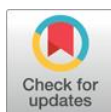


## A mapping of Supervised Practicum in Biological Science: Brazilian scientific panorama



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### Abstract

The aim of this research was to carry out a Systematic Literature Review on Supervised Curricular Internships in Undergraduate Biological Sciences in order to reveal how the subject has been approached in the area of Science Teaching. For this purpose, we present the results of a qualitative study of 102 articles published on the Periodical Portal of the Coordination for the Improvement of Higher Education Personnel in the last ten years. Among them, the journal *Investigación y Experiencias Didácticas* stands out with the highest number of publications, whose most emphasized themes were "teacher training", "pedagogical intervention" and "conceptions", focusing on undergraduate students, educators and documents. No studies were found in the states of Acre, Sergipe, Mato Grosso or Espírito Santo. The Federal University of Paraná was the institution with the most publications. The conclusion is that there is a need to expand research into the training role of higher education teachers since the internship has been investigated from different educational perspectives.

### Keywords

teaching; elementary school; methodologies.

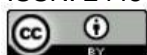
### Um mapeamento sobre Estágio Supervisionado em Ciências Biológicas: panorama científico-brasileiro

### Resumo

Esta pesquisa teve como objetivo realizar um estudo de Revisão Sistemática de Literatura sobre Estágio Curricular Supervisionado em licenciatura em Ciências Biológicas de modo a revelar como a temática vem sendo abordada na área de Ensino de Ciências. Para tanto, apresentaram-se os resultados de uma pesquisa qualitativa que contemplou 102 artigos publicados no Portal de Periódicos da Coordenação de Aperfeiçoamento de Pessoal de Nível Superior nos últimos dez anos. Dentre eles, a *Revista Investigación y Experiencias Didácticas* se destaca com maior número de publicações, cujas temáticas mais enfatizadas foram "formação docente", "intervenção pedagógica" e "concepções", tendo como foco de investigação licenciandos, educadores e documentos. Não foram encontrados trabalhos realizados nos estados do Acre, Sergipe, Mato Grosso e Espírito Santo. A Universidade Federal do Paraná foi a instituição com mais publicações. Com isso, conclui-se que há a necessidade de ampliar as pesquisas envolvendo o papel formativo dos professores do ensino superior, já que o estágio foi investigado em diferentes perspectivas educacionais.

### Palavras-chave

docência; educação básica; metodologias.



## Un mapeo acerca de la Pasantía Supervisada en Ciencias Biológicas: panorama científico-brasileño

### Resumen

Esta investigación tuvo como objetivo realizar un estudio de Revisión Sistemática de Literatura sobre la Pasantía Curricular Supervisada en licenciatura en Ciencias Biológicas de modo que revele como la temática fue tratada en el área de la Enseñanza de Ciencias. Para eso, se presentaron los resultados de una investigación cualitativa que abarcó 102 artículos publicados en el Portal de Periódicos de la Coordinación para el Perfeccionamiento del Personal de Educación Superior en los últimos diez años. De ellos, la *Revista Investigación y Experiencias Didácticas* se destaca con mayor número de publicaciones, cuyas temáticas más enfatizadas fueron “formación docente”, “intervención pedagógica” y “concepciones”, que tuvieron como enfoque de investigación estudiantes de licenciatura, educadores y documentos. No fueron hallados trabajos realizados en los estados de Acre, Sergipe, Mato Grosso y Espírito Santo. La Universidad Federal de Paraná fue la institución con más publicaciones. Con eso, se concluye que hay la necesidad de ampliar las investigaciones relacionadas al papel formativo de los profesores de la enseñanza superior, ya que la pasantía fue investigada en diferentes perspectivas educacionales.

### Palabras clave

docencia; educación primaria; metodologías.

## 1 Introduction

Teacher training is a broad term that refers to both initial and continued training, consisting of training courses offered by education departments, workshops, and postgraduate studies, among others. After the expansion of Internet availability in the 2000s, people began to have faster access to a lot of data and information. This impacted learning and the profile of the generation of children and young people who arrive at school, with new educational demands from the teaching and pedagogical staff. In this scenario, teacher training plays an essential role, requiring innovations, training, updates, and insights from various government bodies to support actions aimed at training, as well as policies capable of improving the quality and rates of education offered in the country.

