

Pedagogical residency and Biology teaching during the COVID-19 pandemic in Salvaterra, Marajó, Pará

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Abstract

This study reports on the implementation and importance of the Programa da Residência Pedagógica (PRP) for initial training in a degree course in Biological Sciences degree course at the Universidade do Estado do Pará, during the COVID-19 pandemic scenario, in a public school in Salvaterra, Marajó, Pará. The experiences reported were based on remote immersion in classes in the 1st and 2nd stages of Educação de Jovens, Adultos e Idosos. The activities carried out included making audiovisual resources, WebQuests and question books. Despite the remote teaching, due to the pandemic, there was considerable student participation and evidence of learning. In short, the PRP contributed to the initial training of the resident Biology undergraduate, preparing them for atypical teaching moments.

Keywords: Biological Sciences. Initial Training. Teaching.

Residência pedagógica e o ensino de Biologia durante a pandemia da covid-19 no município de Salvaterra, Marajó, Pará

Resumo

O presente estudo reporta sobre a execução e a importância do Programa da Residência Pedagógica (PRP) para a formação inicial em um curso de licenciatura em Ciências Biológicas, da Universidade do Estado do Pará, durante o cenário pandêmico da covid-19, em uma escola pública do município de Salvaterra, Marajó, Pará, entre 2021 e 2022. As experiências relatadas foram a partir da imersão remota em turmas da 1ª e 2ª etapas da Educação de Jovens, Adultos e Idosos. As atividades realizadas incluíram a confecção de recursos audiovisuais, de *WebQuests* e de cadernos de questões. Apesar do ensino remoto devido à pandemia, houve uma considerável participação dos alunos e indícios de aprendizado. Em suma, o PRP contribuiu para a formação inicial do residente, licenciando em Biologia, preparando-o para momentos atípicos de ensino.

Palavras-chave: Ciências Biológicas. Formação Inicial. Docência.

1 Introduction

Experimenting with pedagogical practice is an essential stage in the initial training of education professionals. This can take place through the compulsory curricular internship present in undergraduate courses, favoring the student's first contact with the school and, consequently, with teaching. However, according to Freitas, Freitas and Almeida (2020), there are individuals who need a longer period of immersion in the praxis of teaching, in order to have a deeper and more motivating experience.

In this context, the Programa de Residência Pedagógica (PRP) stands out, which allows undergraduates to get closer to full professional practice, from a different perspective and a longer period in relation to the supervised internship, allowing interaction between the undergraduate and the preceptor teacher (Faria; Diniz-Pereira, 2019). It's important to note that the supervised internship's workload is at least 300 hours, while the Ministry of Education's (MEC) PRP should have a maximum of 440 hours, distributed between: setting up in the school (60 hours), immersion (320 hours) and writing a final report, evaluating and socializing activities (Brasil, 2006; Capes, 2018).

Thus, experiences in the PRP are crucial to improving teaching practice and bringing it closer to the reality of public schools in a more lasting way, representing an initiative to enhance teaching careers (Leite; Almeida, 2021; Tardin; Ananias, 2023). Especially for Biological Sciences undergraduates, as the PRP allows them to improve their teaching practice, encouraging them to develop differentiated active methodologies that combine theory and practice, which are intrinsic to Biology teaching, due to the complexity of the biological content (Santos *et al.*, 2020).

It is also considered that, due to social isolation and other disorders caused by the COVID-19 pandemic, between 2021 and 2022, there were changes in different sectors of Brazilian society, such as in the educational area, it then became necessary to adopt temporary and emergency alternatives for teaching practices, such as remote teaching; and this change in the educational system has also affected the PRP's activities (Xavier; Cordeiro; Venâncio, 2022). Generally, this program was carried out by the graduate in person, but due to the pandemic caused by the new coronavirus, there was a migration to

the virtual space, where residents had to adapt to the new teaching model (Silva *et al.*, 2022).

Based on their experiences at the PRP during the pandemic, some reports by Biological Sciences undergraduates have been published, such as Silva's *et al.* (2022), describing their participation in basic education in terms of the preparation and execution of lessons, moments of discussion and correction of activities in remote classes, which provided them with relevant professional experience for teaching in remote education. On the other hand, Alves, Ribeiro and Chaves (2022), in addition to teaching classes and preparing activities and exercises, introduced an application that served as a digital whiteboard in their classes, in order to provide fluidity to the explanation and make the class more dynamic, and this application was well accepted by High School students.

