

From local reality to the classroom: an approach to neglected tropical diseases in the high school context

ABSTRACT

This article aims to analyze the potential of a contextualized teaching proposal for addressing Neglected Tropical Diseases (NTDs). The research is characterized as a pedagogical intervention, conducted at a state public school in Lagoa do Carro/PE, a municipality with sanitation deficits and relevant epidemiological data related to NTDs. The local reservoir, known as the 'central lagoon', is part of the community's daily life and is impacted by environmental issues, such as the reduction of riparian vegetation and inadequate waste disposal, in a region historically dominated by sugarcane monoculture. The work conducted with high school students involved the use of a preliminary questionnaire and the "Station Rotation" instructional strategy. Following the implementation of the instructional proposal, it was observed that students expanded their knowledge, understanding that NTDs result from social, environmental, and political factors within the local context. Thus, the teaching proposal proved relevant, enabling students to construct knowledge about NTDs and develop a critical perspective by recognizing how the lack of investment in basic sanitation contributes to the persistence of NTDs in the local context.

KEYWORDS: Science teaching; health education; contextualized teaching; Neglected Tropical Diseases; station rotation.

Da realidade local à sala de aula: metodologias ativas na abordagem das doenças tropicais negligenciadas no contexto do ensino médio

RESUMO

Este artigo objetiva analisar o potencial de uma proposta de ensino contextualizada para abordar Doenças Tropicais Negligenciadas (DTNs). A pesquisa caracteriza-se como intervenção pedagógica, realizada em uma escola estadual em Lagoa do Carro/PE, município com déficits de saneamento e dados epidemiológicos relevantes relacionados às DTNs. O açude local, nomeado de lagoa central, faz parte do cotidiano da comunidade, sendo perpassado por questões ambientais como a redução da vegetação ciliar e o descarte inadequado de resíduos, em uma região que historicamente teve seu solo ocupado pela monocultura da cana-de-açúcar. O trabalho desenvolvido com os estudantes de ensino médio envolveu a utilização de um questionário prévio e a estratégia didática de Rotação por Estações. A partir da realização da proposta didática, foi possível identificar que os alunos ampliaram seus conhecimentos, compreendendo que as DTNs resultam de aspectos sociais, ambientais e políticos na realidade local. Logo, a proposta de ensino mostrou-se relevante ao permitir que os estudantes construíssem saberes sobre as DTNs e desenvolvessem uma postura crítica, ao reconhecerem como a falta de investimentos em saneamento básico favorece a persistência das DTNs no contexto local.

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PALAVRAS-CHAVE: Ensino de ciências; educação para saúde; Doenças Tropicais Negligenciadas; ensino contextualizado; rotação por estações.

INTRODUCTION

The World Health Organization (WHO) defines Neglected Tropical Diseases (NTDs) as a group of infectious and parasitic diseases caused by pathogens, such as viruses, bacteria, helminths and protozoa (World Health Organization, 2025). These diseases are more prevalent in developing countries, such as those in Asia and Latin America, as they are considered endemic among low-income populations due to limited access to basic sanitation, drinking water, healthcare services, and structurally and geographically adequate housing (Brazil, 2021c). In Brazil, the diseases most frequently addressed by health authorities are: schistosomiasis, rabies, lymphatic filariasis, Chagas disease, trachoma, leprosy, malaria, tuberculosis, onchocerciasis, dengue, visceral and cutaneous leishmaniasis, geohelminthiasis and toxoplasmosis (Brazil, 2021b; Rocha, 2023).

The persistence of neglected tropical diseases in Brazil, particularly schistosomiasis and leishmaniasis, is associated with environmental conditions and inadequate investment in basic sanitation, particularly in the Brazilian Northeast, where these factors facilitate vector proliferation, a situation exacerbated by insufficient investment in public research that could promote more effective ways of tackling these diseases (Souza et al., 2020). Given this context, the Ministries of Education and Health have developed several programmes and initiatives aimed at the school community, such as the Health in Schools Programme (2007) and the dissemination of the educational activity booklet: neglected tropical diseases (2025).

Within this context, health is a contemporary issue that must be integrated into the curriculum in a cross-curricular, contextualised and integrative manner (Brazil, 2018). In line with Mohr (2002), Health Education (HE) in the school context should adopt a pedagogical approach, oriented towards the construction of scientific knowledge and the development of students' critical thinking, promoting students' autonomy and critical reflection on everyday life and the social context in which they are embedded. This perspective differs from initiatives arising from health programmes, which are generally linked to public policies and interventions by the health sector in the school environment, and whose focus lies predominantly on inducing changes in behaviours deemed appropriate.