In this picture of implementation of educational policies, taking into account the provisions of educational legislation in 2018 (Pinho; Santos; Brasileiro, 2022), approval of the third version of the Resolução do Conselho Nacional de Educação (CNE) nº 2/2019 (Brasil, 2019), meaning the Base Nacional Comum Curricular (BNCC), having as a basis for its construction the Lei de Diretrizes e Bases (LDB) and the Parâmetros Curriculares Nacionais (PCN). The BNCC is a normative document that defines the organic and

progressive set of essential learning that must be developed in Basic Education (Brazil, 2019).

The BNCC then becomes the national benchmark for formulating the curricula of school systems and networks in states, municipalities, and the Federal District. This has a direct impact on the curriculum, as Pinho, Santos, and Brasileiro (2022) point out, enhancing its centralization, as well as on teacher training, since the BNCC presents a reductionist conception of teaching, having as its main function the mastery of practical knowledge, with an overvaluation of know-how weakening the unity of theory and practice (Mussi, 2022). This information about know-how can be seen in the following excerpt:

[...] the BNCC indicates that pedagogical decisions must be oriented toward the development of competencies. By clearly indicating what students should 'know' (considering the constitution of knowledge, abilities, attitudes, and values) and, above all, what they should 'know how to do' (considering the mobilization of these knowledge, skills, attitudes, and values to resolve complex demands of everyday life, the full exercise of citizenship and the world of work), the explanation of competencies offers references for strengthening actions that ensure the essential learning defined in the BNCC (Brazil, 2018, p. 13).

Still, according to Mussi (2022), the Base Nacional Comum para a Formação Inicial de Professores da Educação Básica (BNC-Formação) represents a depletion of teacher training, favoring shallow, technical, standardized and pragmatic training. This criticism can be seen, for example, when BNC-Formação emphasizes in its annex that universities must adapt and develop their training projects based on general teaching and specific competencies focused on professional knowledge, professional practice, and professional engagement (Brazil, 2019). Thus, when new teachers enter schools, they will be ready to develop practical know-how with their students. The emphasis falls on technical aspects and training based on following what was determined by the creators of the document, without space for critical thinking.

However, we argue for a conception of training as a continuous process with its own identity, linked to an institutional project that articulates higher education and basic education institutions, with research and extension as guiding principles for educational practices. Furthermore, this conception recognizes the importance of social, cultural, economic, political and institutional issues.

In this sense, higher education institutions must develop their curricula to provide comprehensive, flexible training, with content and practices that lead students to intellectual autonomy, in addition to establishing a good connection with basic education,

through Supervised Curricular Internships (SCI) and other practices that insert them into their future field of work.

Regarding initial training and internship, Barreiro and Gebran (2006) state that they must be guided by the investigation of reality, by an intentional and reflective practice between teacher trainers and students in training when critically evaluating their thinking and practice. Furthermore, initial training and internships must enable the teacher in training to overcome the initial difficulties of contact with the teaching activity and offer possibilities for reflection on what teaching is, the practice of teaching, the school, and the student's reality (Santos; Brumes, 2009). The aforementioned authors add that the internship should provide the acquisition of skills for appropriate intervention and enable the investigation and experience of pedagogical projects, representing a space for knowledge and research into reality.

For Tardif (2002), the academic through the internship, moving between University and school, can weave a network of relationships, knowledge, and learning, not to criticize, but rather of understanding to overcome it. The characteristic of pedagogical practice, with a supervisory, hierarchical, and/or inspection character (Pedras; Seabra, 2016; Tafoi, 2011), was initially addressed around the 1980s, when the function of supervising pedagogical practice was limited to monitoring internships in initial teacher training (Alarcão; Tavares, 2003).

The Political-Pedagogical Project (PPP) of the degree in Biological Sciences at the Universidade do Estado do Rio Grande do Norte (UERN) points out that future teacher must, as soon as possible, get to know the school, insert themselves in it and reflect on their reality. Thus, unlike what happened in the past, it does not intend to evaluate or simply criticize the school, but rather to propose new and creative solutions to the challenges faced in the school context, as well as contribute to the construction of one's own teaching identity.

For this to happen, the figure of the teacher trainer is essential, who will help the academic to understand that the internship activities carried out by them at school seek changes and collect data to identify possible failures and shortcomings of education (Pietrobon; Zeaginski, 2009).

