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STRATEGIES FOR LEARNING SEED GERMINATION IN HIGH SCHOOL

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Abstract: Biology teaching, specifically the area of botany, is affected not only by the lack of incentive to observe and investigate plants, but also by the scarcity of strategies that can help in learning. It is necessary for the Science teacher to develop creative means of teaching and to discover new environments in an innovative way. The activities and practical projects can be an alternative that will facilitate the teaching-learning process in the area of botany. This work aimed to evaluate the use of practical experimental activities in the understanding and learning of the plant germination process, for high school students. Application of theoretical and practical classes on seed germination, with two classes of the 2nd year of high school, called theoretical and theoretical-practical with a quantitative of 18 students. For the collection of information, at the beginning and end of each class, a questionnaire containing 6 multiple choice questions was applied in order to quantify the correct answers regarding the presented contents, and their results were weighted in the form of graphs. Through the practical class, it can be seen that the students' grades were better than the class that received only the theoretical class. The practical classes contributed to the understanding and learning of the contents related to the processes of seed germination
Keywords: Germination; Class; Practice; theoretical.

INTRODUCTION

In the construction of the teaching process, three basic components stand out: teachers, students and available teaching resources. For teaching to be effective it is necessary that students actively participate in the construction of knowledge, let the teacher play the role of intermediary and use teaching methods to support quality education (PEDRANCINI et al., 2007).

The most effective teaching strategy for approaching biology content in the classroom is one of the most frequently asked questions by teachers. Due to its practicality and need for few resources, lectures continue to be the teaching option most used by biology teachers (SILVA; MORAIS; CUNHA, 2011).

Krasilchik (2008) argues that, among the existing educational modalities, such as didactic activities, demonstrations, tours, discussions and practical projects, as ways of experiencing the scientific method, the most appropriate are classes and practical projects. Among the main functions of practical classes, the author lists: the awakening and maintenance of students' interest; understanding of basic concepts; the development of problem-solving skills; and student involvement in scientific research.

The genesis of experimental work in primary schools over a hundred years ago was influenced by the results of research in the field of education, which showed the potential of these practices in the context of teaching and learning. Its objective was to improve the absorption of scientific content, since students knew the content, but did not know how to apply it. However, after these years, international, national and local indicators of the quality of elementary education still showed that the problem remains in the teaching of biology (IZQUIERDO; SANMARTÍ; ESPINET, 1999).

Borges (2002) also emphasizes the importance of practical activities as an opportunity for students to interact with different instruments and protocols that they would not normally have in a more routine classroom environment.

Bizzo (2008) argues that practical activities are also a good way to enable the student to understand the practical application of what is being analyzed and, thus, make the cognitive relationships

appropriate to the environment in which they are inserted.

Unfortunately, in most public schools, practical classes are less frequent, thus affecting student learning, which is an inspiration for the development of the present work. The realization of practical classes seeks to develop their own formulation and interpretation on the subject, thus requiring the student to learn to construct, evaluate, justify, think and develop a critical and questioning sense on a scientific perspective.

According to Viviani et al. (2010) experiments allow students to think about the world in a scientific way, expand their understanding of nature and stimulate skills such as observation, data acquisition and organization, reflection and discussion. Therefore, it is possible to acquire knowledge from actions, not only through lectures, so that students become the main subject of learning.

For Souza et al. (2014) the essence of learning and teaching botany in education cannot be ignored because plants are organisms that are integrated with all other living beings, and thus the discipline complements or contributes to other disciplines in the teaching of biology.

According to Araújo (2011), field trips or a simple trip to the school, the use of plant material in the classroom, laboratory classes and even lectures with didactic material, are good opportunities offered by a teacher to teach botany in classroom.

It is very important that teachers practice teaching plants with interdisciplinarity, creativity and a variety of practical activities that make the content interesting for the student, helping to break the taboo that plants are uninteresting.

OBJECTIVE

This work aimed to evaluate the use of practical experimental activities in the understanding and learning of the plant germination process, for students of the 2nd year of high school at a state school in the city of São Paulo.

METHODOLOGY

The work was carried out in a state school in the city of São Paulo, located in the neighborhood of Capão Redondo, with students from the 2nd year of high school, as follows: the 2nd E class constituted a control group, participating only in the theoretical class on germination, and the 2nd grade class received the theoretical class and an activity experimental practice involving the germination of lettuce seeds. The theoretical class was taught together with the teacher responsible for the discipline. Initially, the students of the two classes answered a questionnaire with six multiple choice questions, to assess their prior knowledge on the subject through a pre-class test that was applied at the beginning of the class. (Link: Teste-Pré-Aula); and a post-class test at the end of the topic being worked on (Link: Teste-Pós-Aula). In order for students to better understand the germination process and the possible favorable and unfavorable conditions during seed germination, the students of the 2nd grade class, in addition to the theoretical class, developed experiments evaluating the action of factors such as humidity, light and oxygen, as shown in table 1 and guidelines below.

