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## STRATEGIC PROPOSAL FOR AN INTERVENTION IN HEALTH EDUCATION FOR THE TEACHING OF AMERICAN TRYPANOSOMIASIS TO PROMOTE SELF- REGULATION

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**Abstract:** American Trypanosomiasis is a parasitic disease that occurs widely in the Americas and has a biphasic clinical picture, with the chronic irreversible form leading to death, characterizing it as a public health problem. The aim of this article is to help educational practices about this disease to develop self-regulation, making it possible to delve deeper into its concepts through strategic planning that deals with the subject in the form of a pedagogical project based on the concept of socio-interactionism proposed by Vygotsky. This method centralizes the student in the schooling process, leading them to investigate and build their own knowledge as they promote teamwork, debate and solve problems dealt with in the conventional textbook through research and illustrative characterization of at least one regional endemic environment where parasitosis is present.

**Keywords:** Trypanosomiasis, American; Health Education; Project Pedagogy; Self-regulation; Primary Health Care.

## INTRODUCTION

American *Trypanosomiasis* is a parasitic disease with a high prevalence and significant mortality, whose etiological agent is the flagellated protozoan *Trypanosoma cruzi*. It has a biphasic clinical picture, consisting of an acute phase and a chronic phase of an irreversible nature, capable of damaging organs of primary importance such as the heart and leading to death (MINISTÉRIO DA SAÚDE, 2017).

Today's educational requirements, in the field of knowledge and learning, have set challenges to the educational process for both those who teach and those who learn (FRISON, 2016). It is of fundamental importance to transform education into a process that allows students to read the world and reflect on the events present in their reality (TEIXEIRA, 2003).

One of the possible ways to facilitate schooling processes would be to use methodologies that encourage students' active participation in the construction of their scientific knowledge and favor cognition, metacognition and volition, since these make studying more attractive (SIMÃO & FRISON, 2013).

Project-based pedagogy has had a major impact on the teaching and learning process, revolutionizing the way learning is viewed. This method goes beyond the teacher-student-society relationship, generating a new meaning within schools, centralizing the student in the process of learning (GIROTTI, 2005).

Developing educational practices based on self-regulation and the socio-interactionist theory of teaching can help students to build techniques related to their learning processes, such as setting goals, carrying out research inside and outside the school environment, managing their study time, revisiting their productions and self-assessing the results obtained (FRISON, 2016).

## AMERICAN TRYPANOSOMIASIS AND CLASSROOM PRACTICE

American *Trypanosomiasis* is an infectious disease caused by the flagellated protozoan *Trypanosoma cruzi*. As an intracellular parasite, it will preferentially parasitize cells in the muscle fibers and nerve plexuses of humans and some species of domestic and wild animals such as dogs and armadillos (DIAS *et al.*, 2015).

Infection in humans occurs when the insect vector makes a blood meal, when it feeds, the insect defecates in the area, the host scratches and ends up giving access to the parasite present in the feces of the Triatominae in the form of trypomastigotes into the bloodstream, this evolutionary form is the infectious form which, after swimming

in the blood, will preferentially infect muscle cells and nerve plexuses, transforming itself inside them into an amastigote, this round form will be responsible for the multiplication of the parasite inside the target cell (NEVES, 2016).

In the teaching of health sciences, this parasitosis is dealt with in the 7th year of elementary school and the 2nd year of secondary school, and it is desirable that the lessons are aimed at contextualizing the information with everyday life in order to promote a change in the individual's behaviour on the attitudinal axis, seeking to raise awareness for the formation of consciousness. The objectives to be achieved should reach points of contribution of knowledge and help to acquire or strengthen habits that are linked to the practice and specific promotion of health (OLIVEIRA & TRIVELATO, 2006).

During the development of science teaching in the classroom, it is necessary to approach the concepts to be worked on in several different ways in order to stimulate greater effectiveness in the teaching-learning process, among these ways we can mention the use of didactic materials, among the various types of materials and didactic resources to be applied, the most present is the book, in order to be insufficient in the process (MELO; ÁVILA & SANTOS, 2017).

