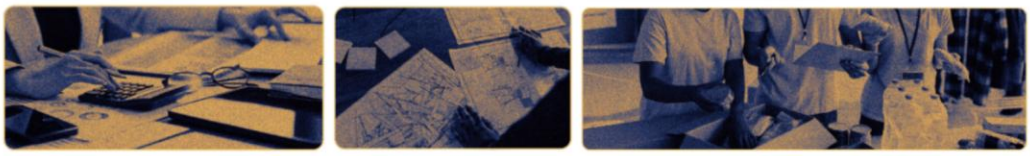

IMPACTO CIENTÍFICO
EDITORA

EDUCATIONAL TERRITORY, TEACHING AND LEARNING STYLES IN NON-FORMAL SPACES: AN EXPERIENCE REPORT AT THE BUTANTAN INSTITUTE

TERRITÓRIO EDUCADOR, ENSINO E ESTILOS DE APRENDIZAGEM EM ESPAÇOS NÃO FORMAIS: RELATO DE EXPERIÊNCIA NO INSTITUTO BUTANTAN

TERRITORIO EDUCATIVO, ESTILOS DE ENSEÑANZA Y APRENDIZAJE EN ESPACIOS NO FORMALES: UN RELATO DE EXPERIENCIA EN EL INSTITUTO BUTANTAN

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ABSTRACT

This paper analyzes the teaching and learning experience of Vocational and Technological Education students during a technical visit to the Butantan Institute in São Paulo. The activity aimed to articulate theory and practice, enabling direct contact with scientific research, institutional history, and the observation of biological phenomena in a non-formal educational setting. Thirty students from the second year of the Interior Design technical course at the Vasco Antonio Venchiarutti Technical School (Jundiaí/SP) participated. The methodology adopted was descriptive, based on teacher observation and reflective analysis of the reports produced by the students after the visit. The results revealed high engagement, scientific curiosity, and a broader understanding of topics related to the immune system, vertebrates, microbiology, and conservation practices. Interaction with the Vaccine, Historical, Biological,

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and Microbiological Museums enhanced learning, allowing students to establish connections between previously studied content and observed phenomena. Furthermore, the development of cognitive, ethical, social, and investigative skills was highlighted, especially through practical activities such as the cultivation of microorganisms. It is concluded that the technical visit to the Butantan Institute promoted meaningful, contextualized learning aligned with the different learning styles of the students, highlighting the importance of non-formal spaces as educational territories that strengthen teaching and bring science, school, and society closer together.

Keywords: Professional and Technological Education. Scientific Learning. Technical Visit.

RESUMO

O presente trabalho analisa a experiência de ensino e aprendizagem vivenciada por estudantes da Educação Profissional e Tecnológica durante uma visita técnica ao Instituto Butantan, em São Paulo. A atividade teve como propósito articular teoria e prática, possibilitando o contato direto com a pesquisa científica, a história institucional e a observação de fenômenos biológicos em um espaço não formal de educação. Participaram da ação 30 alunos da segunda série do curso técnico em Design de Interiores da Escola Técnica Vasco Antonio Venchiarutti (Jundiaí/SP). A metodologia adotada foi descritiva, baseada na observação docente e na análise reflexiva dos relatos produzidos pelos estudantes após a visita. Os resultados revelaram elevado engajamento, curiosidade científica e compreensão ampliada sobre temas relacionados ao sistema imunológico, vertebrados, microbiologia e práticas de conservação. A interação com os Museus da Vacina, Histórico, Biológico e Microbiológico potencializou a aprendizagem, permitindo que os estudantes estabelecessem relações entre os conteúdos que já haviam sido estudados e os fenômenos observados. Destacou-se, ainda, o desenvolvimento de habilidades cognitivas, éticas, sociais e investigativas, especialmente por meio de atividades práticas, como o cultivo de microrganismos. Conclui-se que a visita técnica ao Instituto Butantan promoveu uma aprendizagem significativa, contextualizada e alinhada aos diferentes estilos de aprendizagem dos estudantes, evidenciando a importância dos espaços não formais como territórios educadores que fortalecem o ensino e aproximam ciência, escola e sociedade.