Despite the adverse conditions of the pandemic scenario, PRP activities continued in an adapted and remote manner, with the aim of reducing the damage caused by the lack of proximity to actual educational practice (Tardin; Romero, 2022). Thus, collecting the residents' testimonies is of fundamental importance in order to understand the impact of this program on initial teacher training, since the PRP can enhance future teaching practice (Freitas; Freitas; Almeida, 2020), especially when it comes to an emergency teaching model, such as the remote one that was applied during the COVID-19 pandemic.

In this context, investigating how the PRP was carried out during its period of validity will make it possible to present new contributions to support similar and/or improved programs in academia and to leverage the number of participants (Souza; Gomes; Costa, 2023). Based on this, this paper reports on the implementation and importance of the PRP, linked to the Universidade do Estado do Pará, for the initial training of Biology teachers based on experiences in Salvaterra, on the island of Marajó, in the state of Pará, during the COVID-19 pandemic.

2 Methodology

This work was conceived from the experiences lived in the PRP through the subproject entitled *Contribuições práticas para o ensino de Ciências e Biologia como*

estratégias de ensino e aprendizagem inovadoras no município de Salvaterra-Pará, with scholarship aid to the resident through the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES). The aim of this subproject was to develop strategies and mechanisms to improve the initial training of undergraduate students in Biological Sciences, in addition to subsidizing their innovative teaching actions when they become professionals, providing in the short and medium term an improvement in the quality of education on the island of Marajó, Pará.

In the first stage of the subproject, the PRP nucleus was made up of 12 students, but these students were assigned individually to their respective classes. The activities began in November 2020, and the resident undergraduate student – the main author of this manuscript – studied the three pedagogical lines that underpinned the subproject: “Active methodologies”, “Constructivism” and “Project-based learning”, in order to build pedagogical resources to be used in classes. Subsequently, the residency was carried out in classes of the 1st and 2nd stages of Educação de Jovens, Adultos e Idosos (EJAI), between March 2021 and February 2022.

In this case, the resident's immersion was in the Escola Estadual de Ensino Médio Salomão Matos, in Salvaterra (PA), with the support of the preceptor teacher of the Biology subject, whose reception and help was very important for the implementation of pedagogical practices in the aforementioned classes, in a non-face-to-face format. In addition, it is important to note that this program was not submitted to the Comitê de Ética em Pesquisa (CEP), since it did not analyze student learning or satisfaction with the resident.

Due to the condition of social isolation resulting from the COVID-19 pandemic, there was no face-to-face contact with students or school staff. A pedagogical support session was held every two months via the instant messaging app WhatsApp, which was the only channel of communication between students, teachers and school staff, as the internet was a limiting factor. Thus, during a four-hour period, the preceptor teacher and the resident were available to the class to answer any questions regarding the content, in addition to passing on the materials used in the classes and assessments.

The information obtained during the immersion in the EJAI classes was recorded in a field diary to compose the results of this study. The process of preparing and applying audiovisual resources, question books and WebQuests was described, as well as aspects of student participation and performance and the difficulties faced by the resident.

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3 Results and Discussion

Initially, for emergency remote teaching, the teachers involved in the PRP were instructed to produce didactic support material for Biology classes, based on the knowledge acquired during the theoretical deepening of the three pedagogical lines worked on in the first stage of the subproject in question. The aim of this material was to contribute to the students' teaching-learning process in relation to biological content, serving as a complement to the material used by the school. In this way, the PRP resident sought didactic strategies to help the class and the preceptor teacher by producing audiovisual (educational) resources.

In this context, the videos were produced from a script, based on the content being worked on, but seeking support from other literature in order to provide additional information on the subjects. In addition, the videos were illustrated with images found on the internet and the script produced was narrated by the pedagogical resident. Thus, videos were produced on “Introduction to the scientific method”, “Bacteria”, “Introduction to Cytology” and “Fungi”, aimed at the 1st and 2nd stage classes of the EJAI.