Another highlight given to training is pointed out by Lüdke (2009) when he emphasizes that the school teacher can contribute with reflections and experiences

acquired during his career, as well as detect problems and gaps in teacher training. So, the school's supervising teacher, by welcoming the student in training, collaborates in their process, leading them to a better understanding of the discipline, and the teaching area and facilitating techniques for the production of knowledge (Praxedes *et al.*, 2018). Furthermore, it recognizes that the role of the teacher trainer is to provide guidance, supervision, reflection, and evaluation to be given to future educators, within the internship field.

Given the information presented, we raise the following questions: what is already known about Curricular Internships for a degree in Biological Sciences? How has this topic been addressed in articles published in the area of Science Teaching?

In this sense, this article is justified because the Supervised Internship is considered the moment of search, of encounter with the school universe, full of possibilities, in which the academic establishes the relationship between theoretical and practical knowledge built while still at university. Also, by pointing out specificities found in the various articles analyzed, we will be able to understand the particularities of the courses, point out gaps, and verify the demands of professionals in the area of Biological Sciences teaching; on the other hand, we can contribute to indicating possible strategies relevant to better teacher training to work in basic and higher education.

It is important to highlight that higher education institutions have the autonomy to regulate the curricular internships in their undergraduate courses (Jesus; Tolosa; Fernandes, 2020), therefore, when researching Biological Sciences degree, their internships vary in terms of workload distribution, activities to be developed, experiences in observations and conducting, among other particularities.

With this in mind, understanding the Supervised Internship in the Biological Sciences degree corresponds to a rich source of knowledge that must be taken into consideration for initial and continued training and possible reformulations of internship policies. Therefore, we developed this research to carry out a Systematic Literature Review study on Supervised Curricular Internship in a degree in Biological Sciences to reveal how the topic has been approached in the area of Science Teaching.

## 2 Methodology

This investigation is based on the assumptions of the qualitative approach, considering that it requires a detailed analysis of information, as this type of investigation

considers descriptive data relating to people, places, and conversations. According to Minayo and Deslandes (2007), qualitative research seeks answers to very particular questions, delving deeper into the meanings of actions, human relationships processes, and phenomena that cannot be reduced to the operationalization of variables. Lakatos and Marconi (2003) add that, in this type of research, the approach is based on understanding the phenomena from the perspective of the subjects who experience them and the social environment in which they are inserted.

Furthermore, this work highlights the steps of a Systematic Literature Review (SLR) to identify and interpret scientific studies based on a specific question (Mazur; Giordan; Coelho Neto, 2019). Galvão and Ricarte (2019) state that it is a type of research that follows specific protocols and that seeks to understand and give some logic to a large corpus of documents in a given context. This type is focused on its reproducibility by other researchers, explicitly presenting the bibliographic databases that were consulted, the search strategies, the selection process of scientific articles, the inclusion and exclusion criteria for articles, and your analysis process. The result of the SLR must contain new knowledge and not just reports of elements found in the literature used. Furthermore, the rigor adopted in the literature review should enable its replication and updating by other research and researchers in the future (Brizola; Fantin, 2017).

For this article, based on this methodological proposal, we mapped academic research produced from 2012 to 2022, looking for evidence of how researchers point to the production of knowledge, with a focus on undergraduates, supervisors, coordinators, and documents during the training experiences at SCI in a degree in Biological Sciences. With this, we elaborate on the main question: what is the panorama of scientific production on Curricular Internships in undergraduate courses in Biological Sciences? As secondary questions: which places of knowledge production about SCI and which themes are investigated? Which magazines publish with the SCI theme focused on the Biological Sciences course? What is the most investigated target audience?

With this set, in the next step, we use the Portal de Periódicos de Aperfeiçoamento de Pessoal de Nível Superior ([www.periodicos.capes.gov.br](http://www.periodicos.capes.gov.br)) as a source of search for bibliographic material. Its selection is justified because it is considered one of the largest scientific collections in the country, containing more than 49 thousand full-text periodicals and 455 databases with diverse content, containing a

significant number of national and international magazines from all areas of knowledge. We also used the SciELO Portal, which includes the production of articles produced in several countries in Latin America.