In science education, Krasilchik (2008) argues that biology is a school subject that can be either engaging and meaningful or uninteresting and irrelevant for students. This is directly related to the content that is taught and the way in which it is presented. In this regard, station rotation offers great potential, as it allows students to take the lead in shaping their own learning, actively participating in activities that utilise various teaching and technological resources, with the aim of developing skills and competencies and fostering socially conscious and engaged individuals.

Given this context, this study employed the Station Rotation method, a strategy that involves dividing students into small groups so that all of them take part in a variety of activities distributed across different stations, based on

predefined instructions, with at least one of these stations incorporating the use of digital technologies (Morais & Costa, 2025). When applied to the NTD education in the context of upper secondary education, this didactic strategy is classified among active methodologies, described by Moran (2018, p. 41) as “teaching strategies centred on the effective participation of students in the construction of the learning process, in a flexible, interconnected and hybrid manner”. Its use aims to develop students’ competencies and skills, including the use of Digital Information and Communication Technologies (DICTs), with a view to meaningful and innovative teaching (Costa & Venturi, 2021; Maciel, Benitez & Martinez, 2023; Moran, 2018).

Costa and Venturi (2021), who conducted a systematic literature review at the National Conference on Science Education Research (ENPEC) on active methodologies, found that publications discussing this topic have been appearing since 2013. Recently, a body of studies has highlighted benefits for teaching and learning processes that utilise these didactic strategies, notably in the context of the COVID-19 pandemic, as exemplified by the studies of Lima-Júnior et al. (2023) and Junior de Oliveira, Mares and Sousa (2024). The authors argue that the flexibility and dynamism of rotating stations encourage student participation, with the possibility of adapting to the heterogeneity of the class and the use of different languages that facilitate learning.

However, it is important to note that active methodologies in biology teaching are not a recent invention, as Krasilchik had already presented a set of teaching strategies with the characteristics of active methodologies as early as 1996, as they promote student agency and engagement in the learning process. The author termed these teaching strategies ‘teaching modalities’, encompassing activities such as discussions, demonstrations, practical lessons, field trips, games and projects, amongst others, with the aim of making science and biology teaching more dynamic (Krasilchik, 2008).

In light of the above, the aim of this study is to analyse the potential of a contextualised teaching proposal to address Neglected Tropical Diseases, with a view to fostering critical and socially engaged learning. The following sections will present the main themes that constitute the scope of this study. Next, the methodological approaches that guided the research will be explained, with due justification of the choices made. Subsequently, the results obtained will be analysed and interpreted, seeking to highlight the study’s contributions and limitations. In addition, there will be concluding remarks, in which the main findings of the article are summarised.

HEALTH EDUCATION AND NEGLECTED TROPICAL DISEASES

Health-related topics are primarily addressed in science and biology education, where teaching should encompass not only scientific knowledge but also the broader social dimensions of health (Reis & Pereira, 2020). Thus, Cunha (2023, p. 6) argues that “the teaching of Science/Biology must focus on issues that are part of everyday life, so that students can perceive themselves as members of this environment and agents of change”. Consequently, Health Education should be approached in a contextualised and interdisciplinary manner within the biology

curriculum, with the aim of enabling students to develop a critical understanding of the social, political, economic, and cultural contexts in which they live.

NTDs constitute a major public health challenge closely linked to socio-economic inequalities and a lack of investment from both public and private sector initiatives. However, they are considered economically unattractive to the pharmaceutical industry and, consequently, receive limited investment for research and the development of medicines aimed at their prevention and treatment (AN-VISA, 2013). As a result, morbidity and mortality rates for these conditions remain high. According to the World Health Organization (WHO), people affected by NTDs experience complications that impact their lives in educational, social and professional spheres, such as chronic pain, malnutrition, deformed limbs, organ damage, stunted growth and impaired cognitive function (World Health Organization, 2010).

Mohr (2002, p. 38) provides the following definition of Health Education: “activities carried out as part of the school curriculum, which have a defined pedagogical purpose relating to the teaching and learning of a subject or topic connected with individual or public health”. Thus, for HE to fulfil its pedagogical purpose of developing individuals with critical and reflective thinking skills who are conscious of their attitudes, biology teaching must move beyond traditional and technical approaches. It is necessary for it to adopt an emancipatory approach, in which teachers seek teaching strategies that place students at the centre of the teaching-learning process, encouraging students to critically think and contextualise health-related content—such as Neglected Tropical Diseases—in relation to their reality and current issues.

