

Combating *Aedes aegypti* in Brazil: An Interdisciplinary Proposal in Teaching Biotechnology Chemical

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Abstract

The fragmentation of the sciences contents, the lack of applicability of the teacher in the classes and difficulty of contextualization affect the teaching-learning process of the students. This work was developed in a state school of higher education located in the city of Nova Floresta, Paraíba, Brazil with an interdisciplinary approach in teaching chemistry, using the theme *Aedes aegypti* combat, involving disciplines such as: chemistry, biology, portuguese (literature), history and geography. The purpose of the pedagogical intervention was to promote the importance of interdisciplinarity and the construction of the knowledge of the students of the 3rd grade high school in the school. The activities were built in expository and experimental classes with the purpose of adapting the activities for presentation in a cultural meeting of the school. The results were presented at the school itself with the initiative of the institutional program of the initiation to teaching grant by the Federal University of Campina Grande. Based on the results obtained, it is verified that the interdisciplinary work is relevant, given that through these activities it was possible to verify the importance of the use of current themes in the teaching of biotechnology chemical and in the various knowledge in basic education in the process of knowledge construction, and in the case under study, in the control of the *Aedes aegypti* gnat.

Keywords: *Interdisciplinarity; Chemistry teaching; Basic education; Aedes aegypti*

Introduction

Interdisciplinarity can be understood as the study of integration of the disciplines in the field of knowledge, making them communicative with each other, allowing a wide learning that facilitates the understanding of the various contents. It is possible to

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affirm that the fragmentation of the contents, the lack of applicability of the teacher in the classes and the difficulty of contextualization affect in the teaching-learning process of the students. Since learning is a desirable result in school, intervention is a privileged pedagogical process. The teacher has the explicit role of intervening and provoking in students advances that would not run spontaneously [1,2]. In this sense, it is extremely important that the teacher uses new practices that evidence the qualitative process of teaching in basic education; however, this should not restrict knowledge, but broaden its possibilities to improve the quality of its role in school and life as a citizen [3].

Interdisciplinarity does not pretend to create new disciplines or knowledge, but to use the knowledge of various disciplines or knowledge, to solve the concrete problem or to understand a certain phenomenon. Thus, interdisciplinarity, in general, suggests the use of the knowledge of several disciplines to solve and understand a certain problem [4]. Interdisciplinarity is, in fact, integrative for a full training of scientific knowledge, completing the perception of a certain social theme that can be approached by several school disciplines.

With regard to teaching chemistry, traditional expository classes that use focusing on citizenship, involving participation as the only didactic resource, the student's frame and discourse, with debate in the classroom and teacher, are not single or even problematization of everyday situations, always productive for the teaching of chemistry [5,6]. In order to teach the theoretical subjects addressed in this matter, the teacher should make a reflection as far as possible, where current and important topics should focus on what to teach and how to teach in chemistry classes, being inserted.

In order to promote applicability in the contents learned in basic education, it is necessary to involve problematic for possible daily solutions. Thus, the study of *Aedes aegypti* is extremely important, since it is not enough to know about the mosquito and its diseases, but to combat it daily. The *Aedes aegypti* gnat is one of the main causes of the Zika virus, Dengue and Chikungunya diseases in Brazil, reaching the population in several regions. Unfortunately, the population itself due to lack of information or cultural issues ends up developing practices that intensify the incidence of the mosquito quickly, such as the bad disposal of garbage, water without maintenance and protection, and among other practices that end up putting the health of the population. In the context of climate change, with projections of temperature rise, it is conjectured that it will increase the extent of the latitude of the dengue distribution on the planet [7].

In view of the above, the Institutional Scholarship Initiative Program, chemical subproject, developed in a state high school in the city of Nova Floresta (Paraíba, Brazil) interdisciplinary activities in the teaching of chemistry. The culmination of this project was the promotion of a Cultural Exhibition, whose theme was "The *Aedes aegypti* as an interdisciplinary proposal in the teaching of chemistry". The importance of the cultural show was to promote the interdisciplinary nature of the contents of the *Aedes aegypti* gnat, aiming at sensitizing the school, promoting awareness and highlighting the importance of combat, based on the local knowledge of the School to disseminate knowledge in the community itself.

Materials and Methods

This work was developed in a state school of higher education located in the city of Nova Floresta (Paraíba, Brazil) with an interdisciplinary approach in teaching chemistry, with the theme of *Aedes aegypti* combat. The project involved disciplines such as: chemistry, biology, portuguese, history and geography. The purpose of the intervention was to promote the importance of interdisciplinarity and knowledge construction of the students of the 3rd grade high school in the school, the work was developed in the period from August to November 2019.

The activities were built in expository and experimental classes with the objective of adapting the activities for presentation at the cultural meeting-culmination of the project developed.

The results were divulged in the own school with initiative of the Institutional Program of Initiation to Teaching Scholarship, subproject in Chemistry, Federal University of Campina Grande.

Results and Discussion

For the production of activities in the cultural show with the use of interdisciplinarity in teaching chemistry with the theme “Combat of the *Aedes aegypti*” gnat the students made posters, theater, parody, awareness publicity, chap-book, organic function of medicines, among other tasks which involved the disciplines of chemistry, biology, mathematics, history, geography and portuguese (**TABLE 1**). Silva [8] point out that several questions about the project (interdisciplinarity) are being discussed about its importance in the present day and those teachers can stimulate and from then on bear fruit among students, teachers and even in society. In this way, we sought to relate the problems caused by the *Aedes aegypti* gnat in Brazil, from its historical process until its development in the present day to raise awareness in the school and community, intervening in a diversified way, involving contextualization and interdisciplinarity in teaching.

TABLE 1. Interdisciplinary activities developed.

