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CONTEXTUALIZATION OF CHEMISTRY TEACHING IN ELEMENTARY II AND HIGH SCHOOL, ADDRESSING THE THEME OF SANITANTS USED IN THE COVID-19 PANDEMIC

Contextualização do Ensino de Química no Ensino Fundamental II e Médio abordando o tema dos Saneantes Utilizados na Pandemia COVID-19

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ABSTRACT

In 2020, the coronavirus pandemic (Sars-Cov-2) started in Brazil, in view of this, society needed to adapt to a new reality to protect itself, using masks, social isolation, proper hand washing and disinfection of environments with use if sanitizing. Given the need and the challenges associated with the theme, the project aims, based on pedagogical practices, to contextualize the teaching of chemistry for students in the 9th grade of elementary school and 1st year of high school. The objective is, through the reception of these students, the use of interactive practices and methodologies that promote the contextualization of chemistry concepts, mainly in topics associated with the rational use of sanitizing products, relevant to the current scenario of Covid-19. It was observed that after applying contextualized methodologies with the help of technology, because the process took place online because there are no classroom classes, they are able to enrich learning by increasing the motivation to learn. It is proposed to help the student to relate the scientific knowledge, addressed by the discipline combined with the project, with their daily lives so that they can develop

ISSN 1983-4209

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revista.uepb.edu.br/index.php/biofarm

critical thinking, enabling them to have their own conclusions and to be able to discern information present in the media. This work highlights favorable results in the field of education, highlighting the impact of contextualization and academic institutions in helping the population's daily lives, especially when relating measures that have an impact on the health and training of these individuals.

Keywords: Remote teaching; Virtual learning objects; Extension; Coronavirus.

RESUMO

No ano de 2020 deu início a pandemia do coronavírus (Sars-Cov-2) no Brasil, em vista disso a sociedade precisou se adequar a uma nova realidade para se proteger, fazendo uso de máscaras, isolamento social, lavagem adequada das mãos e desinfecção de ambientes com uso se saneantes. Visto a necessidade e os desafios impostos associados ao tema, o projeto tem por finalidade, com base nas práticas pedagógicas, contextualizar o ensino da química para alunos do 9º ano do ensino fundamental e 1º ano do ensino médio. Objetiva-se através do acolhimento destes alunos, o emprego de práticas interativas e metodologias que promovam a contextualização dos conceitos da química, principalmente nos tópicos associados ao uso racional dos produtos saneantes, pertinentes ao cenário atual da Covid-19. Observou-se que após a aplicação de metodologias contextualizadas com auxílio da tecnologia, porque o processo ocorreu de forma online por motivo de não estarem ocorrendo aulas presenciais, são capazes de enriquecer o aprendizado aumentando a motivação para aprender. Propõe-se auxiliar para que o aluno possa relacionar o conhecimento científico, abordado pela disciplina aliado ao projeto, com seu cotidiano para que assim desenvolva um raciocínio crítico, possibilitando que o mesmo tenha suas próprias conclusões e que possa discernir informações presentes na mídia. O presente trabalho destaca resultados favoráveis no âmbito da educação, destacando o impacto da contextualização e das instituições acadêmicas no auxílio do cotidiano

ISSN 1983-4209

Journal of Biology & Pharmacy and Agricultural Management, v. 17, n. 4, out/dez 2021

revista.uepb.edu.br/index.php/biofarm

da população, principalmente ao relacionar medidas que têm impacto na saúde e na formação destes indivíduos.

Palavras-chave: Ensino remoto; Objetos virtuais de aprendizagem; Extensão; Coronavírus.

INTRODUCTION

The Sars-CoV-2 virus, of the coronavirus family, manifests especially characteristic respiratory symptoms and has a high rate of transmissibility in a short period of time. It can be transmitted through the air or by contact with contaminated secretions, through aerosols, droplets of saliva, sneezing, coughing, close contact with contaminated people or contact with contaminated objects or surfaces, followed by contact with the mouth, nose or eyes. This syndrome can range from an asymptomatic or simple cold to severe acute respiratory syndrome, being capable of showing as yet unproven sequelae. It has high mortality rates, being estimated by the WHO (2021) about 4.5 million deaths in the world and 581,000 deaths in Brazil alone.