Palavras-chave: Educação Profissional e Tecnológica. Aprendizagem Científica. Visita Técnica.

RESUMEN

Este artículo analiza la experiencia de enseñanza y aprendizaje de estudiantes de Educación Vocacional y Tecnológica durante una visita técnica al Instituto Butantan en São Paulo. La actividad buscó articular la teoría y la práctica, facilitando el contacto directo con la investigación científica, la historia institucional y la observación de fenómenos biológicos en un entorno educativo no formal. Participaron treinta estudiantes del segundo año de la carrera técnica de Diseño de Interiores de la Escuela Técnica Vasco Antonio Venchiarutti (Jundiaí/SP). La metodología adoptada fue descriptiva, basada en la observación docente y el análisis reflexivo de los informes elaborados por los estudiantes tras la visita. Los resultados revelaron un alto nivel de compromiso, curiosidad científica y una comprensión más amplia de temas relacionados con el sistema inmunitario, los vertebrados, la microbiología y las prácticas de conservación. La interacción con los Museos de Vacunas, Histórico, Biológico y Microbiológico potenció el aprendizaje, permitiendo a los estudiantes

establecer conexiones entre el contenido estudiado previamente y los fenómenos observados. Además, se destacó el desarrollo de habilidades cognitivas, éticas, sociales e investigativas, especialmente a través de actividades prácticas como el cultivo de microorganismos. Se concluye que la visita técnica al Instituto Butantan promovió un aprendizaje significativo y contextualizado, alineado con los diferentes estilos de aprendizaje del alumnado, destacando la importancia de los espacios no formales como territorios educativos que fortalecen la enseñanza y acercan la ciencia, la escuela y la sociedad.

Palabras clave: Educación Profesional y Tecnológica. Aprendizaje Científico. Visita Técnica.

1 INTRODUCTION

Learning is an experience that goes far beyond the physical limits of the classroom. When the student has the opportunity to interact with knowledge in real contexts, learning becomes more meaningful, as it is built from observation, experience and direct relationship with the world. Non-formal learning spaces, such as museums, parks, and research institutes, offer this privileged setting, in which theory comes to life and school content is transformed into discovery.

In the context of Professional and Technological Education (EPT), these experiences play an even more relevant role, as they allow the articulation between theory and practice, one of the pillars of technical and scientific training. In research and innovation environments, the student understands the social value of knowledge and perceives the applicability of the contents studied, developing cognitive, ethical and professional skills.

It was for this purpose that the technical visit to the Butantan Institute, in São Paulo, was carried out with the EPT students, the Biology teacher and the pedagogical coordinator. During the activity, students were able to observe the process of scientific research, understand the importance of conserving venomous species, learn about the production of vaccines and realize the impact of science on public health and people's lives.

In the light of Felder-Silverman's (1988) model of learning styles, it is possible to understand why this type of experience arouses so much interest and engagement. Each student learns in a unique way, some actively, others reflectively, visually or sensorially. In non-formal spaces, these differences are enhanced, as each student finds the opportunity to learn according to their style, exploring curiosity and experience as ways to build knowledge in a more authentic, collaborative, and meaningful way.

2 EDUCATING TERRITORY, ARCHITECTURAL SPACE AND EXPERIENTIAL LEARNING: THEORETICAL CONVERGENCES

The notion of *educating territory* has advanced in contemporary literature by recognizing that learning is not limited to the institutional space of the school, but is distributed throughout the city, the landscape and socially produced environments. For Milton Santos (2006), space constitutes an "inseparable set of systems of objects and systems of actions", articulating material, cultural and symbolic dimensions that structure social practices, including educational ones. The territory, therefore, is not only a scenario, but a **pedagogical agent**, capable of guiding perceptions, interactions and ways of knowing.