In this respect, it is important to emphasize that audiovisual production as a versatile teaching resource opens up the possibility of working with situations that would not normally be accessible (Silva *et al.*, 2012). Through these resources, it is possible to associate the senses of hearing and sight to understand concepts, phenomena and processes related to the Biological Sciences.

An example of this is the video on “Fungi”, which can be viewed via YouTube (<https://www.youtube.com/watch?v=uYo9nk9IRqk>) and was theoretically based on the works on High School education (Amabis; Martho, 2015a) and Higher Education (Kendrick,

2017). This material shows, through images and narration, the mycological diversity that exists in everyday life, exemplifying unicellular fungi (yeasts) and multicellular fungi (mushrooms and wood ears).

This audiovisual resource also exemplifies the behavior of fungi, for example, parasitizing animals, causing mycoses in humans, damaging crops (rust); being used in the manufacture of food, such as bread, cake, cheese, beer; being used as food, such as champignons and shitake (figure 1); being used as a resource in pharmaceutical production, such as for the manufacture of penicillin; being used in the biological control of agricultural pests; and having importance in nature as decomposer organisms.

Figure 1 – Print of the video showing the diversity of fungi that are commercialized and edible



Source: Authors (2021).

Another example of a video was “Introduction to Cytology”, which can be viewed on YouTube (<https://www.youtube.com/watch?v=oUtmJCoAQIY>) and whose theoretical basis was High School (Amabis; Martho, 2015b) and Higher Education (Junqueira; Carneiro, 2012) (figure 2). This video tells the story of the discovery of cells and the subsequent advances in cytology accompanied by technological development. This

knowledge has led to the understanding and treatment of congenital diseases, the production of more effective medicines, the genetic improvement of animals and plants of agricultural interest, the mapping of the human genome, etc. In addition, the video shows the basic parts of the cell; the importance of microscopes for Cytology and other areas, such as Genetics; the scientific personalities who led to the great achievements in Science; information on cell theory and its principles, among others.

Figure 2 – Print of the video “Introduction to Cytology”, emphasizing the world of cells



Source: Authors (2021).

Another didactic resource developed during the PRP was the question books, with specifics for each class, which were distributed in person at the school on previously scheduled days and/or via WhatsApp. For the 1st stage EJA1 class, a notebook was produced with objective questions on the subject of “Basic concepts of biochemistry”, while for the 2nd stage class the subject was “Protozoa and algae”. In relation to this type of resource, Alves, Ribeiro and Chaves (2022) showed, based on their experience in the PRP, that the creation of activities and exercises is an important skill for the resident's training as a future teacher, since these activities serve as training for future teaching practice.

With this in mind, WebQuests were also developed on the subjects of “Cytology” and “Fungi”. This resource is a guided lesson format in which all or part of the resources used to solve the tasks are found on the internet (Barros, 2005). These WebQuests were produced by the resident himself, with the help of the preceptor teacher, and distributed to the students via WhatsApp, so that they could carry out the activities at home.

Each WebQuest contained an activity to be developed and was divided into sections: introduction, objective, methodological procedures and conclusion. Two WebQuests applied to EJA classes are shown as follows: the first on “Introduction to Cytology” (table 1) and the second on “Fungi in everyday life” (table 2).

Table 1 – WebQuest on “Introduction to Cytology”, applied to the Educação de Jovens e Adultos class, during the Pedagogical Residency

Section	Description
Introduction	With the creation of the microscope, various cell types and shapes could be visualized, enabling various studies that culminated in what is now one of the fundamental pieces of knowledge in Biology: cell theory. The following practices will help you understand the importance of the microscope for scientific research and the emergence of Cytology or Cell Biology.
Objective	Develop a homemade microscope for observing living structures and carry out a literature search on the importance of this equipment for Science.
Methodological procedures	<p>Step 1: Open the links below and see the different types of homemade microscope. If you prefer, you can search for others. Links to building your own microscope: https://aminoapps.com/c/astronomo/page/blog/microscopio-caseiro/4G5q_GGhYuN4GGG6EvVqoEeJXlJpWqjp5j http://docplayer.com.br/45724308-Construindo-um-microscopio-ii-bem-simples-e-mais-barato.html</p> <p>Step 2: Choose one of the homemade microscope models and build it.</p> <p>Step 3: In a Word file, answer the following questions. – Which type of microscope did you choose? How did you build it? – What did you use as a sample to observe with the microscope? What were you able to observe? – What else would you like to research with a microscope? – Produce a text of at least 10 lines on the importance of this tool for Science, according to what you have studied.</p>
Conclusion	Experiments such as the homemade microscope involve a lot of responsibility, maturity and the ability to overcome obstacles. It's important to learn about the