In order to reduce its transmission of the virus, measures to prevent and reduce transmission were proposed, such as frequent hand washing for at least twenty seconds with soap and water, use of alcohol-based antiseptic, use of masks, avoiding touching the mucous membranes of eyes, nose or mouth, when necessary, cough or sneeze, use the inside of the elbow to cover the face, social isolation, avoid sharing personal objects and regular cleaning of environments and materials using sanitizers (BERRIÓS *et al*., 2020) . In view of this, the National Health Surveillance Agency in Brazil, ANVISA, (2020) provided a technical note presenting sanitizing products that can be used in the disinfection of surfaces, objects and environments during the COVID-19 pandemic.

Cleaning and disinfecting environments are important parameters to combat the coronavirus, as the virus can remain viable for a few hours to three days on certain surfaces, according to recent studies. Therefore, the correct use of sanitizers is essential to avoid contamination by the virus, since a person, after having contact with

ISSN 1983-4209

Journal of Biology & Pharmacy and Agricultural Management, v. 17, n. 4, out/dez 2021

revista.uepb.edu.br/index.php/biofarm

an infected surface, takes their hands to the eye or nose, they are already susceptible to contact with the airways (FATHIZADEH *et al*., 2020) and thus the person becomes infected with SARS-COV-2. For an efficient elimination of the coronavirus, it is important to carry out cleaning in stages and then disinfection. Cleaning removes dirt, impurities and microorganisms, reduces the number and risk of virus dissemination, but does not eliminate it, to eliminate SARS-COV-2 it is necessary that the disinfection of the environments occur, because through chemical components it eliminates the virus (LIMA, *et al*. 2020).

Amidst a scenario of wide scientific dissemination and at the same time a mass propagation of fake news, due to the increasingly unmoderated use of the internet and social networks, the search for information about the virus becomes uncontrolled and added to the lack of knowledge and despair of the public disclosure of untruths can put someone's life at risk. Society's anxiety to protect itself has increased the irrational use of sanitizers in this pandemic, so it is of great importance that awareness actions are introduced in the school environment, so that students can identify the risks associated with the use of sanitizing products.

In view of the measures of social isolation, doubts arose about the continuity of the academic period in educational institutions, ways were developed to continue the studies so that social isolation would remain, since it is an essential measure to reduce the spread of the virus. Therefore, with the use of technology, several public/private educational institutions have adopted the remote education system, whether distance education or non-face-to-face pedagogical activities to follow up the classes in a way to adapt classroom teaching to digital platforms, given the diversities of ways of distance learning.

The extension project is coordinated by the Federal Institute of Rio de Janeiro, Campus Realengo, and the members are bachelor's degree students in pharmacy. The school selected for the project is part of the metropolitan region of the state of Rio de Janeiro. The selected institution is one of the Integrated Public Education Centers, recognized by the acronym CIEP in the state, a project implemented in 1980 with the

ISSN 1983-4209

Journal of Biology & Pharmacy and Agricultural Management, v. 17, n. 4, out/dez 2021

revista.uepb.edu.br/index.php/biofarm

aim of offering quality public education full-time for students in the state network, recognized as one of the most relevant policies in the field education in Rio de Janeiro (SILVA, 2018).

This project is shown as a teaching proposal for digital media, bringing in a contextualized way not only the teaching of chemistry but also measures to protect against COVID-19. Through the digital medium propose educational measures during isolation. One of the project's principles and objectives is to propose everyday situations for these students in order to arouse interest within the discipline of chemistry, making connections with other disciplines such as biology, in addition to the mandatory teaching that sometimes can become the teaching of chemistry in schools, making learning boring without the possibility of taking the teaching into their daily lives.

When researching the curriculum of chemistry teaching in elementary and secondary education institutions, certain contents are found with applicability of the contextualization of chemistry through the sanitizing theme, also instructing biosafety practices, guidance on the safety and handling of these products , both for human health and for environmental preservation, to guide the difference between sanitizers and antiseptic products, as some sanitizers are harmful to health if not stored and handled correctly, so basic awareness about sanitizers is also significant for student learning.

MATERIAL AND METHODS

As a measure against the pandemic context, materials were prepared and planned for the digital platforms, aiming to maintain the parameters and dynamics in a similar way within the presence possibility. Aimed at implementation through synchronous meetings through communication networks, a thematic presentation on sanitizers was made, seeking to associate the main contents related to chemistry in elementary and high school with other disciplines and especially with the pandemic context.