The understanding of space as a producer of subjectivities finds resonance in the thought of Henri Lefebvre (1991), when he states that space is socially constructed and, therefore, carries intentionalities, uses and meanings. Applied to the educational field, this implies recognizing that scientific institutes, museums, and parks are not only places of visitation, but cultural devices that **produce experience**, expand repertoires, and mediate cognitive and affective processes.

From this perspective, the Butantan Institute configures a unique educational territory: its landscape, its architectural heritage, the circulations between buildings, the natural environments and the exhibition spaces constitute an **expanded pedagogical system**, in which body, perception and knowledge are intertwined. This reading dialogues with the urban pedagogy proposed by Gadotti (2010), who defends the city as an extension of the school — a formative ecosystem where the subject learns through interaction with cultural objects, social phenomena and collective practices.

In the field of educational architecture, several authors point out that spaces are not neutral, but **act as mediators of learning**. For Loris Malaguzzi, of the Reggio Emilia approach, the environment is the "third educator", capable of provoking, welcoming, organizing and expanding children's and young people's thinking. Peter Zumthor's (2006) architectural phenomenology reinforces this aspect by emphasizing the sensorial and atmospheric dimension of places, which directly influence the way people relate to the world. Richard Sennett (2018), in turn, analyzes how urban environments shape attention, sensitivity, and body intelligence, highlighting the role of spatial experience in the formation of the contemporary subject.

Applied to the context of the Butantan Institute, it is observed that the historical architecture, the courtyards, the circulation routes, the green areas and the museum spaces constitute **multiple perceptual fields**, which require students to pay visual attention, spatial reading, comparison, abstraction and reflection. These elements are aligned with John Dewey's (1938) perspective of experiential learning, according to which knowledge emerges from the interaction between the subject and the environment, and Kolb's (1984) learning cycle, which emphasizes the stages of concrete experience, reflection, conceptualization, and active experimentation.

From the cognitive point of view, this spatial mediation dialogues intensely with the Felder-Silverman Model (1988). The diversity of stimuli present in the educating territory —

visual, sensory, historical, scientific, natural and architectural — simultaneously activates distinct learning dimensions, such as:

- **Visual/verbal**, when exploring exhibitions, panels, historical narratives;
- **Sensory/intuitive**, when experiencing natural environments and observing organisms;
- **Active/reflective**, when conducting experiments and then resuming reports;
- **Sequential / global**, by circulating between thematic spaces and integrating knowledge.

Therefore, the technical visit to the Butantan Institute proves to be not only a teaching activity, but a **territorialized learning experience**, in which the space acts as an epistemological and cultural mediator, expanding the formative possibilities of Professional and Technological Education students.

3 OBJECTIVE

To report the experience of teaching and learning of students of Professional and Technological Education in non-formal spaces in the context of the discipline of Biology.

4 THEORETICAL FOUNDATION

The perception of non-formal learning spaces often involves environments in which learning happens in a spontaneous, experimental, and even mediated way, as Müller and Goldschmidt (2022) approach, when they explore non-formal spaces concentrated in botanical gardens, zoos, museums, science centers, and parks. Eboli (2001) also points out that learning becomes significantly more efficient when students take an active role, participating in experiences in local contexts.

The concept of educating territory present in the studies of Santos (2014), contributes to understanding broad institutional spaces, such as the Butantan Institute, as pedagogical systems articulated between architecture, circulation, landscape and cultural content. In this sense, the territory not only hosts educational activities, but also produces learning opportunities through its physical and symbolic configuration. At the Butantan Institute, the extensive green areas, historic buildings, built heritage, as well as the spaces between them, patios, squares, living areas, thematic gardens and wildlife management areas, make up a diversity of spatial elements that, taken together, configure a territory with a strong

educational vocation. From the point of view of the educating territory, these spaces assume a formative role by integrating city and education, offering investigative opportunities that go beyond the programmatic content, favoring the understanding of phenomena in a contextualized way. Visits to institutes such as Butantan, which connect living, historical spaces outside the physical walls of buildings, students are able to correlate pedagogical practices and work in connection with the environment and its surroundings.