For the systematic investigation, we used the search by subject tool, on the home page of the aforementioned portals, using the following descriptors (or search terms) and Boolean operator AND to collect bibliographic material: “Supervised Internship” AND “Sciences”; “Supervised Internship” AND “Biology”. As a result of the search, we obtained, respectively, 503 and 97 articles when using the descriptors.

However, to verify whether the selected articles were in line with the research objective, we accessed each article, checking if they had as their research focus the SCI in Biological Sciences, aimed at Science Teaching and/or Biology, after reading the title, abstract and keywords, publication date and if they were free to access. Articles that did not meet this request were excluded. The criteria used for exclusion were:

- a) when it was research involving Supervised Internship in areas of knowledge that were not Biological Sciences, such as Pedagogy, Physics, Chemistry, Mathematics, and others;
- b) when information was obtained only from the abstract, without accessing the full article;
- c) when referring to the Supervised Teaching Internship in Postgraduate Studies;
- d) when it involved the Supervised Science and/or Biology Internship in Online Education;
- e) duplicate articles, meaning the articles that appeared in more than one publication.

This research was carried out manually, and we analyzed each work individually in all editions and numbers corresponding to the previously defined period. After applying the exclusion criteria, we reached a total of 102 articles. The content of the research and the systematic exploration of the articles made it possible to categorize essential elements for the procedures, the assessments, and the records of the corpus of this work, based on Bardin (2011), who conceives the corpus as the set of documents gathered to be subjected to analytical procedures. Continuing with Content Analysis, the steps were:

- l) pre-analysis, consisting of the organization of the material;

- II) exploration of the material, comprising an in-depth study of the corpus, in which, upon first reading, we created an Excel® table with the main information about the articles: year of publication, title, authors, publication, summary, research participants, and thematic;
- III) treatment of the results, in which the categories were interpreted, based on inferences substantiated by the adopted theoretical framework.

Thus, the analysis categories were created taking into account the research objectives, which will be described in the next topic.

### 3 Results and discussion

Given the 102 articles chosen for analysis, published from January 2012 to December 2022 (the period established for this research), we highlight some initial considerations. Table 1 shows the number of articles selected from scientific journals after applying the exclusion criteria, which are distributed in their respective scientific journals.

**Table 1** – Number of articles published by scientific journals in the period 2012-2022

Scientific journal	Nº	Percentage
Actio: Docência em Ciências	1	0.98
Amazônia - Revista de Educação em Ciências e Matemáticas ( <i>on-line</i> )	3	2.94
Atos de Pesquisa em Educação	1	0.98
Bio-grafía - Escritos sobre la Biología y su enseñanza	1	0.98
Cadernos GPOSSHE on-Line	1	0.98
Caminhos de Geografia	1	0.98
Ciência & Educação	6	5.9
Ciências em Foco	3	2.94
Colloquium Humanarum	1	0.98
Debates em Educação	3	2.94
Educação e Pesquisa	1	0.98
Educação em Revista	1	0.98
Educação Temática Digital	1	0.98
Educação, Ciência e Cultura	1	0.98
Ensaio: Pesquisa em Educação em Ciências (impresso)	2	1.97
Enseñanza de las Ciencias: Revista de Investigación y Experiencias Didácticas	11	10.79
Ensino de Ciências e Tecnologia em Revista (Encitec)	2	1.97
Ensino em Foco	1	0.98
Ensino em Re-Vista	1	0.98
Ensino, Saúde e Ambiente	1	0.98
Estação Científica (Unifap)	1	0.98
Formação Docente, BH	1	0.98
<i>Indagatio Didactica</i>	3	2.95
Inter-Ação	1	0.98
Investigações em Ensino de Ciências	1	0.98
Investigación en Didáctica de las Ciencias	1	0.98
Laplage em Revista	1	0.98
Olhar do Professor	1	0.98



