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The nature of biology in the supervised internship: a systematic literature review

ARTICLE

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Abstract
This work aims to investigate how teachers in initial training have used teaching resources, scientific practices and faced challenges from the perspective of the Nature of Biology within the scope of the Supervised Internship. To achieve this goal, we applied the Systematic Literature Review in the Annals of the National Meeting of Research in Science Education and the National Meeting of Biology Teaching. The results obtained indicate that the works analyzed have treated the Supervised Internship in Biology Teaching in a general way, without considering the Nature of Biology while conducting activities. This aspect contributes to the conception of memoristic, decontextualized and content-based teaching.
Keywords: Nature of Biology. Biology Teaching. Supervised internship. Initial Training of Biology Teachers.

A natureza da Biologia no estágio supervisionado: uma revisão sistemática de literatura

Resumo
Este trabalho tem como objetivo investigar de que maneira os professores em formação inicial têm utilizado os recursos didáticos, as práticas científicas e enfrentado os desafios na perspectiva da Natureza da Biologia no âmbito do Estágio Supervisionado. Para alcançar tal intento, aplicamos a Revisão Sistemática de Literatura nos Anais do Encontro Nacional de Pesquisa em Educação em Ciências e do Encontro Nacional de Ensino de Biologia. Os resultados obtidos apontam que os trabalhos analisados têm tratado o Estágio Supervisionado no Ensino de Biologia de forma geral, sem considerar a Natureza da Biologia durante as atividades de regência. Esse aspecto contribui com a concepção de ensino memorístico, descontextualizado e conteudista.
Palavras-chave: Natureza da Biologia. Ensino de Biologia. Estágio Supervisionado. Formação Inicial de Professores de Biologia.

1 Introduction

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Biology is a science whose scientific status was obtained in a context where physicalist principles were predominant. This perspective was redefined based on the idea of unifying, through the Theory of Evolution, the experimental branches (Functional Biology) and the descriptive branches (Historical Biology) that make up this science (Mayr, 2005; Marandino; Selles; Ferreira, 2009).

Given the specificities of Biology, such as the description and comparison of morphophysiological structures, we believe it is essential to conceive the Supervised Internship (ES) from the perspective of this discipline, considering its epistemologies, since it is a unique and autonomous science (Mayr, 2005).

It is therefore necessary for the supervision activities in the SE to be directed towards overcoming a Biology Teaching based on a memoristic, expository and mechanical approach to school content (Marandino; Selles; Ferreira, 2009).

From this perspective, it is essential that the epistemologies of the sciences of reference are taken into account when developing activities in ES in school subjects. This is because the way in which knowledge is produced can differ significantly from one science to another, and can also differ internally within each science (Marandino; Selles; Ferreira, 2009).

In this scenario, we asked: "How have teachers in initial training used teaching resources, scientific practices and faced challenges from the perspective of the Nature of Biology within the scope of the Supervised Internship?". This paper aims to answer this question by means of a Systematic Literature Review (SLR), in the hope that the findings will broaden the inclusion of the Nature of Biology in the ES.

2 Methodology

According to Minayo and Sanches (1993), this is a qualitative study, the technical procedure of which used a Systematic Literature Review (SLR). This technique "is a

method that allows us to maximize the potential of a search by finding as many results as possible in an organized manner" (Costa; Zoltowski, 2014, p. 54).

This SLR was applied in the second semester of 2022 and the first semester of 2023 by systematically searching for papers that dealt with supervision activities during the Supervised Internship in Biology Teaching in the Annals of the National Meeting for Research in Science Education (ENPEC) from 2011 to 2023 and the National Meeting for Biology Teaching (ENEBIO) from 2014 to 2021[1].

The choice of these events is justified by the fact that they are promoted by entities that are widely respected in the field of Science Education and Biology Teaching, which foster discussions that include professionals from Basic Education and Higher Education.