It is worth highlighting a similar pedagogical model addressed by educator Anísio Teixeira, when implementing the Park Schools Project preliminarily initiated at the Carneiro Ribeiro Educational Center in Bahia (Isarael, 2020). Anísio Teixeira already imagined the process of extramural learning in connection with the environment where the individual would be surrounded by public facilities lined up in a large square, creating gravitational fields there to structure a network of public facilities, thus promoting society's broader involvement in the educational process (Delijaicov, 2017).

In the context of the Butantan Institute, the experiences provided by the trails, woods, green areas, historic buildings and the built heritage, give greater relevance to Professional and Technological Education (EPT). This training modality requires the integration between theory and practice, articulating scientific knowledge, know-how and know-how. According to Frigotto, Ciavatta and Ramos (2012), the educational work should provide the student with a broad understanding of reality, in which technical knowledge is permeated by ethical, social and human values, allowing for an integral education. In this sense, technical visits, therefore, configure pedagogical practices that strengthen this conception, promoting situated and contextualized learning.

The different stimuli provided by the students during the visitation helped to absorb the content in the different learning styles. As pointed out by the Felder-Silverman Model (1988), when it reports the four main dimensions for higher and technical education: **Active vs. Reflective**, related to the way information is processed; **sensory vs. intuitive**, referring to the type of information preferred; **Visual vs. Verbal**, regarding the form of representation of information and **Sequential vs. Global**, regarding the organization of reasoning and comprehension.

Recognizing individual differences, as highlighted by Felder and Spurlin (2005), is essential to plan diversified and inclusive pedagogical practices, capable of meeting the different profiles of students. In non-formal spaces, learners have the opportunity to experience active, visual and sensory experiences, directly experiencing the phenomena

studied, which enhances meaningful learning and collective engagement. This perspective dialogues with Gadotti (2014), when he understands the city and its spaces as an extension of the school, promoting an integral education that articulates knowledge and experiences of everyday life. In this way, it is evident that teaching-learning can become more effective, dynamic and contextualized, with experience as the structuring axis of training in Professional and Technological Education.

5 MATERIALS AND METHODS

5.1 CLASS DESCRIPTION

For the development of the activity, the class of the second year of the Interior Design course at the Vasco Antonio Venchiarutti Technical School located in Jundiaí, SP, was selected. 30 students aged 16 to 17 years participated in the activity. The Biology contents worked on in the classroom comply with what is described in the course plan (SÃO PAULO, 2025) and the standards of the National Common Curricular Base (BRASIL, 2017).

5.2 DESCRIPTION OF THE ACTIVITY

The activity was carried out in the format of a technical visit to the Butantan Institute, São Paulo. The Institute offers visits to museums in the Science Park initiative, namely the Vaccine Museum, Historical Museum, Biological Museum and Microbiological Museum, in addition to attractions such as the serpentarium and the monkey house. During the guided tour for the school group, activities were carried out in the aforementioned museums.

5.3 EXPERIENCE REPORT

A descriptive approach was used (DALTRO; FARIA, 2019) based on teacher observation and reflective analysis of the students' perception collected in an activity carried out in the classroom one week after the visit.

5.4 ANALYSIS OF STUDENTS' PERCEPTION

After the visit, it was proposed that the students report their experiences based on a reflective activity carried out in a group. The activity was presented in a structured script format, as shown in Table 1.