Journal of Biology & Pharmacy and Agricultural Management

ISSN 1983-4209

Journal of Biology & Pharmacy and Agricultural Management, v. 17, n. 4, out/dez 2021

revista.uepb.edu.br/index.php/biofarm

Among the themes worked on for the contextualization of chemistry, the discussion on sanitizers and their importance in the disinfection of environments can be worked on the concepts of dilution, nomenclature of compounds, measurement units, concepts about solutions and biosafety. Many students claimed that it is difficult to associate these contents to their daily lives, however they saw their importance and influences in the face of the pandemic, demonstrating that the methodology and implications of the contents in the daily lives of these students were related to the understanding and attention to the themes studied.

In addition, when we relate the contents of chemistry in association with other subjects included in the curriculum, students end up associating education and the impacts of the contents on their daily lives, being able to understand that the application of the concepts leads to the contents of larger studies, being presented to them the direct effects on the health system, on management, on the economy and among other broader areas of knowledge.

As for the formatting of the presentation, analogies and schemes were used to simplify the contents covered, not being the application of the contents of the theoretical subjects, but the demonstration in an accessible way to students in order to guide the practice and achieve the desired reflections. In addition to the contextualized concepts, educational measures based on the pandemic were presented, highlighting prevention and distance measures, in addition to the importance of using masks and cleaning actions. It is noteworthy that the methodology of educational measures was still related to the daily contents of students, such as the dispersion of droplets and aerosols and their physical-chemical aspects as a differential factor for virus transmission, for example.

Finally, external and contextualized references were used from videos on recurrent poisoning from the use of sanitizers, presenting all the materials studied in order to suit the target audience in order to work didactics together with aspects of inclusion and accessibility, thinking about plurality project participants. All references

ISSN 1983-4209

Journal of Biology & Pharmacy and Agricultural Management, v. 17, n. 4, out/dez 2021

revista.uepb.edu.br/index.php/biofarm

and materials for the presentation were also thought of in the model of folders that were delivered to students in order to promote access to the themes carried out.

As a way to assess the learning and performance of the project, forms were created in order to understand the students' knowledge on the subject of sanitizing products before and after the presentations. In view of this, two questionnaires were carried out, the first being previously applied with more generalized questions on the subject, in order to test the students' knowledge in terms of common sense. The second form, on the other hand, is based on topics covered in a relevant way about aspects of the theme, presenting a deepening of the theme, in order to assess the understanding and reasoning in these axes.

Seeking to understand whether the development of materials and methodology were carried out satisfactorily to the students, an evaluation form was also built on the project's performance, being a space open to criticism and problems that students may have encountered during the methodology, in addition, reinforce the relevance and follow-up of the project in the social construction of these students.

RESULTS AND DISCUSSION

The results were obtained through synchronous meetings in online teaching platforms and application of questionnaires to know the students' prior knowledge and after the meetings. The meetings took place during the second half of 2021 and were attended by two classes from the CIEP, one class with 19 students from the 9th grade of elementary school II and another with 24 students from the 1st year of high school. The results reported in the work will be of comparative effect.

Initially, questionnaires were applied to teachers to find out about the interest of the classes in relation to the project and what the methodology would be. Subsequently, synchronous meetings were scheduled with the students, so that the numbers used in this research are related to participation in the first synchronous meeting, meaning that the total number of students per class is not related to the

ISSN 1983-4209
Journal of Biology & Pharmacy and Agricultural Management, v. 17, n. 4, out/dez 2021
revista.uepb.edu.br/index.php/biofarm

number of students in the meeting, since some students did not participate in the survey.

Initially, the participating students received a questionnaire with the aim of getting to know the profile of the class regarding the topic of sanitizing, pandemic and contextualization of teaching chemistry. The data resulting from the submission were compatible with the participants and the possible deviations in the result may be related to technical problems through digital instruments. Given the axes and themes discussed in this work, it was possible to capture and reorganize the students' knowledge data after the project was carried out (represented in Figures 1 and 2).

By evaluating the results, it is possible to carry out a comparison with the imagery about sanitizers before the project was carried out, in order to understand the imagery within this selection of students. Both groups were between 13 and 18 years old, highlighting that the handling and handling of some sanitizing products is not recommended, reinforcing the knowledge due to the close experience, especially in the domestic context.

In this way, points of relevance and social impact were observed, such as the places of purchase of sanitizing products and the assessment of risks by users, with some notable results such as the purchase of unregistered products by the informal market, practices related to cultural habits and daily life of the population studied. Not measuring the risks related to the handling of sanitizers was also a question that sought to interpret data, since the annual impact on the health system is directly and indirectly associated with the use of sanitizers, information complemented with the reuse of sanitizer packaging in everyday life (ANVISA, 2012).