Students need to be subjected to activities that stimulate their interaction with other individuals and with the educational and social environment, because each subject has certain knowledge about the subject, resulting from their sociocultural interactions that need to be rescued and valued during the teaching and learning process, in order to contribute to the foundation and formation of the knowledge of the being itself, is what Vygotsky, (1988) positions in his socio-interactionist theory.

## **PROJECT PEDAGOGY AND CONTEMPORARY EDUCATION**

Project-based pedagogy has had a major impact on the teaching-learning process, revolutionizing the way learning is viewed. This method goes beyond the relationship between teacher, student and society, generating a new meaning within schools, transforming the student into an active participant in the process of learning (GIROTTO, 2005).

Widely disseminated in the teaching models of the grades that make up the basic level of education, it is worth noting that the main characteristics of this teaching method go beyond the teacher being the holder of all knowledge, placing student and teacher on the learning level, the teacher as the guide of the process and the student as the protagonist of their learning, this transformation provides the teacher and the student with great challenges in the realization of learning, making a link between life stories, previous knowledge, new scientific discoveries and the environment to which they are inserted (ALENCASTRO, 2017).

Rodrigues; Anjos & Rôcas (2008) state in their research that in the traditional model of teaching there is often resistance both on the part of the student, who is used to receiving ready-made information without having to analyze, understand and reflect, and for teachers who will need to study and dedicate themselves to a new pedagogical method. However, projects have the capacity to intertwine school-family-community, significantly stimulating learning, as they encourage reflection, autonomy, critical thinking and leadership. It makes students construct, deconstruct and (re)construct their concepts.

## **SELF-REGULATION: FACILITATING THE TEACHING AND LEARNING PROCESS**

Self-regulation of learning is an object of research in educational psychology, developed mainly on the basis of the social theory of learning (TESTA & FREITAS, 2005). According to Zimmerman (2015), this theory began to be discussed with emphasis in the 1970s, arriving in Brazil in the late 1980s, according to Frison (2016). Scholars identify that interest in knowledge about self-regulation of learning has been increasing considerably in all areas of knowledge, especially in education.

For Zimmerman (2015), self-regulated learning refers to how students become proactive in their own learning processes. He reports that it is not a mental skill or academic performance, but rather a process of self-management through which students transform their mental aptitudes into skills related to performing tasks in various areas of functioning.

Learning to use certain techniques and strategies is of fundamental importance so that students can organize their learning processes. Setting goals, carrying out research inside and outside the school environment, managing their study time, revisiting their work and self-assessing the results obtained are all strategies known as self-regulation of learning (FRISON, 2016).

The aim of the teaching process that encourages self-regulation of learning is to provide better school performance and encourage metacognition movements, since the structuring of knowledge involves different elements of human functioning and considers the student as a subject who acts and suffers influences from different dimensions, such as environmental, personal and behavioral (BANDURA, 2008; ZIMMERMAN, 2013).

Zimmerman (2015) believes that self-regulation of learning is based on at least seven constructs, including self-regulation of processes, self-regulation of events, self-monitoring and self-efficacy, based on the knowledge previously developed through the subjects' daily experiences, the strategies adopted to obtain better learning results and the self-assessment of the methods chosen in view of the results obtained during and at the end of the cognitive processes, respectively.

### **DESCRIPTION OF ACTIVITY**

The suggested activity is presented in the form of a pedagogical project and is based on the theories of Project Pedagogy and socio-interactionist teaching of American Trypanosomiasis to promote self-regulation. It is hoped that, at the end of the process, the students will be able to illustratively characterize at least one parasitic endemic environment and its complexes in their state.

It is suggested that the activities described be applied to the 2nd year of secondary school, whose concepts are included in the teaching curriculum. The time proposed for the development of the activity is divided into four moments, which are described below.

#### **1st moment (150 minutes)**

Table 1 describes the activities planned for this stage, aimed at retrieving students' previous knowledge of American Trypanosomiasis as a whole, as well as showing the theoretical contribution of the parasitosis in the form of a lecture and the evaluation of what was discussed at this stage using the Quiz resource.