Such initiatives have been encouraged worldwide, as exemplified by the implementation guide: *Transforming Every School into a Health-Promoting School*, published by the World Health Organisation (WHO) and the United Nations Educational, Scientific and Cultural Organisation (UNESCO) in 2022, in which they recognised schools as key settings for health promotion, based on four key pillars (health and well-being, education, community and governance), so that knowledge can be generated and actions can be implemented in order to contribute to improved health conditions in the region and lead to more effective public policies (Pan American Health Organization, 2022). Bonney (2013) highlights the role of the US educational system in fostering interdisciplinary learning about NTDs, through a variety of educational resources that go beyond the textbook, such as organisation websites and case study readings, which can encourage debate and student engagement on the subject.

According to the Pernambuco Curriculum, “the concept of health is directly linked to the cultural, social, political, economic, environmental and emotional context in which one lives” (Brazil, 2021a, p. 37). In this regard, as highlighted by the survey conducted by Nascimento & Prata (2013) of books and articles focused on science education, approaches to Neglected Tropical Diseases are primarily limited to the disease perspective, without considering local aspects. This limitation highlights a gap in the educational process, insofar as it prevents students from developing a broader and more critical understanding, distancing school content from their lived realities and from the concrete conditions that influence the occurrence and prevention of these diseases.

In this context, Venturi and Mohr (2021, p. 18) state that health education in schools is “content-driven and uncritical, and does not contribute to the development of scientific knowledge”. Consequently, it is necessary to rethink the pedagogical objectives focused on health education, moving beyond a narrow perspective to seek ways of promote scientific literacy and citizenship education , addressing issues that affect society at local and global levels , such as NTDs.

NTDs “continue to coexist as a public health problem among the most vulnerable populations living in areas with poor socio-economic indicators” (Brazil, 2022, p. 5). In this regard, with respect to schools, NTDs are often addressed by teachers focusing exclusively on their biological aspects and, consequently, disregarding the social, economic, environmental and political dimensions underlying these diseases, which lead to them being neglected by public authorities and the private sector. Therefore, these diseases should be addressed through active teaching strategies that encourage students to critically examine their social, environmental, economic, and political determinants.

METHODS

This study is an applied pedagogical intervention research. According to Pereira (2019), pedagogical intervention research involves the planning and implementation of teaching interventions and examines both the challenges and the potential of these interventions, with a view to promoting knowledge about the teaching-learning process.

Given the use of the environment as a subject of study, understanding the local context is central to the study, emphasising popular health education in light of the relevance of students’ local knowledge about their region, particularly their knowledge about the local lagoon (Falkenberg, 2014). Sacristán and Gómez (1998), argue that a meaningful teaching-learning process must relate to students’ culture, lived experiences and the particularities of students’ reality—which the authors characterise as a narrative mode of thought—rather than relying exclusively on a practice that considers only academic scientific knowledge.

The research was carried out at a state model secondary school located in the municipality of Lagoa do Carro, which in turn is situated in the Mata Norte region of the state of Pernambuco, 61 km from the capital. The municipality has a population of 17,981 (IBGE, 2022), with two major economic activities: handicrafts, particularly tapestry, and the poultry farming industry (Oliveira, 2024). Furthermore, according to the Institute of Water and Sanitation (2023), around 6,000 inhabitants lack a water supply, leaving a portion of the population without guarantees of basic rights and vulnerable to NTDs, for example.

Environmental degradation in the region has been documented in several studies such as that by Florêncio (2018), which highlights significant local issues, including siltation, loss of riparian forest and pollution of water sources. Furthermore, the Pernambuco Reservoir Water Quality Monitoring Bulletin (2024) corroborates these findings by classifying the water resources as hypertrophic, with high salinity and a Phytoplankton Community Index (PCI) considered poor.

One of the municipality’s key features is the central lagoon (Figure 1), surrounded by houses and vegetation, with a prominent statue of Christ. However,

this body of water faces a serious environmental issue, particularly pollution caused by both sewage discharge and the disposal of waste by the local population; it is visibly contaminated and unfit for any use or consumption, even though it is common to observe unsafe practices that form part of the community's daily life, such as fishing in contaminated waters. The conservation of this lagoon is essential for the local community, particularly in the face of climate change affecting water resources (Rodrigues, 2025). This context is reflected in initiatives such as 'Let's embrace the lagoon', promoted by the sanitation company and state universities in conjunction with the municipality's state schools, which proposes the sustainable revitalisation and preservation of this area (Voz de Pernambuco, 2022).

Figure 1

Central lagoon view in Lagoa do Carro-PE



Source: Giro Mata Norte (2025).

The teaching intervention is therefore based on the observations of Brito, Silva and Quinino (2020), who highlighted that the persistence of schistosomiasis in the region stems from environmental factors, such as the presence of perennial aquatic habitats. These authors present findings from studies in municipalities in the Zona da Mata region of Pernambuco that confirm new areas of transmission and an incipient control programme, as half of the municipalities in the region do not have treatment coverage above 80%. Given this reality, the findings suggest that the study of NTDs can help students develop a critical perspective on the social and environmental aspects of the municipality.