	processes involved in scientific progress, so that we can deepen our scientific knowledge and understand how important Science is to society.
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Source: Authors (2021).

Table 2 – WebQuest on fungi in everyday life, applied to the Educação de Jovens e Adultos class, during the Pedagogical Residency

Section	Description
Introduction	As well as being important as decomposers and in the food and drink industry, fungi are also very important in the pharmaceutical industry. Getting to know them better means learning about many of the products we come into contact with on a daily basis and learning how they are produced and even how to choose the best quality ones. The following practices will help you realize how much fungi are present in our daily lives and their relevance to our lives.
Objective	Recognize the presence and importance of fungi in everyday life.
Methodological procedures	Step 1 – Search your home and list products produced from fungi; Step 2 – Search your yard or street for fungi in the environment, such as wood ears and mushrooms. List each one you find with a description of where you found it; Step 3 – List situations in which fungi have caused you damage; Step 4 – Based on what you have studied and observed in the previous steps, produce a text of at least 10 lines, pointing out the importance of fungi in your daily life.
Conclusion	Knowledge about the various organisms that make up the biosphere, such as fungi, is essential if we are to have an increasingly sustainable relationship with planet Earth. Fungi are an important part of life as we know it and they are all around us, whether in gastronomic recipes, in pharmaceuticals or in the environment. Knowing them also helps us to avoid those that can be extremely harmful to our health.

Source: Authors (2021).

These aforementioned resources were always used in combination during the lessons to complement and/or reinforce the information, for example, the videos and the WebQuests or these quizzes and the question books. In this regard, Cordeiro *et al.* (2023) showed that when these resources are combined with other teaching methods, their ability to energize, entertain and contribute to a wider reach of information is notable, offering an innovative way of disseminating and enhancing science, especially in basic education. Also

according to these authors, teachers must have the skills to handle new technologies and methodologies, as well as knowledge mediation for the development of teaching materials.

It is also worth noting that all the teaching material produced to be made available to the students was previously evaluated by the preceptor teacher, who gave his opinions on the resources produced. The feedback from the preceptor teacher has always been very positive, especially with regard to the way in which it was presented and the content covered, especially when it comes to audiovisual resources and WebQuests. In this context, it is clear that the PRP is configured not only as a support for the initial training of residents, but also in continuing training for preceptor teachers, with the aim of overcoming traditional learning paradigms (Alves; Ribeiro; Chaves, 2022; Pinto; Oliveira; Sousa, 2023).

In addition, each didactic resource used during the PRP was developed in such a way as to be attractive and easily accessible to students in terms of content presentation, considering the appropriate terminology and illustrations, especially in view of the limitations that remote teaching imposes on the subject of Biology, such as the lack of activities that associate theory and practice and the development of collective tasks in the classroom. Based on this, Freitas (2013) and Santos *et al.* (2020) pointed out that the Biology curriculum component is marked by the need for different teaching resources, such as audiovisual productions, software, laboratory and classroom practices, etc. as pedagogical strategies to improve the teaching-learning process.

In the context of emergency remote teaching, the importance of WhatsApp as a communication channel for classes is emphasized, including for passing on the material produced by the resident. In addition, classes were socialized via WhatsApp, where activities were sent out in general, which accounted for student participation. With this in mind, WhatsApp was the technological resource used to conduct the classes in the remote teaching format, helping to easily dynamize the group by sending information and material instantaneously. Unlike other reports in the literature, there was no adoption of tools with more resources for teacher-student interaction, such as Google Classroom and Google Meet, with or without the support of WhatsApp (Xavier; Cordeiro; Venâncio, 2022; Oliveira *et al.*, 2022; Jaques; Abeijon; Bobrowski, 2023).