The search for papers was carried out using the CTRL + G command in the Microsoft Edge browser, and the following descriptors were used individually: Biology Teaching, Supervised Internship, Initial Training, and Biological Sciences.

In order to refine the selection, we applied the following criteria for inclusion in the Annals of ENPEC and ENEBIO: explicitly containing one of the established descriptors in its title, abstract and/or keywords. The exclusion criteria were: i) repeated papers; ii) papers on teaching chemistry, physics or pedagogy; iii) papers unrelated to teaching biology at ES; iv) papers on foreign languages; and v) papers not developed in regular secondary schools.

Finally, we chose Content Analysis (Bardin, 2016) as the technique for examining the works selected via RSL and listing the categories, considering that it makes it possible to understand and extract messages, which will be presented in the next section.

3 Results and Discussion

At first, 1,453 papers were obtained, of which 779 came from ENPEC and 674 from ENEBIO. After being subjected to the inclusion and exclusion criteria, we found 28 papers for analysis (Chart 1).

[1] Both events are held every two years.

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Chart 1 - Papers selected for analysis from the ENPEC and ENEBIO editions

Event	Edition/ Year	Coding - Title of papers	Authors (Year)
ENPEC	VIII/2011	TR01- A percepção de alunos do Ensino Médio em relação à interação gene-organismo-ambiente	Schneider; Justina; Meglhioratti (2011)
	X/2015	TR02 - A construção de modelos no Ensino de Biologia: uma experiência na formação inicial de professores	Silva; Trazzi; Santos (2015)
ENEBIO	V/2014	TR03 - O Estágio Supervisionado no Ensino de Biologia como espaço de aprendizagem da profissão docente	Bastos; Silva; Alves; Oliveira; Rodrigues; Matos; Martins (2014)
	V/2014	TR04 - Ensinar e aprender a partir do Estágio Supervisionado: Biologia do ensino médio	Valladão (2014)
	V/2014	TR05 - Conscientização ecológica através de um jogo didático sobre os biomas brasileiros	Silva; Vallim (2014)
	V/2014	TR06 - O Estágio Supervisionado como foco na profissionalização docente: experiências vivenciadas no cotidiano escolar	Silva; Araújo; Martins (2014)
	V/2014	TR07 - A formação de professores: relato de uma experiência do Estágio Supervisionado com o uso da fotografia para ensinar Biologia no ensino médio	Barros; Neves (2014)
	VI/2016	TR08 - Educação inclusiva no Ensino de Biologia: experiência no Estágio Supervisionado	Menezes; Neves; Nunes (2016)
	VI/2016	TR09 - A importância do Estágio Supervisionado para o Ensino de Biologia: um relato de experiência	Lyra; Maruchi (2016)
	VI/2016	TR10 - Um olhar sobre o Ensino de Biologia através do Estágio Supervisionado	Silva; Silva (2016)
	VI/2016	TR11 - Estratégias metodológicas no Ensino de Biologia desenvolvidas no Estágio Supervisionado III: alternativas facilitadoras no processo de aprendizagem	Oliveira; Silva (2016)
	VI/2016	TR12 - A experimentação no Ensino de Botânica: um relato de experiência	Trevisan; Alves (2016)
	VI/2016	TR13 - Estágio Supervisionado: uma etapa relevante na formação docente	Odorcick; Zanon; Wirzbicki (2016)
	VI/2016	TR14 - O Estágio Supervisionado na formação inicial do professor numa perspectiva reflexiva	Melo; Barreiros; Gianotto (2016)
	VI/2016	TR15 - Estágio Curricular Supervisionado: momento de ensinar e aprender	Luft; Oldoni; Wirzbicki (2016)
	VI/2016	TR16 - Ensino de zoologia no ensino médio: uma experiência do Estágio Curricular Supervisionado II do curso de licenciatura em Ciências Biológicas – UFG	Peixoto; Shuvartz; Chaves (2016)
	VII/2018	TR17 - Da experiência a formação: o estágio como espaço de diálogo no processo formativo do professor de Biologia	Santos; Santana; Santos; Silveira (2018)
	VII/2018	TR18 - A genética da vida real: os três momentos pedagógicos no ensino de alterações cromossômicas	Figueiredo; Rodrigues (2018)
	VII/2018	TR19 - O cordel como método avaliativo no Ensino de Zoologia	Barbosa; Gallão (2018)