The participants are part of a Year 12 class, comprising students aged between 16 and 18. Regarding the methodological approach, a printed questionnaire was initially administered to assess the prior knowledge of the 28 students present on the day, containing five multiple-choice questions. Broadly speaking, the questions focused on how the students had become aware of the NTDs, their in-depth understanding of two NTDs, and whether the local reality is taken as a subject of study. Based on this, the proposal was structured around three lessons, two of which were dedicated to developing the station through rotations and one to creating mind maps.

In light of the development of the station-rotation teaching strategy, which enables the lesson topic to be explored through activities involving different resources, including DICTs, present at the stations (Coussirat, 2020), thereby providing students with meaningful, autonomous, collaborative and active learning. Furthermore, studies involving the application of station rotation in biology

lessons (Albuquerque, 2023; Barbosas & Robaina, 2023; Conceição, Nunes & Pigatto, 2021; Santos et al., 2020; Steinert & Hardoim, 2019) highlight the role of this strategy in fostering students' interest, critical thinking, autonomy and active participation in knowledge construction. Also noteworthy is the closer relationship between teacher and student and the respect for diverse learning styles through the versatility of the activities.

Initially, the students were divided into four groups and directed to the stations; following this, preliminary instructions were given regarding the time allocated and how the methodology would be implemented. In general, four stations were set up, named after colours, which use different teaching resources to address the topic of neglected tropical diseases. The activities carried out at the stations are described in the table below (Figure 2).

Figure 2

Diagram of the stations rotation

STATION	AIM	RESOURCE	ACTIVITY
PINK	Collection of notification numbers from a selected NTD to produce charts comparing the year of its inception with the most recent year at national, state and municipal levels.	cards setting out the secure websites where you can find out about DTNs, how to search them, what SINAN is, and how to access the data.	Collection of notification numbers from a selected NTD to produce charts comparing the year of its inception with the most recent year at national, state and municipal levels.
GREEN	Write a text describing the impact of COVID-19 on NTDs	a video by Fiocruz entitled "COVID-19 and neglected tropical diseases" and an article entitled "Mortality rate from neglected diseases rises during the pandemic"	Writing an essay discussing the positive and negative impacts of COVID-19 on neglected tropical diseases.
BLUE	To analyse the local situation, identifying the factors that contribute to the incidence of disease and proposing solutions.	Case study on the lagoon situated in the centre of Lagoa do Carro	Answering the questions: "Do you know of any other places in the city like the lagoon?" and "Discuss this in a group and propose a solution to the problem presented."
ORANGE	Find out about some of the NTDs	A video entitled 'All together against neglected diseases', with cards highlighting aspects of some neglected tropical diseases	participation in the educational game, developed on the WordWall platform.

Source: Own authors (2025)

Finally, the students were asked to create mind maps on the topic of 'neglected tropical diseases' as a further way of assessing whether learning had taken place. Thus, for the preparation of this study, data were analysed from the questionnaire; from the work produced during the station rotation by four groups that completed all the activities; and from three mind maps, selected on the basis of their organisation and the presence of more elements in their construction.

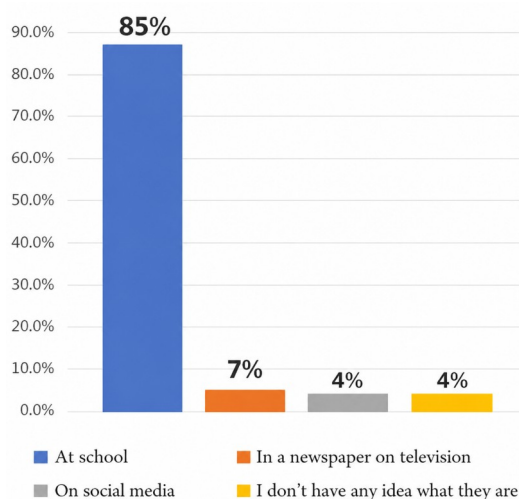
RESULTS AND DISCUSSION

ANALYSIS OF PRIOR KNOWLEDGE

The questionnaire sought to assess students' prior knowledge of NTDs and their understanding of the local context. The responses to the question “Have you ever heard of neglected diseases? If so, where did you hear about them?”, revealed that 96% of respondents indicated that they were already familiar with the term “neglected diseases”. Among these students, 85% reported having learned about it at school, 7% from newspapers and TV (7%) and 4% from social media (4%). In contrast, 4% stated that they did not know what it was, as can be seen in Figure 3.