Viewing the results relevant to knowledge after the project, different profiles were presented in the responses among the participating classes, knowing that the knowledge of the form sought to assess particular points of the project, being more specific in relation to the theme in order to understand the absorption and the understanding of students. As the form was also based on the multiple-choice model, there is the possibility of students being induced to similar information or discussed

Journal of Biology & Pharmacy and Agricultural Management

ISSN 1983-4209

Journal of Biology & Pharmacy and Agricultural Management, v. 17, n. 4, out/dez 2021

revista.uepb.edu.br/index.php/biofarm

during the project, which is a possible interference and limitation of the proposal, in addition to problems intrinsic to remote systems.

From the answers, concepts associated with the storage and care with the handling of sanitizers presented most of the positive results that the interventions sought to achieve, in order to fix these concepts in view of the assessment of the associated consequences. However, when evaluating behaviors such as actions against intoxication, disposal and the contextualization of the concepts of chemistry, there are still several alternatives and proposals by the students, demonstrating the deficit in associating the contents with other areas of knowledge. However, the contextualization and themes associated with the pandemic, including the chemical products used in the period in question, showed positive responses and actions to the implemented issues, associating that the contextualization and use of educational dynamics to reality and other contents show a higher rate of hits.

It is noteworthy that the meeting was held in a unique way with each class, seeking to contextualize within this model the main aspects related to sanitizers, both in daily life and focused on the pandemic, in order to develop critical thinking and questioning about the theme, in order to encourage students to research and discuss fundamental concepts in their respective locations in order to have a long-term benefit through educational measures, as described by ALBUQUERQUE & STOTZ (2004), defining education as an instrument for reduction of health risks.

Figure 1: Results found by the students' responses to the forms in relation to the Sanitation theme.

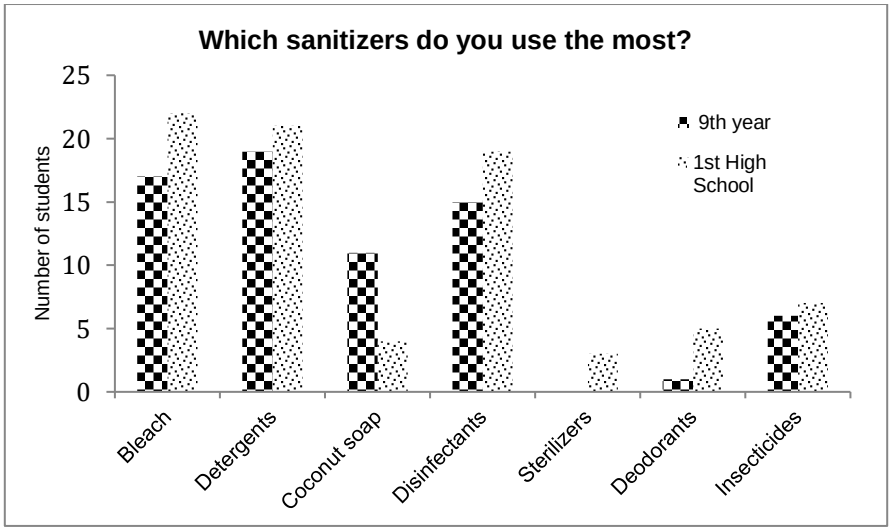
Do you know what sanitizers are?		
	9th	High School
Yes	10	21
No	2	4
Perhaps	7	2

Journal of Biology & Pharmacy and Agricultural Management

ISSN 1983-4209

Journal of Biology & Pharmacy and Agricultural Management, v. 17, n. 4, out/dez 2021

revista.uepb.edu.br/index.php/biofarm



Do you read the product label?		
	9th	High School
Yes	1	5
No	14	9
Sometimes	4	13

Journal of Biology & Pharmacy and Agricultural Management

ISSN 1983-4209

Journal of Biology & Pharmacy and Agricultural Management, v. 17, n. 4, out/dez 2021

revista.uepb.edu.br/index.php/biofarm

Do you know the risks of using an irregular product?		
	9th	High School
Yes	6	16
No	13	11