Guidelines for setting up experiments

1. Separate and number four plastic pots.
2. Cover the bottom of the pots with a piece of cotton, and add 10 lettuce seeds to each pot.
3. Using a syringe, in the first pot, place 10mL of water; in the second pot add 60mL of water; and in the third pot, 10mL

Materials	The amount
lettuce seeds	10 seed units for each group
Plastic pot	1 piece for each group
Cotton	1 piece for each group
10 ml syringe	1 piece for each group
aluminum foil	1 piece of leaf for each group
paper labels	1 piece for each group

Table 1. List of materials used in setting up the experiments.

of water completely covering this pot with aluminum foil. In the fourth pot, do not put water.

4. Then place the pots near a window, so they receive sunlight.

5. Follow the germination of the seeds for five days, always maintaining the initial humidity of each pot, noting the changes that occur during two weeks.

RESULTS AND DISCUSSION

Through the Pre-Class test carried out with students from the 2nd E (control group) and 2nd A classes, it was possible to notice that the average of correct answers on the presented topic was different between the two classes, showing a little higher in the class of 2nd And through the After-Class test, a significant improvement was noticed in relation to the knowledge of students who developed the theoretical-practical class (2nd A) (91%), in relation to the group of students who participated only in the theoretical class (2nd E) (59%) (Figure 1).

Figures 2 and 3 present the relative hit rate between the two groups, in the Pre-Class and Post-Class test. The most expressive values in questions 1, 2 and 3 may be related to the fact that students already have a little knowledge about the presented subject. It was observed that in questions 4, 5 and 6 that the students presented a lower performance of correct answers, because the degree of difficulty in the questions was greater (Figure 2).

In the After-Class test (Figure 3), 2nd grade students had a relatively lower percentage of correct answers in questions 1, 2 and 3, compared to 2nd grade students. It was also observed that 2nd A students had 100% correct answers in questions 1, 2, 5 and 6 and slightly lower indices in questions 3 and 4, but the 2nd A students' hit rates were always better than the group. of students control (2ºE).

Faced with the difficulties faced by teachers in awakening students' attention to the subject, thus improving teaching efficiency in the teaching process, it can be suggested that the first step in teaching botany is to stimulate students' enthusiasm through examples and applications. practices.

According to Towata et al. (2010) for the student to learn the contents of botany, the practical classes become necessary and important, allowing to relate the theoretical contents with the daily life of the students.

The elaboration of activities of this theoretical-practical model brings students closer to living beings, and consolidates the importance of the process of learning about botany and the meaning that classes come to have for students, since direct contact with the material is promoted. studied (FEITOSA et al., 2016). This way, the practical class is differentiated, because by treating the

Figure 1. Assessment of students' knowledge about germination before and after theoretical and theoretical-practical classes.

Source: Prepared by the authors (2021).