Figure 3

Ways in which students learned about NTDs

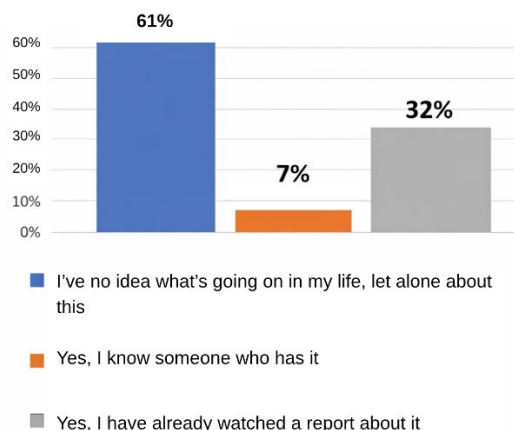


Source: Own authors (2025)

Regarding students' knowledge of specific NTDs, the responses showed that more than half (61%) of the students who responded were unfamiliar with concepts about schistosomiasis, whilst 7% reported knowing someone who had the disease and 32% had seen a news report about it (Figure 4).

Figure 4

Building knowledge about schistosomiasis

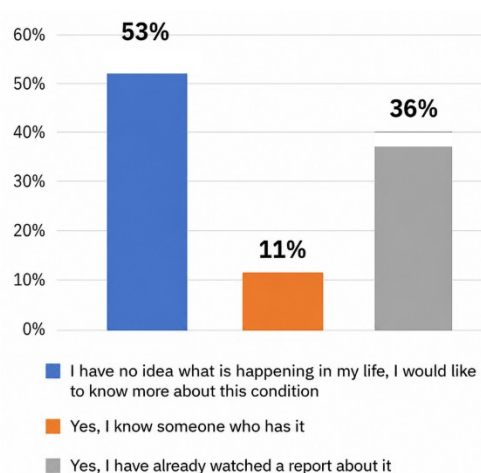


Source: Own authors (2025)

Regarding filariasis, although fewer students were unaware of this condition compared with schistosomiasis, it was found that more than half (53%) of the participants had no previous knowledge about it, whilst only 11% knew someone with the condition and 36% had seen a news report about it (Figure 5).

Figure 5

Building knowledge about lymphatic filariasis



Source: Onw authors (2025)

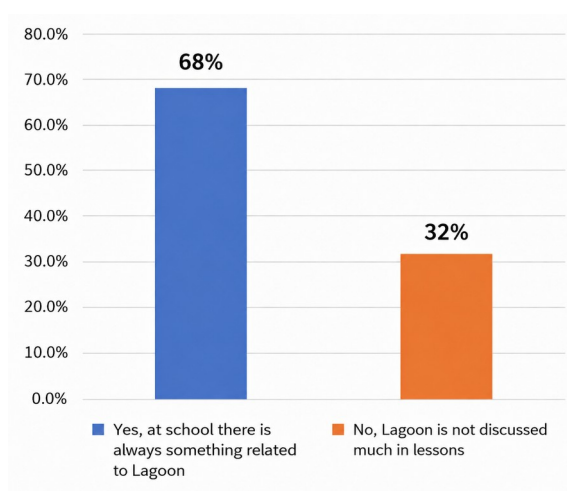
Overall, the findings indicate that the term 'neglected diseases' is familiar to the vast majority of students. However, a more detailed understanding of some of these diseases, which affect the country, the state and the municipality, showed students' knowledge declined considerably. This may be related to the way in which HE is approached in the school context. According to Venturi (2018), HE can take a normative approach, when it relates to traditional and technical strategies

aimed at behaviour change; or a reflective approach, which aims to the construction of knowledge through strategies that promote critical reflection on the social, environmental, cultural, and cognitive dimensions of health.

To investigate the use of the local environment in as a learning context, the aim was to identify whether the students had already participated in any school activities related to the lagoon in the city centre. The findings showed that 68% of the students had previously participated in educational activities related to the lagoon, whilst 32% had not this opportunity (Figure 6). Regarding whether the lagoon provides conditions that may facilitate disease transmission to the transmission of diseases, more than half (86%) of the students agreed with that, whilst 14% stated they had never considered this issue, as shown in Figure 7.