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	VII/2018	TR20 - Estágio Supervisionado em Biologia: construindo reflexões	Paranhos; Paranhos (2018)
	VII/2018	TR21 - Relato de experiência de estratégias de ensino para a aprendizagem de Biologia para estudantes do terceiro ano durante o Estágio Supervisionado	Silva (2018)
	VII/2018	TR22 - Uma experiência em ensino de evolução por meio da contextualização e aplicação de jogo didático	Figueiredo; Santos; Guia; Bontempo (2018)
	VII/2018	TR23 - Genética: passado, presente e futuro(s) – relato de uma prática docente	André; Gomes (2018)
	VIII/2021	TR24 - Potencialidades do dicionário biológico como ferramenta pedagógica no Ensino de Biologia	Aguiar; Paulo; Silveira (2021)
	VIII/2021	TR25 - Diversificação dos recursos didáticos no Ensino de Biologia: Estágio Supervisionado em ação	Nascimento; Moura; Menezes (2021)
	VIII/2021	TR26 - Relato de experiência: Estágio Supervisionado e a Formação do Professor de Biologia	Santos; Mota (2021)
	VIII/2021	TR27 - Oficina pedagógica como metodologia para o Ensino de Biologia Celular	Jarenczuk; Kovalski (2021)
	VIII/2021	TR28 - O uso de dinâmicas: os desafios frente à indisciplina	Abreu; Freire; Souza (2021)

Source: Research data.

The selected papers presented various activities developed during the Supervised Internship in Biology Teaching, which were analyzed by establishing the following categories: i) didactic resources used to develop the Supervised Internship in Biology Teaching, ii) the scientific practices of the Biological Sciences in the Supervised Internship in Biology Teaching; and iii) the characteristics of the Supervised Internship in Biology Teaching.

3.1 Didactic resources used to develop the supervision activities in the Supervised Internship in Biology Teaching

In this category, we identified the didactic[2] resources most used by undergraduates in the development of supervision activities in the Supervised Internship in Biology Teaching in the following works: TR02 to TR28.

[2] We have adopted Melo's (2019, p. 15) definition of didactic resource, i.e. "pedagogical creations developed to facilitate the process of acquiring knowledge".

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In their practice, teachers have relative autonomy to choose the didactic resources best suited to teaching a lesson, depending on the content they are going to cover and the objectives they want to achieve. Considering that they will help them mediate knowledge, their diversity favors the relationship between the teacher, the student and knowledge (Melo, 2019).

Bearing in mind that the teaching and learning processes are specific, it is important to mention that there are teaching resources, which relate to teaching, and student teaching resources, which relate to learning. The same teaching resource can be used by both the teacher and the student, as long as the purpose of each is preserved (Barguil, 2016).

Mota (2019) states that practical classes can motivate and provide moments of interaction between students. An example of this is the record obtained in the TR02 project, which states that "when the practical activity to be developed in the following lesson was announced, it was possible to see **the students' enthusiasm and expectation for that lesson** [...]" (Silva; Trazzi; Santos, 2015, p. 6, emphasis added). In addition to this, let's look at the excerpt below from TR27, which used a pedagogical workshop to make teaching models during the supervised internship in Biology Teaching, and the same process is reported in TR03, TR06, TR10, TR11 and TR13. The authors of TR27 state that, during the lecture, the students were indifferent, but when they were told that they were going to make didactic models, they became

> [...] **euphoric, anxious, enthusiastic** about the proposal [...]. An interesting fact occurred at this stage of the model's construction: **the students who didn't have as much of a connection began to interact,** share materials and even **help their colleagues** [...] (Jarenczuk; Kovalski, 2021, p. 1.609, emphasis added).

