questions applied after remote class

Graph 7 shows the result obtained when asking students if they associated chemistry with the cinematic universe, in which 91.7% of the students answered yes, while 8.3% said no. Many students had already watched the films used in class, because they are part of a universe that interests them, which is in line with many works reported in the literature. According to Oliveira (2013), the scenes from the film Spider-Man 2, for example, which involved the nuclear fusion of tritium and battles between the protagonist (Spider-Man) and antagonist (Dr. Octopus), when worked in the digital room managed to arrest the students' attention, causing them to participate with a much greater motivation of later discussions.

Figure 7 - Have you ever associated chemistry with the cinematic universe?



Source: Prepared by the author (2021)

Translation:

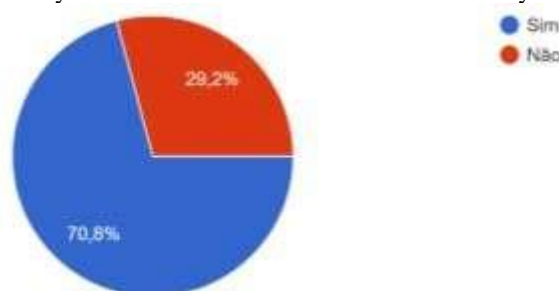
Yes

No

Since the invention of the cinematographer by brothers Louis and Auguste Lumière in 1895, the 7th art has adopted an educational bias that cannot be ignored since then, the film industry has made room for discussions of the kind of deciphering images and sounds contained in films for the sake of the field educational. According to Fernandes (1998), most students see the chemistry presented in the classroom as a discipline full of names, cycles and tables to be decorated. The author argues that there cannot be a universal formula, so is each teaching situation is unique. In this sense, he states that it is necessary to seek solutions, reflect on the subject and exchange experiences.

Among the teaching resources available to the teacher, cinema acts as an assistant in the process, that is, the audience that gathers in a cinema room equates, for educators, students who gather in the classroom. In this work, films and services were the audiovisual resources prominent objects to be used in the teaching and learning process, through this students were asked if they used audiovisual resources to study (Graph 8) and, if the answer was affirmed, they could mention which one(is), as can be observed in the Graph 9, which shows the responses obtained categorized by classes 1 to 3.

Graph 8 - Have you ever used audiovisual resources to study? If so, which one?



Source: Prepared by the author (2021)

Translation:

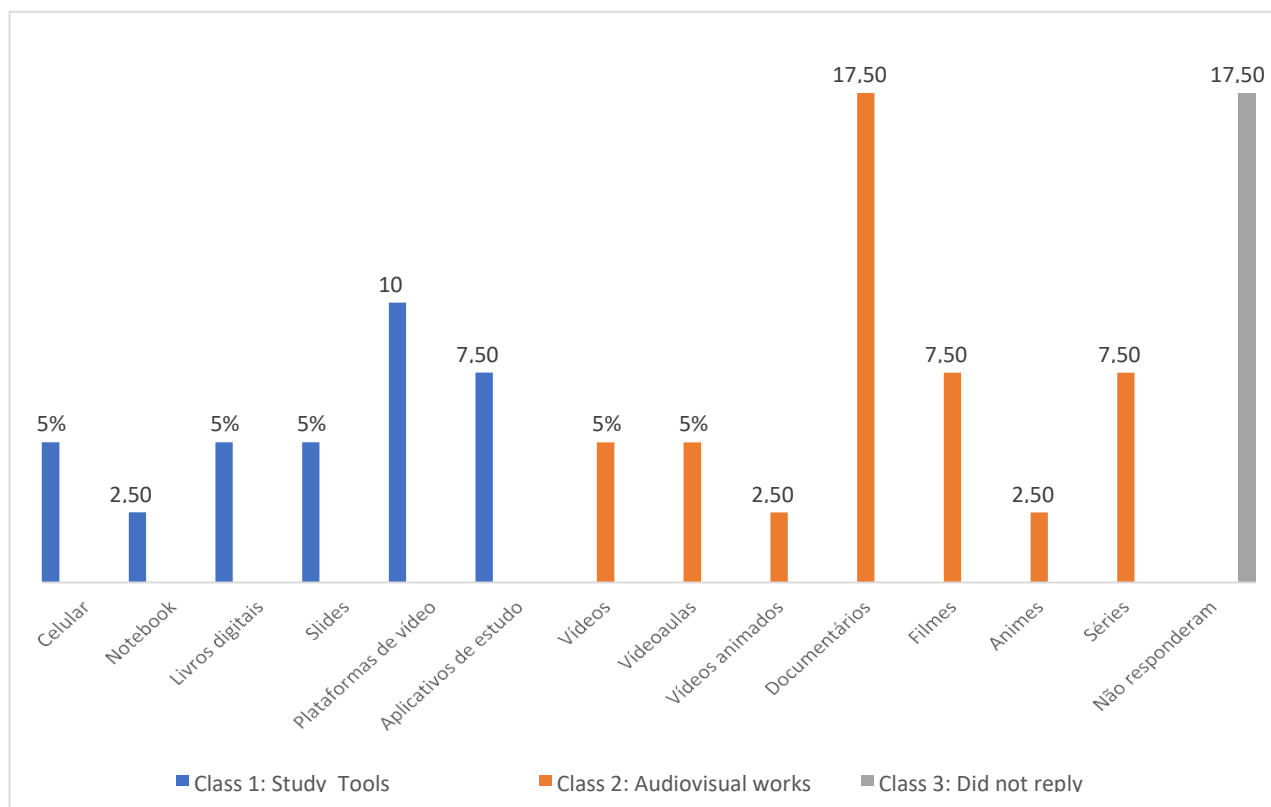
Yes

No



It was observed that most students (70.8%) used some kind of audiovisual resource to study, it is counted as an audiovisual resource any digital objects or tools for learning, such as the mobile phone used to research the subject of interest. While 20.2% denied the use of audiovisual resources for the study, only in the middle of "analog" paper, pen and book for the learning of the content taught in the classroom.

Graph 9 - Analysis qualitative analysis of the Justifications Of question 2.



Source: Prepared by the author (2021)

Class 1 represents students who use technological resources as a means of study in their day-to-day life. In addition to access to information, these resources can be a means for research, because they create environments for the construction of knowledge and if they are in, which helps in the development of critical reading. Thus, digital information and communication tools have also been incorporated into the school routine and the teaching and learning process, as Santaella (2010) points out, the digital revolution is resulting in transformations by all levels and facets of human existence, especially for educational processes.

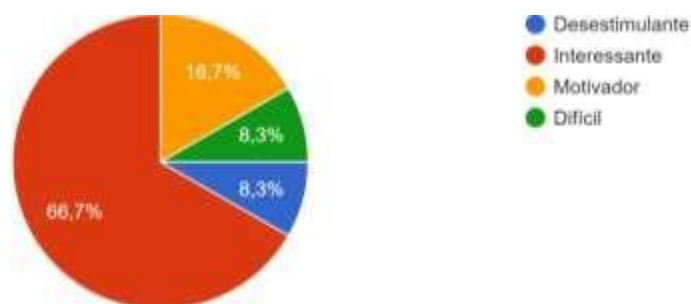
Class 2 represents students who have given answers related to the resources they access, which demonstrates the interest in using audiovisual works as part of their studies. Audiovisual resources encourage students to develop intellectual and cooperation skills, where they show interest in learning and seek more information on a given subject. Regarding the contributions of these devices to teachers, we highlight the rapid obtaining of information about instructional resources, greater interaction with students and ease in detecting specific strengths and difficulties of them. This continuous research process can facilitate the development of knowledge (COSCARELLI, 1998).