Figure 6

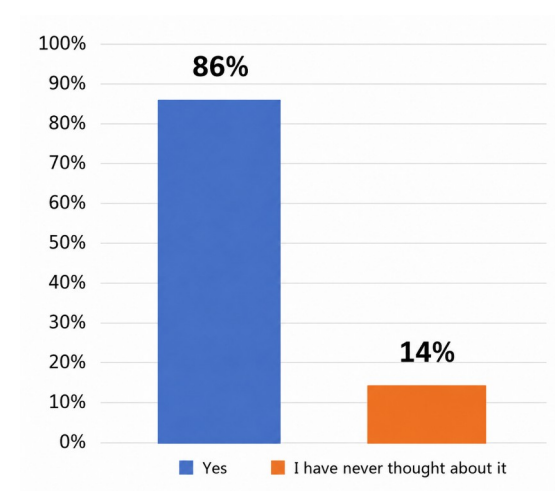
The environment as a subject of study



Source: Own authors (2025)

Figure 7

Environmental degradation as a factor in disease transmission



Source: Own authors (2025)

Santana and Farias (2025) argue that the use of the environment in the teaching-learning process is important for contextualising the construction of knowledge within the reality experienced by students and in valuing to their prior knowledge. In this way, science teaching, particularly that focused on health, can move beyond a purely content-based approach by engaging with students' existing knowledge as a starting point for understanding concepts. The following section presents the results of the Station Rotation activities.

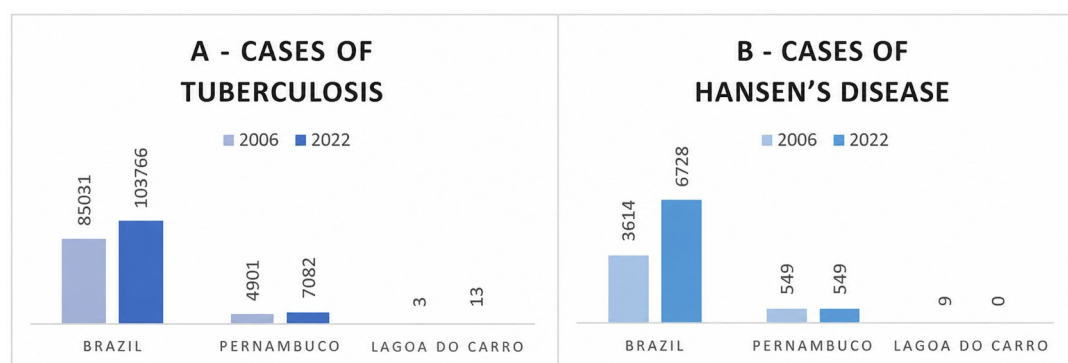
ANALYSIS OF THE STATION ROTATION ACTIVITIES

The Station Rotation activities were not completed in the same sequence by all groups. Each group began at a different station and rotated until all groups had completed every station. Therefore, the results are presented according to each station rather than in chronological order.

At the pink station, students were introduced to the websites of Fiocruz, the Ministry of Health and the Notifiable Diseases Information System (SINAN), and shown how to navigate these resources. Consequently, the aim of this station was to enable the collection of information from reliable sources on NTDs, in an era characterised by the widespread dissemination of misinformation. To this end, the students used their mobile phones to access SINAN, collected data on a Neglected Tropical Disease of their choice and, finally, created graphs comparing epidemiological data from their birth year with the most recent available data, at the national level, for Pernambuco and for Lagoa do Carro (Figure 8).

Figure 8

Graphs of the data collected by the students



Source: Own authors (2025)

This activity enabled students to use DICTs to understand the extent to which the Brazilian population is affected by diseases that are neglected and rarely discussed by public authorities and private initiatives, such as schistosomiasis, leprosy and tuberculosis. At the same time, whilst gathering information, the students developed their ability to collect information from reliable sources.

At the green station, the activity was designed to encourage students to reflect on NTDs in the context of the COVID-19 pandemic. They had access to the

Fiocruz video entitled “COVID-19 and neglected tropical diseases” and the supporting text “Mortality rate from Neglected Tropical Diseases rises during the pandemic”, to produce texts discussing the positive and negative impacts of COVID-19 on NTDs. According to Bacich, Tanzi Neto and Trevisani (2015, p. 47), digital technologies should be integrated into the educational context “in a creative and critical manner, seeking to develop the autonomy and critical thinking of those involved”.

In this context, the texts produced by the groups revealed that the students highlighted the lack of medical care for people with NTDs during the pandemic as a negative impact, and technological advances in the development of vaccines and medicines as a positive impact that could benefit the prevention and treatment of these diseases (Table 1). Thus, the activity enabled students to develop knowledge, critical thinking and reflection on the social and political contexts surrounding neglected tropical diseases.