REnCiMa - Revista de Ensino de Ciências e Matemática	2	1.97
Revista Amazônica	1	0.98
Revista Brasileira de Educação em Ciências e Educação Matemática	2	1.97
Revista Brasileira de Ensino de Ciência e Tecnologia	4	3.92
Revista Brasileira de Pesquisa em Educação em Ciências (RBPEC)	4	3.92
Revista de Educação	1	0.98
Revista de Educação, Ciências e Matemática	1	0.98
Revista de Ensino de Biologia da SBEnBio	5	4.9
Revista de Estudos Geoeducacionais	2	0.97
Revista de Instrumentos, Modelos e Políticas em Avaliação Educacional	1	0.98
Revista Docência do Ensino Superior	1	0.98
Revista Educação em Questão	1	0.98
Revista Electrónica de Enseñanza de las Ciencias	3	2.95
Revista Ensino de Ciências e Humanidades	1	0.98
<i>Revista Insignare Scientia</i>	4	3.92
Revista Metáfora Educacional	1	0.98
Revista Multidisciplinar em Educação	1	0.98
Revista Pemo	1	0.98
Revista Portuguesa de Educação	1	0.98
Revista Prática Docente	1	0.98
Revista Práxis Educacional	1	0.98
Revista Tecné, Episteme y Didaxis: TED	1	0.98
Revista Tempos e Espaços em Educação	1	0.98
Revista Vivências em Ensino de Ciências	4	3.92
Tear - Revista de Educação, Ciência e Tecnologia	2	1.97
Travessias	1	0.98
Uni-pluri/versidad	1	0.98
Total	102	100%

**Source:** Authors' own (2023).

When analyzing the productions with the theme of Supervised Internship in the teaching of Science and Biology, we found that the *Enseñanza de Las Ciencias: Revista Investigación y Experiencias Didácticas*<sup>1</sup> was the scientific journal with the largest number of publications, with 11 articles, followed by the *Revista Ciência & Educação*, with six works, and the Revista de Ensino de Biologia of SBEnBio, with five works. This result is expected because it is a journal dedicated to publishing research that particularly involves teaching Science and Biology. The rest varied between four and one publication.

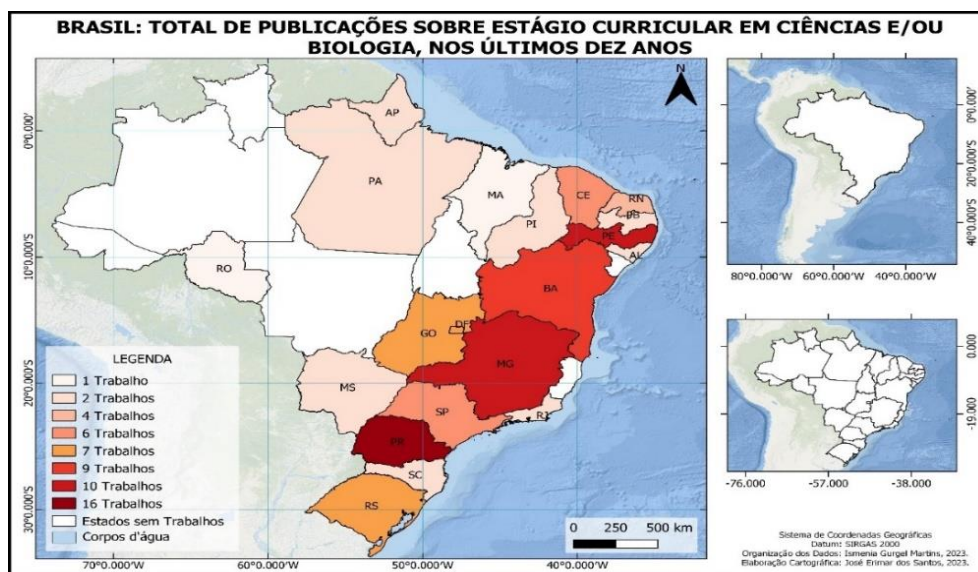
In the research by Rosa et al. (2020), carried out based on articles published in Qualis/Capes periodicals with strata A1 and A2, with the theme of initial teacher training in the last decade, they point out the *Revista Ciência & Educação* as being the second with the highest number of publications. The authors show as a result that Supervised Internship, Professional Identity, Theory and Practice Articulation, Teaching Knowledge, Pedagogical Strategies, and Information and Communication Technology are among the main themes in initial teacher training.

<sup>1</sup> Spanish publication.

As we observed the results presented in the 55 scientific journals, we realized that only one has as an objective to publish about this topic more frequently. This is cause for concern, not only about the need for further investigations and the possibility of expanding publications in impactful journals but also because it may indicate a dispersion on the topic. On the other hand, such results can serve as a warning about the importance of strengthening research groups that study SCI in Science and Biology teaching.