Table 1

Script applied to the class after the technical visit

Technical Visit Butantan Institute
Introduction The Butantan Institute is a research institute active since 1901, playing an important role for public health in Brazil. As part of scientific dissemination and community extension, it currently has four museums dedicated to the themes of the creation and history of the institute, vaccine, zoology and microbiology.
Group perception
1. What did you think of the technical visit carried out? Did it meet your expectations? 2. How important this activity is to you (you can describe it in personal terms and/or from a learning point of view). 3. Summarize in one sentence what you learned from this activity.
Remembering (you should only use your memory, not search the internet.)
1. Briefly tell us what was seen at the Historical, Vaccine, Biological and Microbiology Museum. 2. At the Historical and Vaccine Museum, we had the opportunity to learn complementary topics to our classes. Write down what you remember about the difference between serum and vaccine. 3. Tell us about an episode you witnessed at the institute (in the museums, serpentarium or monkey farm) that reminded you about a subject we saw during our vertebrate classes. 4. At the Microbiology museum, did anything remind you about our classes? 5. Briefly document what was observed on the culture plate after 6 days.
Participants (names)

Source: Authors.

6 RESULTS AND DISCUSSION

The subject grid of the chosen course includes the contents of Biology during the second and third grades of High School. As it is a technical course with little approach to Science (only the contents provided for in the BNCC), the technical visit to the Butantan Institute allows the analysis of the experience from the perspective of students who have the experience of learning Science limited to the classroom. This assumption could be observed already in the preparations for the activity resulting from the interest and adherence of the class to the proposal, since of the total of 35 students, 30 participated in the activity.

In general, the students expressed that the experience exceeded expectations and that they acquired new knowledge in the context of the Biology discipline, complemented some and remembered others.

The visit took place on September 19, 2025 and began with the exploration of the park freely by the students. In this activity, it was possible to observe through photographic records the students' interest in the architecture of the buildings that make up the park (Figure 1).

Thus, the Butantan Institute, as an educating territory, materializes fundamental principles of learning in non-formal spaces, by transforming its own landscape, architecture and circulation spaces into constituent elements of the pedagogical experience. It also characterizes a territory that not only welcomes teaching practices, but teaches by itself,

configuring living, complex and interactive spaces that dialogue with contemporary theories of education and educational territories.

Figure 1

Buildings in the Butantan Institute park photographed by the students during the technical visit

Source: prepared by the authors (2025).

In the park space, students were also able to visit the serpentarium, a space for observing snakes, and the monkey that houses a colony of monkeys of the genus *Rhesus* (Figure 2). In this phase, associating an episode of the visit to the classes, one of the groups wrote:

> *"One snake was in the sun and the other in the shade* [in the serpentarium]. *This is because they are petilotherms, that is, they cannot regulate their own temperature, so they need to go in the sun."*
> *"The behavior of the monkeys (especially him spinning while hanging)".*
> *"... One of them was eating sweet potatoes."*

Figure 2

Free observation of animals in the serpentarium and monkey farm. A. Snake sheltered in the shade. B. Rhesus monkeys playing

Source: prepared by the authors (2025).

As for the museums, guided visits were carried out by monitors from the Institute in the following order: Vaccine Museum, Historical Museum, Biological Museum and Microbiological Museum.

At the Vaccine Museum, students were able to review and acquire new concepts about the immune system, the creation, use and manufacture of vaccines in an environment prepared with interactive technologies. It was possible to observe that this activity brought clarification about fake news regarding the topic of vaccines.