In the same way as the pedagogical workshop, practical activities such as experimentation and the application of didactic games can stimulate these moments of interaction between students and their peers, as well as engaging and involving them in the activities proposed by the teacher. According to the TR05 study, during the application of the didactic game "[...] the students were very **participative and motivated**." (Silva; Vallim, 2014, p. 4315, emphasis added). Papers TR02, TR03, TR09, TR10, TR11, TR12,

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TR14, TR15, TR20, TR22, TR26 and TR28 corroborate the fact that the students interacted during the practical activities, sometimes with their classmates and sometimes with the undergraduate students.

According to TR10, during the "[...] Histology lesson, **didactic models** presenting the main levels of organization of the human body **were displayed** [...]" (Silva; Silva, 2016, p. 6.641, emphasis added). Likewise, TR08 used the didactic model as a learning facilitator and TR16 and TR25 used didactic games.

We understand that this type of resource is important, as it allows students to better visualize and contextualize biological content, as expressed in the TR06 work, whose objective was to produce a didactic model to "[...] facilitate the visualization of cytoplasmic membranes and organelles, providing students with the use of alternative materials in the teaching/learning of Cytology" (Silva; Araujo; Martins, 2014, p. 4241, emphasis added).

Thus, it is very significant when students build this resource, making the learning process even more productive and empowering, since in addition to supporting the teaching and learning processes, they also contribute to the teacher-student-knowledge relationship (Mota, 2019).

In biology teaching, the diversification of teaching resources is interesting because it can motivate students in the development of activities and, therefore, transgress a concept of memoristic and content-based teaching. Adding other resources to biology lessons can be useful, but TR13 reported difficulty in keeping the students' attention throughout the lesson: "[...] what struck us was that **during the development of this activity the students seemed to be discouraged** [...]" (Odorcick; Zanon; Wirzbicki, 2016, p. 2,331, emphasis added).

When using teaching resources, it is essential that the trainee plans and is clear about their purpose, as these tools will influence the mediation between the student and the acquisition of new knowledge (Melo, 2019).

In this context, didactic resources enable students to understand the themes worked on in the classroom, as their use is intrinsically linked to the learning objectives that the teacher wants to achieve, but which are difficult to achieve through lectures alone. In

addition, these resources can contribute to the inclusion of the Nature of Biology in the teaching of this curricular component, as long as they include scientific practices in which students make observations, comparisons and descriptions of morphological, anatomical and/or molecular structures (Azevedo; Motokane, 2013).

It is well known that lectures are indispensable for teaching and learning processes, as they introduce the topics that teachers wish to cover in class, for example.

Krasilchik (2019) points out that one of the purposes of the lecture is to help introduce the subject that the teacher will be working on, however, the excessive use of this didactic modality is responsible for maintaining the student's passive behavior. According to the author, as this type of lesson progresses, students' concentration tends to decrease. In this context, it is possible that the TR04 paper encountered difficulties during the course, since it exclusively used this didactic modality in conjunction with the textbook to mediate the lesson:

> What made me notice that these "**unruly**" students were paying more attention in class was their speech during the lesson, the things they said causing laughter from the rest of the class. Here are a few words that express the indiscipline of certain students in the first few lessons: "[...] Ugh, why do we have to learn that? It's useless [...]" "[...] I'm going to play on my cell phone, which is much more interesting than sitting here [...]" (Valladão, 2014, p. 4.752, emphasis added).

We suppose that this situation may be related to the lack of dynamism during the lesson, culminating in the students' indifference, expressed by "indiscipline". According to Libâneo (2010), this behavior may be associated with the traditional way in which the class was developed, structured only in the expository modality and in the textbook.