Activities	Objective
Chemistry: Exposure of organic functions, active principle, the main drugs that help reduce gnat consequences.	To promote the contextualization of the organic functions to understand the studies of organic chemistry.
History: The exhibition about the <i>Aedes aegypti</i> gnat, from historical process in countries until the arrival in Brazil.	Show the development of the gnat throughout the historical period up to the present day.
Portuguese: The creation of the posters: a proposal to raise awareness of the school community for care in mosquito prevention.	Build knowledge about care for <i>Aedes aegypti</i> .
Geography: Students developed statistics in Brazil on the incidence of the gnat in the region.	Present the community data on gnat proliferation through statistics.
Biology: Understanding the process of embryonic development of the gnat and its advances in different climates and temperatures.	Understand the <i>Aedes aegypti</i> life cycle.
Literature: The reading and dissemination of chap-book involving the historical process of the mosquito and a form of awareness recited in the cultural exhibition by the students.	Rescue the popular northeastern culture in order to combat the gnat, emphasizing its historical process and prevention methods.

The students constructed the main organic functions present in the model, as well as demonstrating the main characteristics that they understood about the study of the physical and chemical properties of water (**FIG. 1**). Water is the most favorable resource for the development of the gnat, in this way, they have highlighted their properties. Some of them emphasize that the mosquito already develops in already contaminated waters, that is to say, the advance of the mosquito has intensified over the years. Hence the

importance of studying water and its properties.

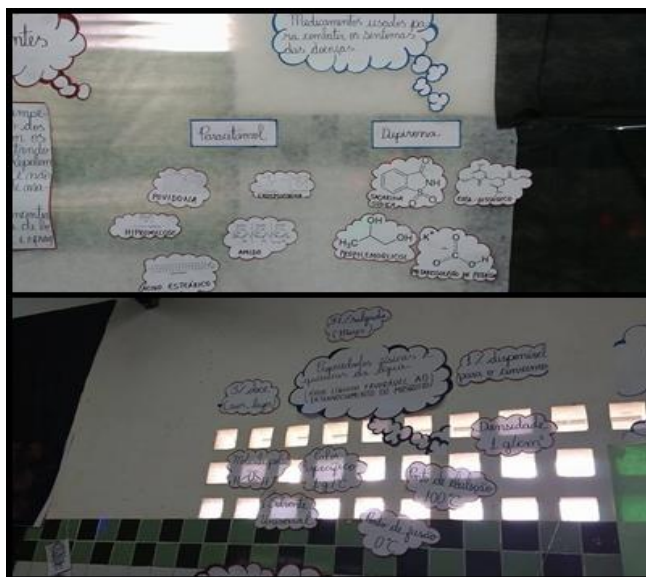


FIG. 1. The main drugs used to combat the symptoms of *Aedes aegypti* disease and the physical and chemical properties of water.

In the Paraíba State, the Dengue indexes have increased according to previous years. According to the survey conducted by the school's students, more than 12,000 cases have already been confirmed. According to the Executive Management of Health Surveillance, Paraíba registered 30,610 probable cases of dengue in the period from January 1 to May 28, 2017 according to the bulletin released by the state department of health (SES). In the same period in 2015, according to SES, there were 13,092 suspected cases of the disease, showing an increase of 133.80%. According to the results the Zika Virus disease has proliferated with more than 70% between the years 2015-2016. The FIG. 2 showed the didactic representation of diseases indexes caused by *Aedes aegypti* gnat in Brazil and Paraíba.



FIG. 2. Didactic representation of diseases indexes caused by *Aedes aegypti* gnat in Brazil and Paraíba.

Regarding the interdisciplinarity involving the portuguese subject, the Institutional Program of the Initiation to Teaching grantees selected a chap-book called "Dengue Cord, Chikungunya and Zika virus", authored by Orlando Paiva (FIG. 3). Through the contact of the students with this literary genre, they realized that the same theme could be approached from different perspectives [9]. Given this, in the cultural show they delivered some copies of this text to managers, teachers and the community in general. Thus, these also verified the possibility of the same subject being worked by the most varied disciplines, including literature.



FIG. 3. The *Aedes aegypti* life cycle and the chap-book Exposition.

Finally, the students mobilized and created a play along with a parody (FIG. 4) as a proposal of awareness and mobilization of the School [10] with the community emphasizing the care against the gnat *Aedes aegypti*.



FIG. 4. The parody and the theater as a proposal of incentive and reflection about the care with the gnat *Aedes aegypti* promoted by the students of the school.

In the theater was initially approached by the narrator of the play the period in which the gnat arose. At that moment the students built the theater and the parody, reflecting their daily life and care with the disease Zika Virus, Chikungunia and Dengue,

explaining the difference of these diseases, the symptoms, the consequences of a very simple form of reality itself. The disease-transmitting agent known as *Aedes aegypti* originated in Egypt and for a long time spread to the tropics since the 16th century, brought by ships that trafficked slaves. In Brazil, the first cases of dengue occurred in the nineteenth century in Curitiba, Parana. In this historical period the population did not worry because of the yellow fever that intensified at the time. With the passage of time the gnat has been proliferating and developing until the present day.

Conclusion

According to the results, it was verified that the activities "Combat the *Aedes aegypti*", finalized in the cultural meeting of the school, offered a space of socialization of the knowledge of interdisciplinary form, using daily problems to reflect the actions that could be developed from the school environment and disseminated among the community. The students had the opportunity to build and interact with chemistry and the different disciplines, where it was possible to reflect on actions that can be developed to combat and prevent mosquitoes.

The cultural meeting made possible a significant learning, since the students saw applicability of the same theme in the various fields of knowledge. The contribution of this work was to understand that the problematic of students' daily life can be minimized and understood in the school and community.

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