Within this theme, the visit to the Historical Museum complemented the content, by presenting to visitors the production of serums from the historical perspective of the creation of the Institute, whose purpose was the production of serums. In this way, the students learned the difference between these two types of immunization (vaccine and serum) and the occasions that should be administered, synthesizing concepts:

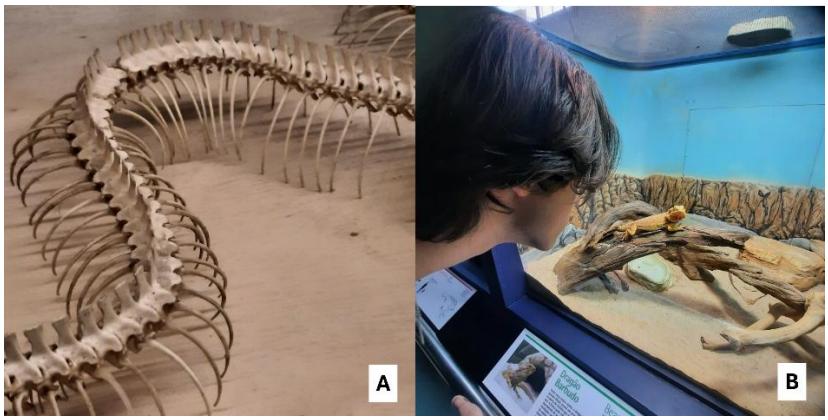
> *"The vaccine prevents and the serum treats."*
> *"The main difference between serum and vaccine is that serum contains ready-made antibodies that serve to fight existing infections* [not only infections, but also toxins*], providing immediate, but temporary, immunity. The vaccine, on the other hand, contains antigens that stimulate the body to produce its own antibodies, preventing diseases and generating slower but lasting immunity. Thus, the serum is used to cure* [treat], *while the vaccine is used to prevent."*

At the Biological Museum, students had the opportunity to observe several species of snakes and some species of lizards, amphibians, anurans and arachnids (Figure 3). As the content of vertebrate animals had already been worked on in the classroom, the students reported memory regarding the snake skeleton (Figure 3) seen in the Historical Museum and the behavior of a couple of Anurans:

> *"At the Biological Museum we saw several snakes with different scales, frogs, scorpions and spiders."*
> *"At the Historical Museum we were able to see the body and bone structure of snakes, reminding us of classes on reptiles."*
> *"During the visit we saw two frogs reproducing, which we learned how it works in the classroom and with a documentary made by UNICAMP students. They reproduce externally (release of gametes into the water)."*

Figure 3

Reptile exposure. A. Snake skeleton. B. Lizard species



Source: prepared by the authors (2025).

The last Museum visited was the Microbiology Museum where students were able to observe bacteria, protozoa and fungi under the microscope, learn a little about the history of microbiology, get to know schematic replicas of animal viruses and bacteriophages.

> *"In Microbiology we saw models, microscopes with fungi and bacteria and we even painted drawings of microorganisms."*
> *“... We saw bacteria, fungi and protozoa in an interactive and visual way."*

Table 2

Spatial Interactions and Felder-Silverman Learning Dimensions

Element of the educating territory	Activated learning dimension	Evidence from the students' reports
Historic architecture and landscape	Visual / Global	Mention of architectural structures, candid photographs
Serpentarium and monkey	Sensory / Active	Observations on animal behavior and thermoregulation
Vaccine Museum	Sequential / Verbal	Reports on the difference between serum and vaccine
Historical Museum	Reflective / Visual	Association of snake skeleton with vertebrate contents
Biological Museum	Sensory/Visual	Identification of amphibians and reptiles from classes
Microbiological Museum	Active / Reflective / Sensory	Reports on the cultivation of microorganisms and observation of fungi
Circulation between spaces	Global	Integration of content throughout the visit

Source: prepared by the authors (2025).

Table 3

Kolb cycle applied to the technical visit

Kolb Stage	Evidence observed during the activity
Concrete experience	Animal observation, museums, microbiological experiments
Reflective observation	Subsequent written activity, individual and collective reports
Abstract conceptualization	Differentiation between serum and vaccine; Concept review
Active experimentation	Cultivation of microorganisms; Application of concepts during the visit

Source: prepared by the authors (2025).