It should be noted that during the pedagogical support sessions, in the period set aside for questions about Biology content, the students showed little participation, their questions being more related to a possible “grade” given to the material passed on than to the content itself. Historically, the importance given to grades is due to the quantitative evaluation and promotion system inherent in traditional education, in which the concern of teachers, parents and students is focused on the results of grades, thus disregarding the process of building knowledge and the quality of the content learned by students (Silva; Amorim, 2024).

Despite the scenario described, there was no drop in the class's performance, as the majority of students generally took part in all school activities, giving feedback and socializing tasks. In this sense, Santiago, Sousa and Silva (2020) pointed out that, with the implementation of remote learning caused by the COVID-19 pandemic, students could decrease their performance in their academic/school activities. This may be associated with a number of factors, such as those mentioned above: the lack of teacher-student interaction and the difficulty students have in accessing technological resources so that they can participate effectively in online classes, such as the internet.

In this perspective, Guerreiro *et al.* (2023) mentioned the compromised mental health of university students during remote education, which resulted in some problems in relation to learning capacity, especially difficulty concentrating and low productivity or unproductivity. Another factor that may have compromised the teaching-learning process in pandemic times was teachers' difficulty in adapting to technological influences, with problems of knowledge of technological tools and accommodation in teaching methodologies, at the same time as they had to learn to manipulate digital technologies quickly and urgently (Araújo; Progetti; Santos, 2021; Souza; Oliveira; Rangni, 2023).

In terms of the resident's difficulties, the biggest problem with the remote classes was the lack of interaction between the teacher, the resident and the students, as the dynamics organized by the school did not favor good contact with the classes. Another problem was the lack of access to technological resources for most of the students, since many belonged to low-income families and only had access to WhatsApp. Oliveira *et al.*

(2022), during the PRP in schools in the state of Paraná, found that many students did not have access to computers and/or the internet to attend remote classes. Sanz, González and Capilla (2020), for their part, have pointed out that, in the context of the COVID-19 pandemic, the risk of school dropout has increased, especially among the most disadvantaged social classes, who have little access to tools for online classes.

In short, developing the PRP activities made it possible to learn about new teaching resources that wouldn't normally be used in Biology classes, such as audiovisual resources and WebQuests. In addition, it was possible to develop important skills for the educational context to which the resident will be inserted in the future, such as the search for constant improvement, the use of technology, creativity, empathy, teamwork, among others, especially in an atypical teaching context caused by a pandemic. In this particular case, the resident, together with the preceptor teacher, had to overcome the existing difficulties in order to better develop the Biology lessons.

4 Conclusions

Based on the report presented, the importance of the Pedagogical Residency for the initial and continuing training of Biological Sciences undergraduates and the preceptor teacher is evident, since the program, in theory, allows the mutual exchange of experiences between active teachers and future education professionals, with the aim of providing quality teaching to students. The relevance of this immersion in formal education institutions is magnified when the experience takes place at an atypical time when the education system needs to change its classroom format in order to continue operating, as has visibly happened during the COVID-19 pandemic.

Thus, the resident's work in the remote classes was very productive, especially in terms of obtaining the knowledge needed to produce teaching materials, such as audiovisual resources, question books and WebQuests. In addition, the very making of these resources allowed the exercise of skills and competencies focused on the handling of technologies and teaching work. It is also worth highlighting the contribution of the

preceptor teacher, in the form of feedback, to improve the resources produced, as well as having access to new pedagogical resources, which can be used in their entirety or as a basis for formulating new methodologies and educational tools in their classes.

Despite the resident's minimal contact with the students, the experience as a whole enabled great personal and professional growth, allowing reflection on teaching practices and the importance of more effective interaction with the class and the use of contemporary methodologies for teaching Science and Biology. These tools and strategies used in this immersion in EJAI classes can be used in face-to-face and remote classes, mainly to prepare education professionals to work in atypical teaching situations.

Thus, it is considered that programs such as PRP can contribute to the experience of undergraduates in different realities of formal education, observation of students' learning difficulties, particularly in relation to biological content and the search for the best way to intervene pedagogically, especially in times of pandemic. In addition, the PRP has gradually strengthened relations between Higher Education institutions and public schools.

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