Even though it is an important resource for planning teaching work (Rodrigues; Mohr, 2023), teachers who center their teaching practice on the textbook renounce their autonomy and freedom, since teaching will be anchored in materials whose production is to meet a commercial demand, a factor that reinforces a technicist conception of the teaching profession (Krasilchick, 2019).

Other elements - news stories and videos - were used to support the supervision activities in the Supervised Internship in Biology Teaching. The TR14 paper, for example, used videos to review the content on active and passive transport that takes place in the

cell's plasma membrane. The author points out that "[...] as the evaluation date was set, I gave a review lesson, in which **I presented videos** that simplified the transports learned at the beginning of the internship" (Melo; Barreiros; Gianotto, 2016, p. 2,447, emphasis added). Assignments TR05, TR10, TR14, TR15, TR17, TR22 and TR23 also used news stories and/or videos in their supervision activities.

Unlike the works mentioned so far, which made use of teaching resources such as videos and reports, the TR19 paper made use of Cordel as a teaching resource the excerpt below shows how a lesson was conducted about:

> [...] the animals of the vertebrate phyla, showing the animals of these phyla taxidermized and/or kept in alcohol the following day. After these presentations in the discipline, we read the verses of the cordéis, slowly, so that the students had time to analyze and identify the phylum that was being mentioned in the reading (Barbosa; Gallão, 2018, p. 4.448, emphasis added).

Both this paper and TR17 used biological collections of vertebrate and invertebrate animals, respectively, as a teaching tool. Didactic Zoology Collections are an option capable of making biology teaching more attractive and dynamic because, by giving students access to specimens of species, they can bring biological knowledge closer to students' everyday lives (Azevedo *et al*., 2012).

Projects TR07 and TR21, during their supervision activities at ES in Biology Teaching, opted for developing a project. According to Krasilchik (2019), projects are characterized by being activities in which students have to solve a problem, either individually or collaboratively with their peers. In this type of activity, students prepare reports, for example, as a product that materializes the conclusions of the project developed, which did not occur in the works mentioned.

In the TR07 paper, photography was used as a didactic tool and, through it, the students freely observed and analyzed the urban environment, without the teacher having established a theme for discussion, thus, "[...] in the field, the students had two hours to photograph what interested them. **The teacher didn't set any parameters or themes** [...] (Barros; Neves, 2014, p. 5.172).

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Although this type of activity motivates students, it is important that teaching situations are planned and have pedagogical intent, so that they can contribute to achieving the proposed objectives. In addition, the curricular content inherent to Biology must be worked on concomitantly with the practical activity, so as to avoid theoretical emptying resulting from an action that focuses merely on practice without articulation with theory.

In order to carry out the supervision activities for the Supervised Internship in Biology Teaching, TR21 used the "[...]**Green Project**, as an objective to interact students with botany and verify the knowledge of high school students about medicinal plants [...]" (Silva, 2018, p. 3353, emphasis added) and through the planting of seedlings with such properties, worked on the notions of cultivation of these organisms.

Project development is an interesting didactic modality for motivating students to be proactive and persistent, which is why steps such as: establishing a problem to investigate, planning and drawing up a timetable are so important. This type of activity requires the biology teacher to be able to guide and support students in solving the problems that may arise. In this sense, if the teacher is insecure about conducting this type of activity, it could discourage student involvement in the proposed projects (Krasilchik, 2019).

Unlike paper TR07, which did not cover biological topics during the supervised internship activities, paper TR24 asked students to create a biological dictionary to help them learn biological concepts. Understanding the concepts pertinent to the Biological Sciences is extremely important so that students can make more assertive choices when faced with issues that require critical positioning, since they will be scientifically based (Pedrancini *et al.*, 2007).

And to finish off this category, we have paper TR18, which theoretically based the lessons on chromosomal alterations on the Three Pedagogical Moments (Delizoicov; Angotti; Pernambuco, 2011). This theory aims to put students through the stages of initial problematization, organization of knowledge and then its application.