The analysis of the students' perceptions shows that the Butantan Institute operates simultaneously as **an educating territory** and a **formative architectural environment**, expanding learning beyond the limits of the classroom. The interaction between space, body and knowledge reinforces that architecture and landscape function as **pedagogical mediators**, an aspect widely discussed by Zumthor (2006), Sennett (2018) and Malaguzzi (1993).

The data reveal that the experience awakened numerous cognitive processes linked to the Felder-Silverman Model: practical activities favored active students; visual exhibitions included visual profiles; reflective scripts supported introspective students; and the circulation between different environments stimulated global learning. This multiplicity of stimuli confirms the power of non-formal spaces as catalysts for diversified, inclusive and meaningful learning.

In addition, the spatial organization of the Institute — its courtyards, historic buildings, green areas and circulation flows — contributed to the emergence of unforeseen learning, such as aesthetic perceptions, comments on architecture and spontaneous associations with school content. This brings the formative process closer to the conception of the educating

city (Gadotti, 2010) and to Santos' (2006) understanding of space as an instance that produces meanings and actions.

At the end of the visit, a practical activity of cultivating microorganisms in two Petri dishes containing TSA (soybean tryptone agar) culture medium was proposed. About the culture medium all the participants of the group). In the first plate, microorganisms present in the fingers of the hands of all the participants of the group were deposited, from the touch of the surface of the culture medium. In the second plate, a sample of the spectacle surface of one of the participants was inoculated with the aid of a moistened swab. The plates were taken to school and remained at room temperature for a week.

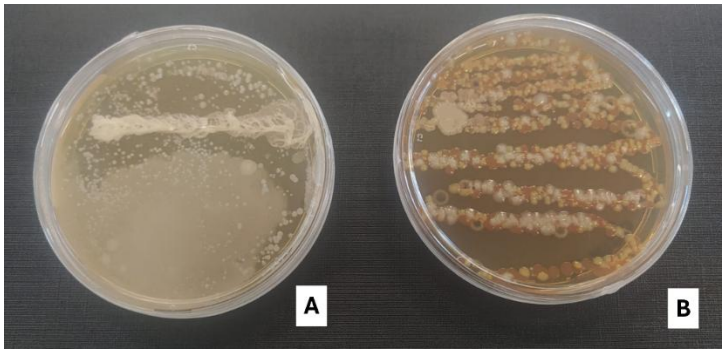
The end of this activity consisted of the explanation and resumption of contents on bacteria and fungi previously addressed with the class in the classroom (Figure 4), emphasizing the ubiquity of microorganisms and the demystification of the popular concept that associates dirt with the existence of microorganisms, as shown in the reports transcribed below:

> *"We saw the dirt on people's hands! (just kidding). We saw bacteria, fungi* [molds] *and yeasts coming from the hands of the staff in the room..."*
> *"Fungi, yeasts and bacteria were seen. It was possible to observe different aspects in the plates."*

Figure 4

Petri dishes after one week of incubation.

A. Samples of participants' fingers. B. Glasses surface sample



Source: prepared by the authors (2025).

It is notable that the activities developed at the Museum of Microbiology contributed to complementing the content not only on bacteria, but also on protozoa and fungi, since students were able to observe samples of protozoa such as *Trypanosoma cruzi*, the etiological agent of Chagas disease, and the microscopic structures of fungi such as *Aspergillus*, an activity that would not be possible to be carried out in the school space.

Regarding the importance of the activities developed during the technical visit, from the students' perspective, they wrote about the learning and expectations:

> *"With this experience, we were able to see in practice everything we learned in theoretical classes and we were able to associate each thing learned."*
> *"In addition to being a moment of learning, addressing classroom issues in a more relaxed way, it was a moment of leisure between the classroom."*
> *"There we saw and learned so many new things that we don't learn on a daily basis, and it was very cool and interesting."*
> *"The best part is that we were able to see everything live, rather than simply seeing everything (imagination) in the classroom.*
> *"We found the technical visit very interesting and educational."*
> *"The visit exceeded our expectations, we saw things already learned in the classroom and others that we had not yet learned."*
> *"Very cool! It exceeded our expectations as we knew nothing about the place and its history."*

From the students' reports, it is possible to perceive that the technical visit to the Butantan Institute acted as a mediator of learning, allowing concepts previously addressed in the formal space (classroom) to be consolidated through direct experience. The observations in the serpentarium, for example, enabled the students to apply Biology content, such as the thermoregulation of snakes, demonstrating the link between learning and real experiences.