Table 1

Excerpts from the texts produced by the groups highlighting the negative and positive impacts

Group	Positive impacts	Negative impacts
1	“[...]it is possible to produce effective vaccines in a short space of time, and it has also demonstrated the impact that new technologies have on the treatment of countless diseases [...]”	“[...]has brought many changes to the treatment of neglected tropical diseases [...]”
2	“[...]advances in scientific research and vaccine development, and greater awareness of hygiene and public health [...]”	“The healthcare system was overwhelmed and there was a shortage of medical resources, leading to a decline in hospital admissions for neglected diseases and an increase in mortality [...]”
3	“[...]If neglected diseases were given the attention they deserve, I would be able to develop a vaccine or a cure for them.”	“[...]include the suspension of health services, the reallocation of resources and reduced access to treatment [...]”
4	“[...]greater awareness of the importance of public health and additional investment in research and the development of treatments for neglected diseases.”	“[...]a further increase in mortality, despite the fall in hospital admissions. During the pandemic, the malaria mortality rate rose to 82.55%, despite a 29.3% drop in hospital admissions [...]”

Source: Own authors (2025)

At the blue station, students’ responses indicated that they were aware of any environments in the same situation as the lagoon, most groups highlighted environments such as rivers and vacant lots near their localities, whilst one group stated that they were unaware of any. As for solutions, the groups emphasised the need for enforcement, fines, environmental conservation and basic sanitation, among other measures (Table 2). From this perspective, the activity enabled the students to reflect on environmental issues in their daily lives that often go unnoticed by

them. According to Venturi and Mohr (2021), HE must be an education that uses health-related themes to build knowledge and to develop a more critical and reflective perspective on the social, environmental and cultural aspects involved.

Table 2

Answer from the students to the questions in the case study

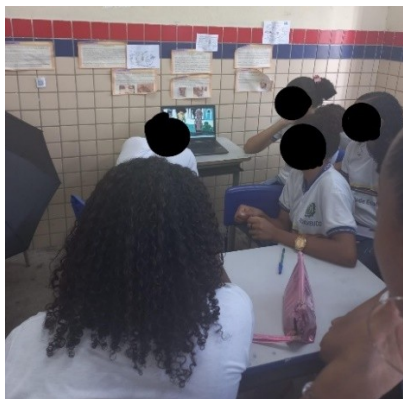
Group	Do you know other places in the city where the situation is similar to that of the lagoon?	Discuss this in a group and present a solution to the problem described.
1	"Yes, the garbage is dumped in a spot near the reservoir close to my house..."	"Preventing littering, increased enforcement by the local council, and more collection days"
2	"Yes, near the community 'mutirão' court"	"To introduce a law imposing fines on anyone who throws garbage in inappropriate places"
3	"[...]“The ‘roncador road’ is also extremely polluted, with sewage flowing into”	"[...]preserve and respect the lagoon’s environment [...] The current state of the lagoon requires that rubbish be removed and the water treated, thereby preserving both the local wildlife and the vegetation"
4	"We don’t know; in this precarious state, there’s only the lagoon"	"[...]a further increase in mortality, despite the fall in hospital admissions. During the pandemic, the malaria mortality rate rose to 82.55%, despite a 29.3% drop in hospital admissions [...]"

Source: Own authors (2025)

Regarding the orange station, the aim of this station was to address students’ knowledge gap concerning the causative agent, the vector, the symptoms, treatments and prevention of certain neglected tropical diseases. This was achieved through the video “All together against neglected diseases”; by reading cards highlighting aspects of certain NTDs; and, finally, by participating in the educational game developed on the WordWall® platform. Given that the questionnaire revealed that most students had limited knowledge of certain conditions, this station was designed to address those gaps. In this regard, this finding is consistent with Krasilchik’s (2008, p. 81) statement: “variation in activities can attract and engage students, catering to individual differences”. The students actively engaged with the activities, as it can be seen in Figure 9.

Figure 9

Development of the Orange Station's activities



Source: Own authors (2025)