We can see, then, that the lesson preparation stage is complex and requires the teacher to have a range of skills and competences in terms of using teaching resources.

Despite the use of various resources, most of the works did not bring students closer to the nature of biology, as the activities developed did not relate to how biological knowledge is produced. An example of this is the scientific methods used in evolutionary biology, such as observing, comparing and describing morphological aspects in order to create historical narratives (Mayr, 2005).

With this in mind, the Supervised Internship can be characterized as a space of encouragement and possibilities, since, during the supervision activities in Biology Teaching, undergraduates can reflect on the best strategy to mediate the learning process of biological knowledge. In this way, by positively impacting this process, it is possible to promote quality, meaningful and effective biology teaching.

3.2 The scientific practices of the Biological Sciences in the supervision activities of the Supervised Internship in Biology Teaching

The construction of scientific knowledge requires a series of practices, such as developing hypotheses, collecting and analyzing data, which are responsible for giving robustness, veracity and reliability to science. This category groups together the works TR01, TR07, TR09, TR11, TR12, TR15 and TR17, which, during the supervised internship in Biology Teaching, describe the development of activities that tried to bring students closer to the scientific practices inherent in the production of biological knowledge

The works TR07, TR09 and TR17 enabled students to observe the natural environment by going out into the field and handling species. On TR07, during the field activity, the students had the opportunity to observe and photograph the natural environment, which helped to address issues related to the processes of adaptation of organisms, as did TR09:

> In order for us to be able to work on practical lessons with the students, even without the Science/Biology laboratories, an alternative way we found was through a field trip, held in the school's surroundings, where we were able to discuss with the students **aspects of the environment that enable plants to grow** and show that, given the necessary conditions, they can grow even where we least expect it,

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> such as in the bricks on the school's sidewalk, for example (Lyra; Maruchi, 2016, p. 4,237, emphasis added).

The observation method, as well as classification and description, is a widespread practice in ecology studies (Azevedo; Scarpa, 2017). When proposing practical activities, it is essential to establish an association between these scientific practices and the specific contents of Biology so that we don't run the risk of emptying the teaching process of biological concepts and reinforce the belief that teaching this science is memoristic and fragmented (Marandino; Selles; Ferreira, 2009).

According to Mayr (2005), biological knowledge is built predominantly on concepts. This stems from the fact that biological events are unpredictable, contrary to the laws of physics, because organisms are complex and are influenced by a variety of random factors. In the context of biology teaching, the learning of concepts also needs to occupy a central place because, once they have been appropriated, students can participate critically in debates involving advances in biotechnology, for example, thus broadening learning with the application of knowledge outside the school context (Pedrancini *et al.*, 2007).

In addition to this, it is essential that biological concepts are approached from a historical perspective, which takes into account their constitution over the years, as TR01 did, when developing the regency activity based on "[...] contextualization of the gene, DNA and chromosome in the eukaryotic cell; history of heredity and the concept of gene in different historical periods; concept of gene in different historical periods, and the deterministic view of gene/DNA." (Schneider; Justina; Meglhioratti, 2011, p. 07).

In this way, by exploring biological concepts we can conceive of teaching biology that is coherent and integrated with society, and we can also break away from the notion that scientific knowledge is detached from the political, cultural, economic and social context in which it was and is produced (Gil-Pérez *et al.*, 2001; Meglhioratti *et al.*, 2009).

Papers TR11 and TR15 developed a laboratory experiment to extract DNA from bananas and onions, respectively. Although TR11 mentioned the importance of error for learning biological knowledge, he presented a misconception that the scientific method is infallible "[...] **Despite all the caution in carrying out the experiment and even following**

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the protocol correctly, it was only possible to visualize DNA from one group of the four groups formed." (Oliveira; Silva, 2016, p. 6,699, emphasis added).