In addition to the analyzes presented so far, in this investigation we consider the distribution of research in different Brazilian regions, as shown in Figure 1.

**Figure 1** – Distribution of publications on Curricular Internship in Sciences and/or Biology (2012-2022)



**Source:** Authors's own (2022).

According to Figure 1, we can see that the state of Paraná (South region) published 16 times in the national journals investigated, followed by Minas Gerais (Southeast region) and Pernambuco (Northeast region), both with 10 publications. We found that, among the 26 Brazilian states, four had zero research on the topic in question, namely: Acre (North region), Sergipe (Northeast region), Mato Grosso (Central-West region) and Espírito Santo (Southeast region). The regions with the fewest publications were the North and Central-West.

Institutionally, we have the Universidade Federal do Paraná (UFPR), with six works; the Universidade de Brasília (UnB) and the Universidade Estadual de Santa Cruz (UESC), both with five works; the Universidade Estadual do Ceará (UECE) and the

Universidade Federal de Goiás (UFG), both with four research projects. These were the higher education institutions that produced the most Supervised Internship in Science and Biology teaching, bringing various perspectives about teacher training.

UFPR, in turn, has four Postgraduate Programs connected to the area of Education and Teaching, they are: Education (Master's - 1976/Doctorate - 2001); Education in Science and Mathematics (Master's - 2009/Doctorate - 2019); Education: Teaching Theory and Practice (Professional Master's Degree - 2013); and Science Education, Mathematics Education and Educational Technologies (Master's - 2020). All programs aim to strengthen the training of Basic Education professionals, especially those who work in public education networks, as there is a notable increase in demand at all levels of training (UFPR, [s.d.]). Therefore, this increases the commitment of Universities to offering quality initial and continued training, committed to diversity, inclusion, and social factors, and training researchers in the field of Education and Teaching.

So, in the publication entitled "Evaluation of Postgraduate Programs in the Area of Science and Mathematics Teaching in the Triennium 2007-2009", Nardi and Gonçalves (2014) highlight the evolution of the area since its institutionalization by Capes in 2000. The advancement that Postgraduate Studies in Science and Mathematics Teaching in the country experienced during this period seems to have been important for Capes, since from 2010 onwards, it has expanded the evaluation area 46, which came to be called the Teaching Area. Another issue pointed out by Nardi (2015) refers to the effects of government policies, which recently implemented national professional master's degrees in a national educational system, being the first in the area of teaching Mathematics (ProfMat) and Physics (Profis), among others.

Similar information is provided in the investigation by Sidone, Haddad, and Mena-Chalco (2016) on the conduct of public policies regarding the allocation of resources for collaborative projects between regions to increase the quality of scientific production from a certain amount spent on financing them. Another information brought by the authors is that the Southeast region shows intense coordination between researchers from these states, which increases the quantity and quality of academic-scientific productions.

In contrast, the results of the systematic review by Ferreira, Benites, and Souza Neto (2021) – which analyzed the production regarding SCI within the scope of Physical

Education in an attempt to establish considerations about the University-School relationship – point out the Southeast region as the most prominent, with the majority of journals from the state of São Paulo, followed by the Central-West region, with journals from the state of Goiás and from Brasília.

Based on these notes, we agree with the aforementioned authors when they indicate that the concentration of this group of authors working on the subject in these regions would be a possible inference to justify the Southeast and South as the largest producers of scientific research. In them, despite the increase in the probability of production, there is also an encouragement to think about discussions regarding the distribution of government/state funding to these groups of authors and higher education institutions. Our research also identified a greater concentration of publications in some regions of the country, such as the South, Southeast and Northeast.

After reading and analyzing the articles, the themes more often were: teacher training initial and continued, 37.26%; pedagogical intervention with the application of different methodologies, both in classes in basic education and at university, all during internships, 17.65%; and conceptions, with 12.75%, referring to scientific concepts specific to Biology or pedagogical concepts evidenced by undergraduate students and/or educators (Table 2).