Class 3 belongs to the group of students who did not know how to respond leaving the answer blank, and may be justified by going unnoticed by the student.

Graph 10 expresses the results obtained regarding the methodology using visual hearing resources. It can be observed that 66.7% of the students judged the methodology used as interesting, 16.7% considered it motivating, 8.3% of the students claimed to have been discouraged, as well as 8.3% others judged that teaching with audio-visual resources was difficult to understand.

Graph 10 - How was teaching using the audiovisual resource



Source: Prepared by the author (2021)

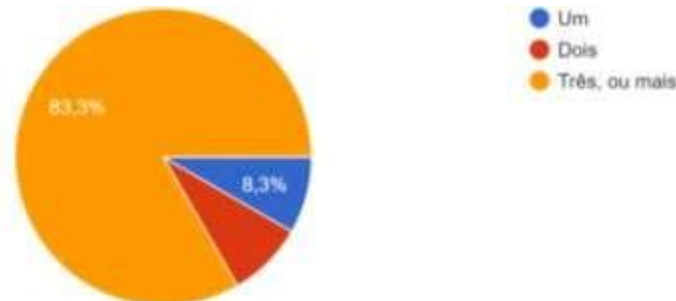
Translation:
discouraging
Interesting
motivator
Difficult

The good results of the use of these tools depend on the use made of them, how and for what purpose they are being used, and it is up to the teacher to plan their application in the classroom (COSCARELLI, 1998). The use of audiovisual resources facilitates the teaching-learning process in education, providing greater retention of knowledge, as people absorb information preferably by sight. The ability to retain the content is an important factor to be considered, both in the preparation and during the theoretical class, being influenced by several factors, such as the way in which we acquire the information, the amount of information transmitted, the duration of the exposure and the interventions that this process should undergo (PAZIN FILHO; SCARPELINI, 2007).

When considering the characteristics we can mention factors such as internet, time management and concentration, Hodges et al (2020) explain that remote educational work is a work that requires patience and creativity, because, despite being applied at a distance, it should recommend the real-time transmission of classes, promoting constant contact between educator and student. Remote education refers to space distance and what is currently being done is a emergency remote education, which should be considered a temporary solution to an immediate problem. In this context, parents had to learn to teach and accompany their children, both in terms of pedagogical and technology, in addition to adapting to recorded classes, video conferences, in short, to remote classes with synchronous and asynchronous activities, in which the student receives the material and at any given time of the day accesses the class online.

When asked how many audiovisual resources science were perceived in any way, 83.3% of students perceived the science present in three or more media, 8.4% were able to visualize science in up to two resources, while 8.3% see only a resource for scientific perception (Graph 11).

Figure 11 - How many of the audiovisual resources have you noticed science?



Source: Prepared by the author (2021)

Translation:

One

Two

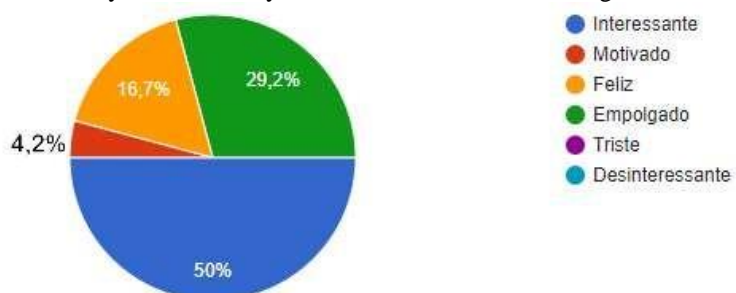
Three or more

The results presented are based on Portnow and Floyd (2008) who propose the idea of tangential learning, in which they consider that somehow the film environment promotes interest in understanding certain content. Breuer and Bente (2010) cite that the tangential learning strategy is also a promising concept to promote more self-directed and proactive learning. The film has its potential, not necessarily to educate, but can create new opportunities to teach contributing to a better teaching and learning process. In some cases, students consider that classes were not attractive, so they did not get involved with them and, consequently, did not learn the subjects correctly, for example this, the tangential learning is important for the teaching and learning process.