The construction of scientific knowledge is not linear, nor is it produced in just one way. Considering this aspect, scientific methods are not an agglomeration of steps to be completed in a mechanical and rigid way, as trial and doubt are present in scientific practices (Gil-Pérez *et al.*, 2001).

The TR12 assignment was the one that offered the most scientific practices, giving students the opportunity of

> [...] **collecting plant samples** that would be classified according to the plant groups studied. **Several slides of the collected samples were prepared** together with the students to visualize the stomata, tissues (chlorophyll parenchyma, lacunose parenchyma) and epidermis of the leaf. [...] With the leaves and roots collected from different angiosperms, the students **classified the plant samples** as belonging to mono- and dicotyledonous plants. After each practice, the students **drew the structures they saw under the microscope** in their activity guide (Trevisan; Alves, 2016, p. 6,729-6,730, emphasis added).

As well as the method of observation, the description and comparison of structures are indispensable to the Biological Sciences, especially when referring to its historical branch, since it is not possible to directly observe the evolutionary events that influence the adaptations of species (Azevedo; Motokane, 2013).

In the works analyzed, the topics covered in the activities include the functional branch of Biological Sciences, which shows its hegemony over the descriptive branch, in which the Theory of Evolution is inserted. This theory is central to the movement to unify and overcome the physicalist and vitalist conceptions attributed to biological phenomena during the Scientific Revolution (Mayr, 2005).

Integrating the nature of biology with its teaching at school is important for a holistic understanding of the biological sciences. The work carried out during the internship, most of it very incipient, includes some general elements of scientific practice. However, it is essential to consider the specificities of Biology in teaching practices, as this science has very peculiar characteristics. If they are disregarded, this can reinforce the idea of teaching biology in a fragmented way, disconnected from students' daily lives.

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3. 3 The characteristics of Supervised Internship in Biology Teaching

In this category, papers TR03, TR04, TR09, TR13, TR14, TR17 and TR23 reported on experiences during the supervised internship in biology teaching. It is known that the integration of undergraduates into the school is crossed by several issues: i) insecurity about the development of the regency; ii) the welcoming and receptiveness of the institution, teachers and students of Basic Education.

Papers TR04, TR13 and TR23 describe their hesitation when teaching Cytology, Evolution and Genetics, in that order. TR13 pointed out that "[...] **the first topic at the beginning of the course caused us some concern and fear**, after all Evolution has always been a content considered difficult to work with in schools, because this is a **'controversial' topic**, where there are discussions about the various opinions on the subject [...]" (Odorcick; Zanon; Wirzbicki, 2016, p. 2,329, emphasis added).

In this respect, Dorvillé and Selles (2016) point out that it is a student's right to have access to a pluralism of knowledge beyond what is taught in the family or in their community. In this sense, the classroom is not just a place where we can socialize the knowledge inherent in biology in a disconnected way, but where students can access plural knowledge, expanding their repertoire of knowledge in order to make critical decisions.

In order to become a Biology teacher, undergraduates need to develop pedagogical and disciplinary knowledge, which is necessary in teaching practice, with the ES being "[...] a space-time for learning and sharing knowledge acquired during training [...]" (Sousa; Indjai; Martins, 2020, p. 10).

According to Carvalho and Gil-Pérez (2011), knowing the curricular component to be taught is essential, but not the only one, for the biology teacher, since the weakness of this dimension can lead to a mechanized teaching process, in which the teacher will only be a reproducer of what the textbook presents.

In addition to the insecurity about the skills needed to teach Biology content, TR17's work expressed that the challenges of dealing with various demands, such as

students outside the regular teaching age group, can trigger in Biology teachers in their initial training "[...] **the fear of continuing in the profession** and living with those situations leads teachers at the beginning of their careers to give up teaching, given all the limitations that school spaces have." (Santos *et al*., 2018, p. 3.417, emphasis added).