**Table 2** – A survey of the themes present in each article analyzed, in the period between 2012-2022

Theme	Nº	% per year of publications
Assessment	2	1.96
Conceptions	13	12.75
Curriculum	2	1.96
Teacher professional development	1	0.98
Rural education	3	2.94
Emotions	2	1.96
Teaching and learning	2	1.96
Teaching, research and outreach	1	0.98
Teacher training	38	37.26
Identity and teaching knowledge	5	4.9
Pedagogical intervention	18	17.65
Teaching material	3	2.94
Motivation	1	0.98
High school student participation	1	0.98
Teaching profile	1	0.98
Pedagogical practice	5	4.9
Basic education teachers	3	2.94
Social representation	1	0.98

Total	102	100%
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**Source:** Authors' own (2022).

Publications related to “teacher training” covered 38 works. Of these, 19 involved the initial teaching training of academics in a Supervised Internship. One of the works sought to analyze the role of Supervised Internships in the initial training of UFPE Biological Sciences graduates (Barros, G.; Barros, M., 2022). In it, the authors confirm the importance of rethinking the training curriculum regarding internships, their structuring, and their conduct during initial training.

A survey conducted by Jesus (2022) aimed to recount experiences acquired during the progress of the Supervised Internship in high school. The author concluded that the internship offers the opportunity to maintain our first experience as a teacher, as it is an opportunity to ask ourselves if we really want to be teachers. Rotta and França (2018) investigated, from the perspective of undergraduate students, whether SCI disciplines have contributed to their initial reflective training. Data analysis indicated that the view on internships varies according to how far along into the course it happens, that is, those who have attended more internship subjects, in general, better understand the importance of experiencing the environment of their future profession.

In general, although the highlighted research focuses on the aspect of initial training, both address different points, bringing contributions regarding the place of the internship in the curriculum. However, we agree with Carvalho and Gil-Pérez (2006) when they state that it is not enough to carefully and fundamentally structure a curriculum if the teacher does not receive adequate preparation to apply it since they are the ones implementing the contents in the classroom.

The internship is considered a moment of self-knowledge and reflection. However, maturing is more recurrent in those who have already experienced different situations at school in various situations throughout their training and interaction with teachers, other undergraduates, basic education students, and the school management team. According to Freitas and Araújo (2012), one of the ways to contribute to these moments of reflection is through impression records, as they contain opinions, feelings, criticisms, desires, and points of view related to the work developed, resulting in a self-assessment that provides to academics new bases for understanding their own practice.

Regarding pedagogical interventions, we considered the application of activities developed in the classroom such as a pedagogical workshop, whose objective was to raise awareness about environmental education through the correct disposal of waste and reflection on the excessive consumption of materials to preserve the environment and the civic and environmental training of students (Ziesmann *et al.*, 2022); drug awareness in a workshop format to problematize a reality and develop a pedagogical proposal for intervention (Soares; Santos, 2021); food pyramid as a teaching resource, with a survey of which foods comprise the school menu, what nutrients these foods had, and where they fit in the food pyramid (Saldanha *et al.*, 2018).

These works point out theoretical and methodological paths of practices that can be used in the context of initial training in the Supervised Internship, seeking to bring investigative and reflective training into everyday life. Therefore, it encourages academics, supervising teachers, and basic education students themselves to reflect on their training, on the influence they have on other individuals, and the knowledge acquired in the context of formal education.

However, more than diversifying strategies, it is necessary to work towards exploring them to their full potential, providing critical training that allows teachers to have autonomy and initiative to overcome obstacles, and seeking to coordinate the entire school team (Viveiro; Diniz, 2009). We also highlight that the activities to be developed must provide a survey of students' conceptions, with subsequent group reflection, and, thus, contribute to questioning the traditional view of teaching and learning processes, as well as providing constant reflections on teacher practice.

About conceptions, Matos and Jardimino (2016) conceptualize them as a term that refers to a system of explanations about a certain phenomenon, which encompasses concepts, representations, and prejudices of each subject, reaching both criticism and appreciation of lived experiences. Given this concept, regarding this category, the investigations were very diverse, addressing aspects such as conceptions about the science lab (Zancul; Viveiro, 2012), showing that, based on their experiences, the undergraduates reported the perception of the lab as a collaborative space that provided improvement in practice; conceptions about Didactic Sequence (DS) (Souza; Machado, 2018), which, for undergraduate students, is formed by a set of activities to promote student learning, making the teaching-learning process dynamic and improving

the teacher practice; and conceptions of undergraduate students about the Internship in Youth and Adult Education (YAE) (Paixão; Queiroz; Prudêncio, 2019), as a way of sparking discussions about the importance of experience with this modality in initial training and highlighting some potentialities and challenges regarding teaching YAE.