Graph 12 presents the results obtained in relation to how students felt when perceiving the scientific knowledge present in the cinematographic universe. 50% felt interested when perceiving science in films and series, it was found that 4.2% of the students felt motivated. In these cases, motivation and interest end up making students participate more actively in the class, share much more their experiences and doubts and, consequently, these actions promote an improvement in learning. through happiness, 29.2% felt excited to see the content in a playful way. Both situations demonstrate aspects of tangential learning, which although not objective of the film, motivates the student's interest for research on a given subject (PORTNOW; FLOYD, 2008; BREUER; BENT, 2010).



Graph 12 - How did you feel when you realized scientific knowledge in the cinematic universe?



Source: Prepared by the author (2021)

Translation:

Interesting

Motivated

Happy

Excited

Sad

Uninteresting

The results of Graph 12 were obtained through the WhatsApp group, which was used to organize the online class, where after the end of the application deadline of the second questionnaire were asked informally about: What did they think of the lesson theme? Have you been able to understand the relationships? What did you think of class? Through the students' answers, present in Chart 1, it can be seen that the objective of the research was met.

Table 1 - Students' answers on the question

Student A	I found it a fun and different class. very cool for those who want a way different to learn.
Student B	It might be better if it was face-to-face, but it was still fun and I Liked.
Student C	It was fun, I didn't even get sleepy and i was able to attend class.
Student D	The class was very cool and fun , but the quality of the internet was a bit unpleasant and hindered my understanding in a few moments .

Source: Prepared by the author (2021)

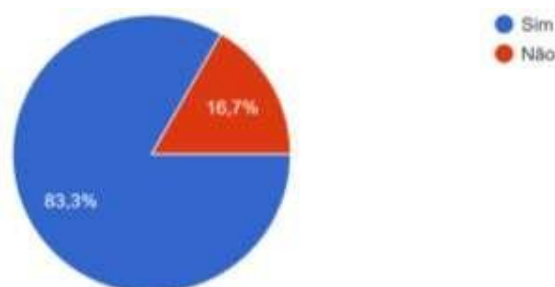
In general, for Ausubel (1982), significant learning needs two phenomena: the student needs to be willing to learn, because if the student only memorizes arbitrarily, the learning will be mechanical. In addition, the content must be potentially meaningful, that is, each student filters the content that makes sense or not to him. In view of this, Portnow and Floyd (2008) reinforce the idea that the audiovisual work has an incentive to seek knowledge.

Graph 13 shows that 83.3% of students claim to have related science and film and then go researching about. This is consistent with Ausubel's (1982) thoughts on meaningful learning, Portnow and Floyd (2008) about tangential learning. However, 16.7% of the students deny having any mental clarity or idea about what audiovisual works see only for the purpose of entertainment.

It is worth mentioning that this thought is not wrong, because the intention of cinema is essentially to entertain, and not permeate knowledge. According to Kant (2002, p. 20), "education is the biggest and

most arduous problem that can be proposed to men." Therefore, the educational model needs to choose the search for the promotion of learning based on self-knowledge, so the student will spontaneously research the content and thus relate to the film or series.

Graph 13 - Have you captured any insight, about the film or series and went to seek knowledge?



Source: Prepared by the author (2021)

Translation:
Yes
No

Table 2 presents the answers obtained, organized and categorized by student (AX), when the discussion about how the student felt when learning a scientific fact was raised found in cinematographic works. The question was discursive in order to obtain the position of the student himself, thus being qualitative.

Table 2 - Students explain how they feel when they learn that a scientific fact is present in films, series, drawings, among other means .