EThis doubt is part of the initial training process, which he is experiencing and, therefore, the relevance of the ES as a space-time that brings him closer to daily school life and the challenges of the teaching profession in order to acquire confidence and security. Another aspect noted was the inclusion of the teacher in initial training in the school and the importance of the interrelationships between student-teacher-supervisor, in other words, the relationship between the student, the teacher in basic education, and the teacher in higher education. Papers TR03 and TR14 show us the importance of these aspects and how they are expressed in this training process, thus "The plans were drawn up jointly with **the internship teacher and the teacher responsible for the class**, who at different times corrected some points and pointed out guidelines to improve teaching practice." (Melo; Barreiros; Gianotto, 2016, p. 2.441, emphasis added).

This report shows us the importance of the mentoring that the teacher in the supervised internship and the teacher in the school need in order to experience a meaningful training process, as their experience can help the trainee overcome setbacks, whether scientific or didactic. It is also important for the supervising teacher to know that their contributions can be significant to the training of their future colleague and to reject the mistaken belief that the placement of the student in the school is just another work requirement (Krasilchik, 2019).

Knowing that the student is a peer of the supervising teacher and vice versa helps to avoid unpleasant situations such as those reported by TR09, when the students were not allowed to use the teachers' room and were forced to wear white coats to distinguish them from the teaching staff. In addition, the teacher-supervisor didn't give feedback and

> During the lessons, **she interfered a lot to discuss other subjects with the students** [...] In addition, there were times when **the teacher questioned our knowledge and mastery of the content in front of the students**, which, in our opinion, is not the ideal thing to do, as this totally takes away the trainee's autonomy in the classroom (Lyra; Maruchi, 2016, p. 4.235, emphasis added).

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Essas tensões reafirmam a importância do estabelecimento de uma convivência colaborativa e de reciprocidade entre os licenciandos e os professores-supervisores, para que se evite uma esfera fiscalizatória sobre a atuação docente um do outro e que pode comprometer esse processo formativo (Krasilchik, 2019).

In conclusion, we recognize the importance of the Supervised Internship for the training of Biology teachers, since this space allows the undergraduate to experience the different nuances of the school and the teaching profession, which contribute to the construction of the Biology teacher's identity, especially if reflections on these experiences are stimulated in dialogue with theoretical references.

4 Conclusions

This work sought to answer how teachers in initial training have used teaching resources, scientific practices and faced challenges from the perspective of the Nature of Biology within the scope of the Supervised Internship.

Analysing the teaching resources, which are important for contextualization in biology teaching, especially in topics involving molecular biology, as they require a greater capacity for abstraction on the part of the students, we found a predominance of models built with low-cost materials, such as modelling clay.

We also highlight the importance of teaching resources being used critically by the teacher, so that they enhance the processes of teaching and learning biological content. It is therefore important for schools to offer these teaching resources, whether they are analog, digital or made from low-cost materials.

After reading and analyzing the 28 selected papers, we found that only two of them considered the nature of biology in the supervised internship activities in biology teaching. The other papers did not consider the nature of biology in the supervised internship activities in biology teaching, as they promoted classes to make models and apply didactic

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games, which does not include widespread scientific practices in the biological sciences, such as the observation and comparison of morphological and/or physiological structures.

In addition to this, the works that only used the teaching and solving of questions reinforce the label of a content-oriented and memoristic curricular component attributed to Biology Teaching, which contributes little or nothing to the formation of subjects capable of taking a critical stance towards the individual and collective demands that go beyond the school space.

The aim of this article is to bring up a topic that has been little discussed to date, which is the integration of the nature of biology in the teaching of this curricular component, since it is essential to consider that each area has its own specificities, which need to be taken into account in initial training in higher education.

In this sense, we draw attention to the need for the pedagogical projects of Biological Sciences teaching courses to integrate discussions about the Nature of Biology, with a goal of providing initial training for Biology teachers who consider the specificities of Biological Sciences in their pedagogical practice, which can contribute to improving the quality of basic education in the country.

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