Although we identified 13 works that address the theme of conceptions, they all presented different objectives, with an investigative focus, mostly on academics, followed by documents, professors from higher education institutions, and teachers from basic education. However, none involved the perspectives or concepts of internships, with the Biological Sciences course as the target audience. This demonstrates an investigative gap regarding this very important aspect of teacher training since the internship is considered the central axis of teacher training courses (Pimenta; Lima, 2004).

In this sense, according to Abreu (2014), the internship was already understood as an imitation of models; as an instrumentalization of practice; as a space for associating theory with practice; and as a starting point for transforming teaching practice. Each of these conceptions, implicitly or explicitly, directs the curricular structure of undergraduate courses and the pedagogical work of the educator, which is present in their daily actions and the relationships established with their peers.

We know that each conception brings with it the importance for the internship and directs it towards different paths and perspectives (Contreras, 2002; Gimenes, 2018; Pimenta; Lima, 2004). In other words, the future teacher observes and then reproduces this modeling practice (internship as imitation of models); values practice by focusing its actions on a curriculum based on skills, competencies, and centrality in assessment; observes the university as a place for theory and the school being considered a place for the practice and intervention of the future teacher; and/or reflects on the purposes of education in a dialectical way between theory and practice.

Each of these conceptions carries a commitment to society and education. Therefore, we argue that the internship field must provide reflected, contextualized, and investigative training, capable of bringing improvements and favoring the development of relations between school and university in a more democratic, egalitarian, and inclusive way.

## 5 Final considerations

Considering the objective of carrying out a systematic literature review on the Supervised Curricular Internship in Biological Sciences degree, to show how the theme has been addressed in journals in the area of Science Teaching, this work had as its starting point the articles published in magazines from the Capes Periodical. Reflectively analyzing these articles, their focuses, their perspectives, and their epistemological orientations becomes fundamental for the advancement of the Supervised Internship, especially regarding the convergence of research objectives with the interests and needs of society.

Among the main results related to our secondary questions, we highlight *Enseñanza de las Ciencias: Revista Investigación y Experiencias Didácticas*, with the largest number of publications. The state of Paraná (South region) had the largest number of publications in the national and international journals investigated, with emphasis on UFPR, as the higher education institution that produced the most internships in Science and Biology teaching, bringing several essential perspectives to teacher training. It is worth noting that the UFPR has four Postgraduate Programs connected to the area of Education and Teaching. The most emphasized themes were teacher training (initial and continued), pedagogical intervention and concepts, presenting different themes, highlighted by undergraduate students, educators from higher education institutions, basic education, and in the legal documents that guide education and Supervised Internship.

As main reflections, based on our main question, which is related to the panorama of investigations on the SCI, we found that, among the articles published in the magazines examined, the publications are found in greater numbers in the South and Southeast regions, with the need for expansion and strengthening among research groups in other locations and institutions in the country. Thus, one of the regions with the most needs is the Northeast, with emphasis on the state of Rio Grande do Norte, since only one scientific journal and three publications are within the results found in this region, especially the internships in the teaching course in Biological Sciences.

Furthermore, we highlight that no investigation was found related to learning, conceptions, training processes, or any other theme involving the training triad: internship



coordinator professors at the higher education institution, academics and supervising teachers in basic education. Given this situation, we consider that it is urgent to arouse researchers to understand, among other aspects, what is imparted from learning and experiences both in their educational and training contexts.

Although this work aims to encourage researchers to continue studying the internship, some limitations were highlighted in its preparation. The issue of choosing the databases for the articles analyzed, while configuring a limitation, leaves suggestions for future investigations: the expansion of the research corpus. As only publications from the Capes Periodical were analyzed, it is essential to bring to the discussion other specific events in the area of Science Teaching and Education to advance research in the area of SCI.

Finally, we highlight the contributions of the present study to the area of teacher training in Biological Sciences, considering that the results found point to paths for future investigations. These can be verified in other educational contexts involving the internship and with other objectives.

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