STUDENTS	ANSWERS
A1	I feel impressed and inspired
A2	i find it curious to realize that even in productions of the seventh art there are references of subjects of chemistry, physics and etc.
A3	interested because it is easier to memorize the information in some way and learn easier
A4	I don't know, it's equally interesting even though it doesn't present in a more Explanatory.
A5	These are mainly things I've always been curious about to find out, but I've never had the "initiative" to research this data. And it's gratifying to have them being finally answered
A6	I am happy and motivated to know that through these resources, which are often entertainment , I can acquire knowledge. In addition to being a very Fun.
A7	I'm happy, because these drawings/films usually attract an audience of various ages. if the contents involving science are well worked in movies/drawings, many people will seek knowledge, thanks to curiosity that such content Generated.
A8	It's interesting when I see science in audiovisual resources and entertainment, because you can see it in a more playful and less complex way.
A9	I feel that my interest in this subject becomes greater
A10	I feel very happy and motivated to learn more and more about the subject
A11	Besides being easier to understand I also feel more excited to search more upon.
A12	I feel very motivated, since I can acquire new scientific knowledge and that will be useful to me through something that I like very much and i feel pleasure in watching.
A13	I'm glad I learned some information in an easy and fun way.



It is important to highlight the response presented by student A5, who stated that he did not have the initiative to go research on the facts, and finally have found the answer in something that he assisted, reinforcing the idea of tangential learning (where the participant observes knowledge being applied in something of his daily life, in this case, films and series).

Three students (A7, A11, A17) gave similar answers related to the search for knowledge, it is important to highlight their view, because in each answer we noticed the sensitization they had regarding the valorization of chemistry with their daily lives and still showing the social relevance of the discipline. Five participants (A2, A9, A13, A19, A21) considered cinematographic works as motivating tools in the teaching and learning process, highlighting that the objective of films or recreational activities consists of inducing students to think, reflect and build their knowledge. As described by Coelho and Viana (p. 53, 2011), "the use of movies in the classroom can make classes dynamic and school life becomes less tiring for teachers and students". Therefore, understanding that the film does not need to be rigorously coherent and that it does not need to express the scientific reality, but that it can be a great resource, is one of the fundamental assumptions to the teacher in the use of this teaching resources.

The A23 student showed indifference when perceiving scientific facts in films, thus showing that this approach is not 100% effective.

Finally, it is worth mentioning that using movie scenes to start discussions in the classroom and class is a favorable didactic resource for the teaching and learning process. In addition, discuss how much films can contribute in relation to scientific knowledge in citizen education and how much knowledge acquired at school can contribute to your day-to-day life, is currently considered of extreme importance. The fact that students are able to discern what is true and what is fictitious in the films favors the formation of a critical, autonomous, participatory and transformed citizen.

The results obtained in this work prove that the use of 7th art in chemistry classes was able to promote gains in the teaching and learning process. It was also possible to make a comparison of real chemistry with fictitious chemistry, relating the of tangential and significant learning. The observations made during the classes showed that most students had difficulty relating films with approaches to chemical knowledge. Therefore, it is perceived that students do not usually perform such relationships consciously and, therefore, need the guidance of a teacher. In view of this, planning a class with films, series, etc., also requires that the teacher be able to relate these materials with the knowledge to be passed on, since the films alone will not achieve the success necessary for learning to occur. For this, this professional needs to update himself on new teaching methods and the knowledge addressed.

Thus, the role of the 7th art and interdisciplinary and significant activities in the process of teaching and learning chemistry can be effective. Moreover, this method has the potential to relate science with art and social issues, from the memory generated by films.

It is expected that the work can serve as inspiration for other authors, considering that it is an unusual theme, especially when the use of films and series is portrayed in the project, something that is very



common in the lives of all of us. This work was important for a relationship between theory and practice in the classroom and a subsequent critical analysis of the approaches performed. It was possible to notice that this work stimulated the students' interesse and facilitated the learning of concepts, and can then be characterized as a useful tool in chemistry classes



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