In the museums visited, the reports show that students not only reviewed theoretical content, but also corrected misconceptions, as in the case of false information about vaccines. Active engagement in space exploration and practical activities, such as the cultivation of microorganisms in petri dishes, indicated that learning was enhanced by sensory, visual and experimental involvement.

In addition, the reports highlight affective and motivational aspects of the process: the students highlighted that the experience was interesting, fun and different in relation to formal classes, which indicates that emotional engagement can favor the retention of content and the construction of meanings.

Thus, it is observed that the teaching-learning process, when mediated by non-formal spaces, promotes not only the acquisition of knowledge, but also critical reflection, practical application and internalization of previous concepts.

The reports concretely demonstrate the applicability of the Felder-Silverman (1988) model, revealing how the different learning styles manifested themselves and were

contemplated during the technical visit to the Butantan Institute. The students learned actively, by participating in observations and practical activities; in a visual and sensorial way, by interacting with the exhibition spaces and the biological elements presented; and in a reflective way, by resuming their experiences in discussions and written productions in the classroom. This multiplicity of stimuli favored both students with a more experimental profile and those who prefer to observe, record and relate information to theoretical concepts.

The pedagogical practice, in this context, incorporated elements that met the four dimensions of the model: active/reflective, sensory/intuitive, visual/verbal and sequential/global, promoting a balanced and inclusive learning. By experiencing Biology in a real research environment, students not only understood the content, but also recognized themselves as subjects of their own learning process, developing autonomy, scientific curiosity and critical awareness about the social role of science.

7 FINAL CONSIDERATIONS

The technical visit to the Butantan Institute confirmed the potential of non-formal spaces as privileged environments for meaningful learning and for the integration between teaching, research and extension in Professional and Technological Education (EPT). By extrapolating the physical and methodological limits of the classroom, the activity promoted an experience that united theory and practice, allowing students to learn with all their senses, establish connections between knowledge and reality and understand Biology as a living, dynamic and socially relevant science.

In addition to favoring the conceptual understanding of biological contents, the technical visit contributed to the development of socio-emotional and professional skills, such as teamwork, scientific communication, critical thinking and intellectual autonomy. These skills are essential in the integral training of EFA students, as they prepare them not only for technical practice, but also for ethical and conscious performance in the world of work and in society.

The direct contact with scientific practice and with the history of a reference institution such as the Butantan Institute awakened in students a new perception of science, demystifying concepts and bringing them closer to everyday life. This interaction between school knowledge and socially produced knowledge broadened the participants' worldview, promoting experiential learning (KOLB, 1984), in which knowledge is constructed through action, reflection and reconstruction of knowledge.

In addition, the activity reinforced the role of the teacher as a mediator of knowledge, capable of creating bridges between the curricular content and the experiences lived by the students. The approach adopted demonstrated that the teaching of Biology, when connected to real and meaningful contexts, can arouse scientific interest and consolidate lasting learning. The experience also revealed that non-formal spaces, when articulated with the school curriculum, become living laboratories for investigation and reflection.

Thus, learning in non-formal spaces proves to be an essential pedagogical instrument to strengthen teaching-learning, making it more contextualized, participatory and meaningful. The articulation between the model of learning styles and the pedagogical use of these spaces points to promising paths for a more inclusive, experiential education that is connected with the professional and citizen reality, reaffirming EFA's commitment to the human, scientific and social formation of its students.

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