Do you reuse sanitizer packaging?		
	9th	High School
Yes	4	11
No	15	16

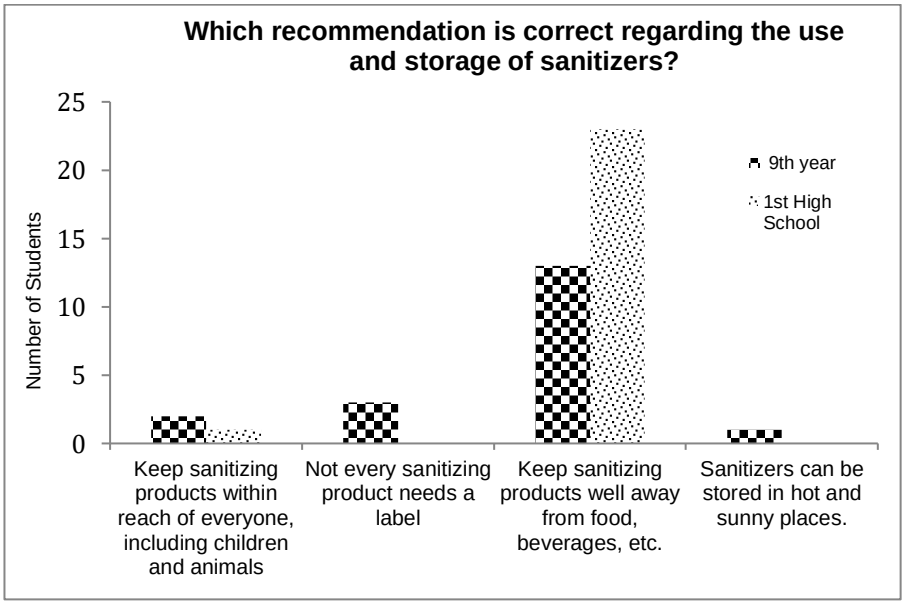
Journal of Biology & Pharmacy and Agricultural Management

ISSN 1983-4209

Journal of Biology & Pharmacy and Agricultural Management, v. 17, n. 4, out/dez 2021

revista.uepb.edu.br/index.php/biofarm

Figure 2: Results found by the students' answers in the Quiz application.



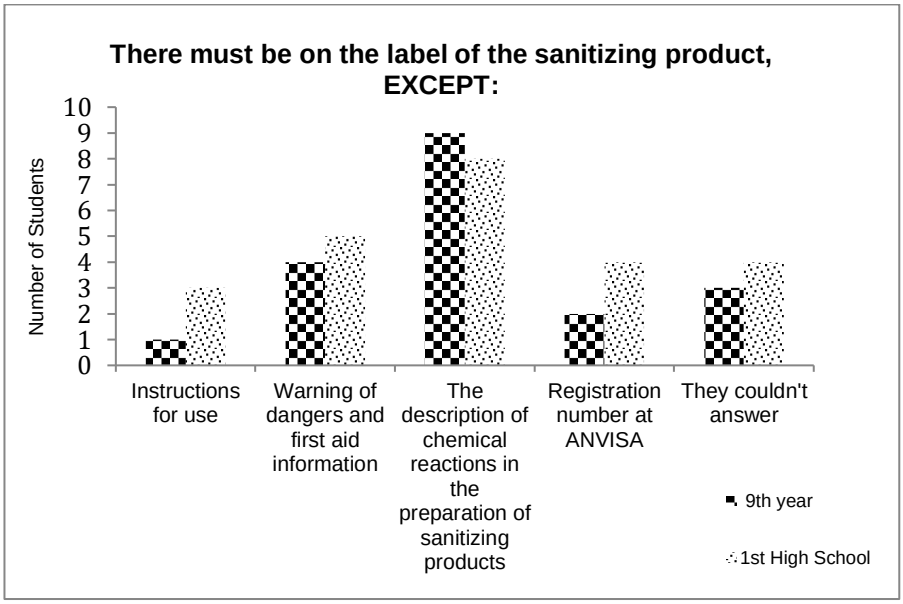
In case of ingestion of cleaning products, should you induce vomiting?		
	9th	High School
True	7	11
False	12	13

Journal of Biology & Pharmacy and Agricultural Management

ISSN 1983-4209

Journal of Biology & Pharmacy and Agricultural Management, v. 17, n. 4, out/dez 2021

revista.uepb.edu.br/index.php/biofarm



Does 70% alcohol have the best concentration for disinfecting action?		
	9th	High School
True	13	23
False	6	1

Diluting bleach is important because of the formation of hypochlorous acid, which has an effect against microorganisms		
	9th	High School
True	14	11
False	5	12
Couldn't answer	0	1