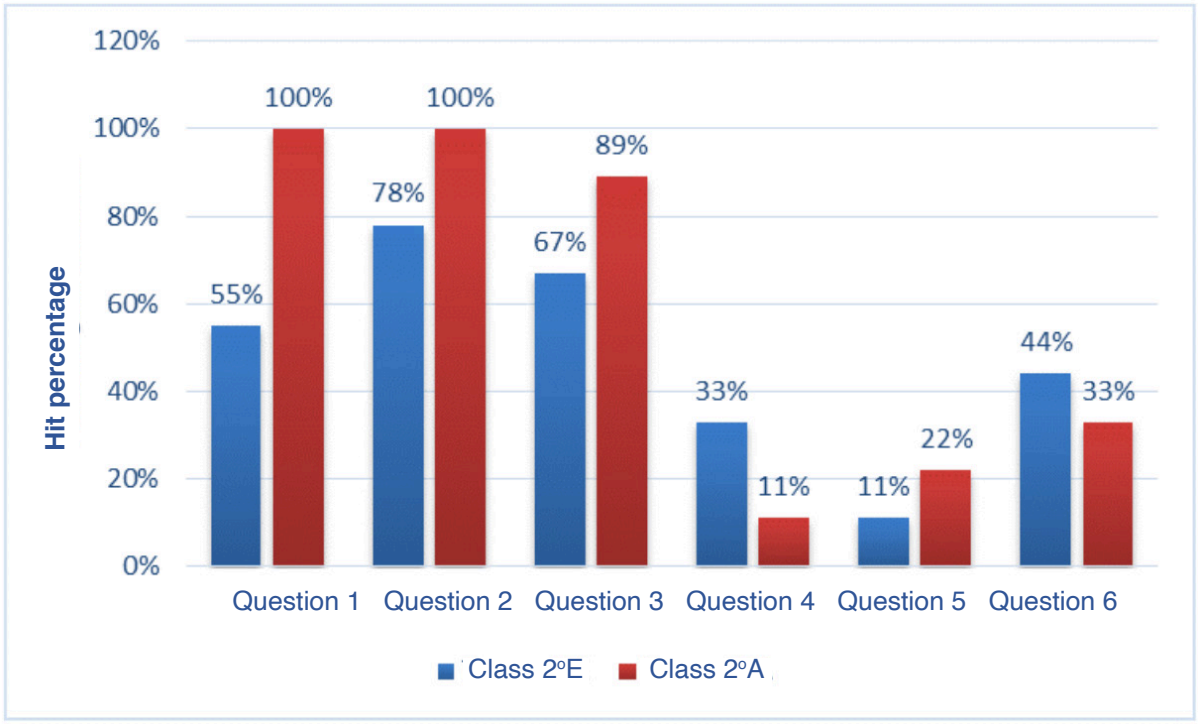

Figure 2. Pre-Class test questions correct percentagem

Source: Prepared by the authors (2021).

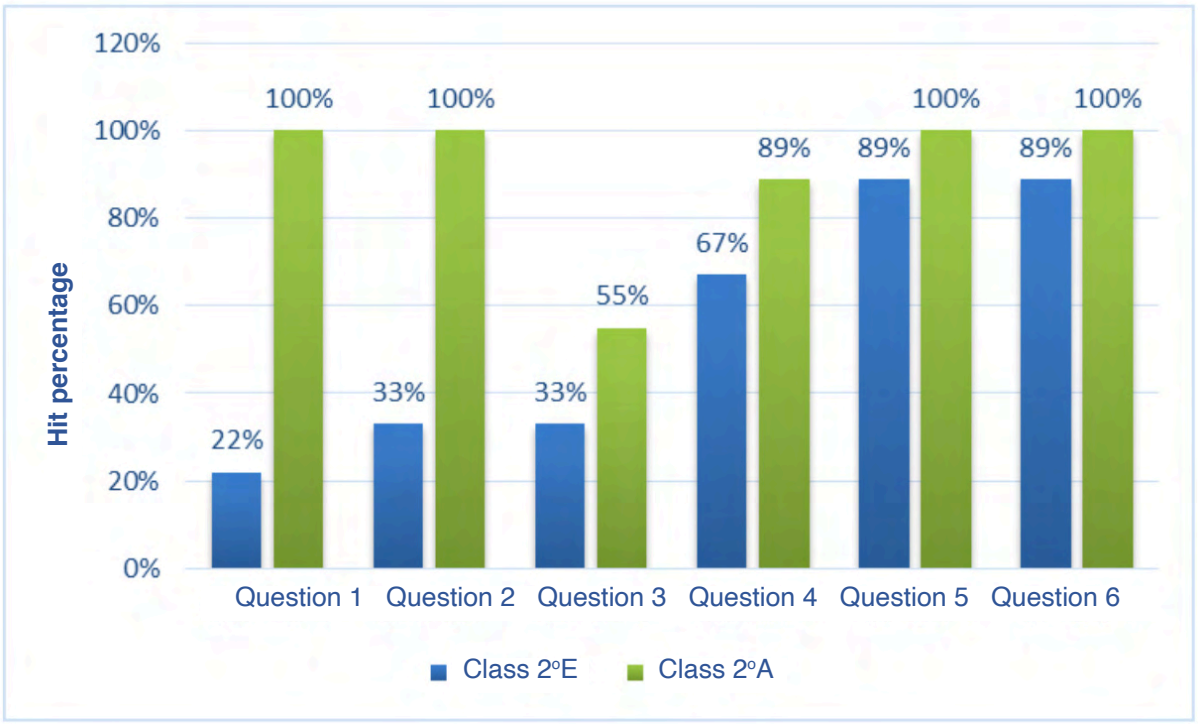

Figure 3. Correction percentage of the Post-Class test questions.

Source: Prepared by the authors (2021).

student as a "researcher", he accumulates his knowledge, draws his own conclusions and does not forget this experience. The practical classes offered by the school are intended to complement the theoretical classes. The use of these classes facilitates the visualization of content that previously existed only in the student's imagination, arousing interest in understanding the topic.

Salatino and Buckeridge (2016) called "botanical negligence" the lack of interest on the part of basic education students in teaching plants. This lack of interest can be seen in the theoretical classes developed in this work, where in fact students show little interest in the theme, while students who experienced the theoretical-practical class were more interested, investigative and participatory.

CONCLUSION

It was concluded in this work that the practical classes contributed to a greater interest shown by the students, and a better understanding and learning of the contents related to the processes of seed germination.

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