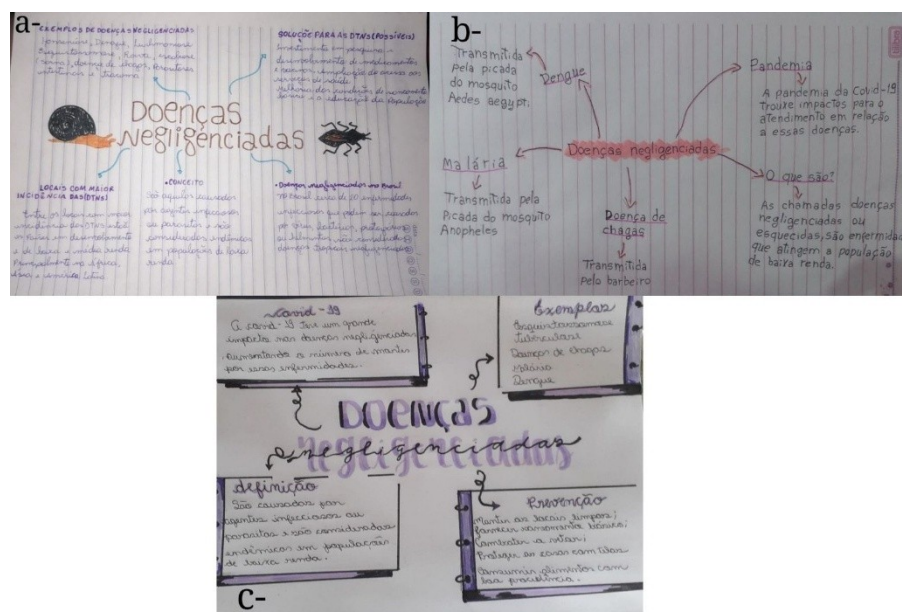
ANALYSIS OF THE ACTIVITIES PROPOSED IN THE STATION ROTATION

An analysis of the students' mind maps, when compared with the results regarding prior knowledge, demonstrates the potential of this pedagogical approach. In the first stage, 61% of the students were unaware of schistosomiasis. Following the intervention, the students not only named the disease but also defined it, identified its causative agents and methods of prevention, and linked it to social issues and infrastructure solutions, such as basic sanitation. This progression in the contextualised teaching-learning process highlights the relevance of the NTDs approach and the Station Rotation method for socially engaged learning.

Student 1's mind map (Figure 10a), shows that she identified the concept of NTDs, some examples, and their aetiological agents. Furthermore, it was also emphasised that these diseases mainly affect low-income populations and the need for investment in research, basic sanitation and health services. Regarding Student 2's mind map (Figure 10b), it is possible to identify how dengue, malaria and Chagas disease are transmitted, as well as the negative impact of the pandemic on NTDs. Finally, regarding the work of student 3 (Figure 10c), the map illustrates methods of preventing these diseases, the definition and examples of neglected tropical diseases, as well as the consequences of the pandemic.

Figure 10

Mind maps developed



Source: Own authors (2025)

The use of mind maps proves to be particularly relevant as a teaching tool for making the teaching and learning process both effective and enjoyable, as it encourages students to use their creativity to organise and connect what they have learnt (Buzan 2009), demonstrating that learning about the NTDs took place at the orange, blue, green and pink stations. Furthermore, for example, at the Blue Station, where students investigated the problem situation of the lagoon and proposed solutions they consider relevant to the community, the results indicate the development of the third specific competence for the Natural Sciences area, highlighted in the BNCC: “To investigate problem situations and evaluate applications of scientific and technological knowledge and their implications in the world, using procedures and languages specific to Natural Sciences, in order to propose solutions that take into account local, regional and/or global demands [...]” (Brazil, 2018, p. 539, translated by the authors).

FINAL REMARKS

This study aimed to analyse a proposed pedagogical intervention designed to address non-traditional subjects in a way that is contextualised to the local reality of secondary school students. To enable this analysis, the students’ prior knowledge of the subject was identified and a pedagogical intervention based on a station-rotation approach was developed. From this, the intervention showed that that NTDs were addressed through traditional practices, preventing the effective development of knowledge and critical thinking.

Consequently, the students not only systematised technical concepts relating to NTDs—such as aetiological agents, transmission and prevention—but also developed critical thinking, reflection and a sense of agency. The new approach

helped students to link the diseases to their structural causes, such as social, political and environmental issues, including the lack of investment in drug production, the lack of basic sanitation and adequate housing, which are all relevant to this topic. Thus, the station-based rotation facilitated the systematisation of concepts regarding NTDs, the aetiological agent, transmission, prophylaxis, the impacts of Covid-19 and environmental degradation, whilst also fostering students' reflection, critical thinking and active engagement with various teaching resources.

Furthermore, the station-based rotation proved to be an effective teaching strategy, as an analysis of the activities carried out by the students showed that they were able to develop knowledge about Neglected Tropical Diseases and relate this to social, political and environmental issues. It is important to notice that the organisation of students into groups of seven participants per station was determined by contextual factors, such as the total number of students in the class, the number of stations designed, the time available for the activity and the complexity of the content addressed. Since the literature indicates that smaller groups, of around four to five students, tend to foster greater individual engagement and higher-quality interactions, the configuration adopted in this study was constrained.

Further studies should be conducted on the use of the Station Rotation model, covering other topics to investigate the teaching-learning process within the context of biology education at various educational levels. Such studies could also support the development of a repository of evidence-based teaching strategies that teachers may adapt and incorporate into their own educational practices. Therefore, the intervention sought to make the teaching-learning process for secondary school students meaningful in light of their local reality. To this end, it equipped them with scientific knowledge in health linked to.

NOTES

1. Translated by Thais Augusto (Contato: dasilvat990@gmail.com)

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