Journal of Biology & Pharmacy and Agricultural Management

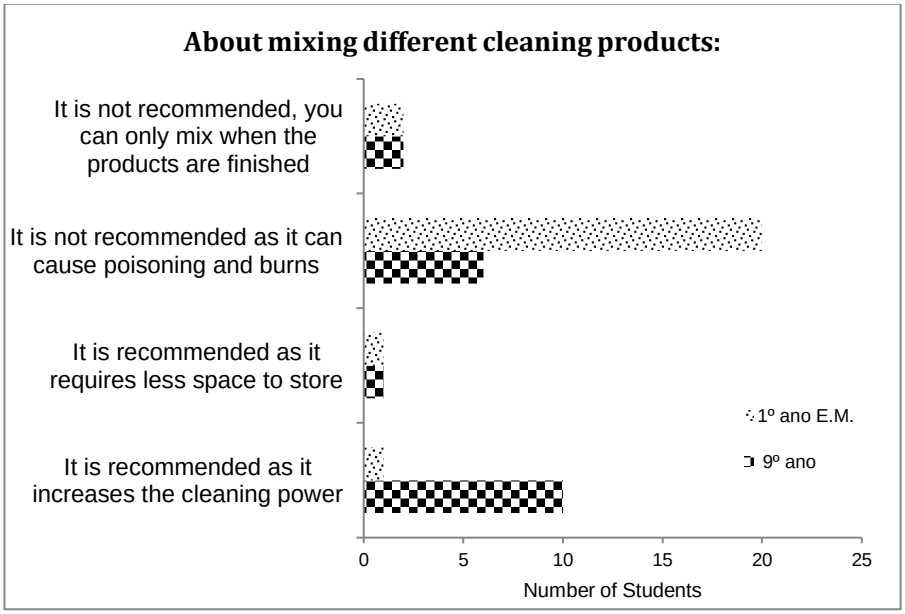
ISSN 1983-4209

Journal of Biology & Pharmacy and Agricultural Management, v. 17, n. 4, out/dez 2021

revista.uepb.edu.br/index.php/biofarm

Is it necessary to reuse sanitizing packaging at home to reduce plastic production in the environment?		
	9th	High School
True	17	11
False	2	12
couldn't answer	0	1

Is it okay to use cleaning products after the expiration date?		
	9th	High School
True	0	2
False	19	22

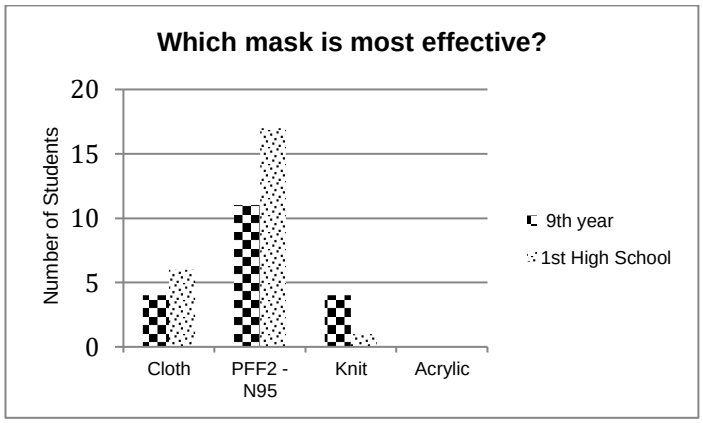


Journal of Biology & Pharmacy and Agricultural Management

ISSN 1983-4209

Journal of Biology & Pharmacy and Agricultural Management, v. 17, n. 4, out/dez 2021

revista.uepb.edu.br/index.php/biofarm



CONCLUSIONS

The observation and interpretation of the data obtained demonstrates the need to address issues already deeply discussed in higher education institutions and that favor social needs in order to enrich the basic education offered to the population, to make chemistry teaching less tiring and more interactive and inclusive in order to reduce school dropout and aversion to this discipline. The irrational use of chemical substances triggered by the COVID-19 pandemic highlights its concern for health agencies, especially regarding the dangers due to toxicity and risk of death.

For this reason, the project provides guidance on the variety of household cleaning products, updates on the progress of the pandemic. It is concluded, then, that the project continues to meet the proposed objectives, presenting innovative methodologies that can be adapted to the classroom in order to make classes less monotonous and more productive, bringing long-term benefits to society.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

ISSN 1983-4209

Journal of Biology & Pharmacy and Agricultural Management, v. 17, n. 4, out/dez 2021

revista.uepb.edu.br/index.php/biofarm

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