<b>Planned activity - American Trypanosomiasis trail game (50 minutes)</b> <ul style="list-style-type: none"> <li>• The American Trypanosomiasis trivia game is a game with 25 squares numbered from 1 to 5 repeatedly;</li> <li>• Each house should be the size of an A4 sheet of paper so that the students can position themselves on them;</li> <li>• Each number should represent important aspects of parasitosis to which the question in each box should refer. E.g.: boxes 1 = Etiological agent, boxes 2 = Transmission of the disease, boxes 3 = Life cycle of the parasite, boxes 4 = Insect vector, boxes 5 = Prophylaxis and treatment;</li> <li>• For this activity, we suggest dividing the class into groups of up to 4 members.</li> <li>• Each group should choose a student to act as a “pawn” and walk around the houses.</li> <li>• Once the “pawns” have been chosen, each team throws the dice and the student walks the number of squares they hit on the dice, followed by a question about the theme that that square represents;</li> <li>• The questions must have been precisely drawn up and written on cards by the teacher;</li> <li>• Everyone must reach the end of the game;</li> <li>• The winner is whoever has reached the end with the most points.</li> </ul> <p><b>Attention, teacher!</b> This activity model was designed to kick off the project by drawing on the students’ previous knowledge. It is important that the questions are developed in a language that is accessible to the population and that makes the most of the information the student already has on the subject. This stage is also geared towards the development of self-regulation processes, since the subjects will act on the basis of pre-suppositions built up from their experiences.</p>
<b>Planned activity - Lecture on American Trypanosomiasis (80 minutes)</b> <p>To develop the lecture, it is suggested that the teacher invite one or more professionals who are part of the community to give it, such as nurses and nursing technicians.</p> <p><b>Attention, teacher!</b> This moment aims to decentralize the teacher as the sole source of information, enabling students to reconstruct knowledge with different sources and in different ways.</p>
<b>Planned activity - Quiz (20 minutes)</b> <ul style="list-style-type: none"> <li>• Divide the class back into teams of four;</li> <li>• Make A to E signs and hand them out to the teams;</li> <li>• Create multiple-choice questions in slide animations;</li> <li>• Ask the question and all the teams raise their signs at the same time, the team that gets it right gets 5 points;</li> <li>• The team that finishes with the most points wins.</li> <li>• Everyone gets chocolate.</li> </ul> <p><b>Attention, teacher!</b> The Quis is aimed at assessing whether there was a difference in the answers developed by the students between the activity of retrieving prior knowledge and those presented after the presentation of the lecture, and it is recommended that all teams be valued for their participation. This activity model is also geared towards the self-regulation of processes and their pre-suppositions.</p>

**Table 1 - Suggested activities for the first stage**

## 2nd moment (100 minutes)

Table 2 shows the guidelines for the research to be carried out by the students. As Project Pedagogy says, the teacher should only act as a mediator, centralizing the students in the teaching and learning process.

<b>Planned activity - Research on endemic environments for American Trypanosomiasis (100 minutes)</b> <ul style="list-style-type: none"> <li>• Divide the class into groups of 4 students;</li> <li>• Now draw the main cities in your state that have cases of American Trypanosomiasis;</li> <li>• Each team will receive two cities according to the draw;</li> <li>• Instruct the teams to search freely on the internet, SUS epidemiological books and books for the environmental characterization of the cities, the types of housing, food and other factors that influence the establishment of parasitosis;</li> <li>• Give students examples of safe research methods;</li> <li>• Make a note of all the information you have researched;</li> <li>• Arrange an individual meeting with the teams to review previous results, make suggestions and help where necessary;</li> <li>• Agree with the class on the final date for presenting the results and culminating the activities.</li> </ul> <p><b>Attention, teacher!</b> The research activity seeks to provide self-regulation of events, so it is of fundamental importance that the individuality of each subject is respected in terms of the study model they have chosen. It is also interesting to provide guidance on new mechanisms, as long as the final choice of study method after analysis is always the student's own.</p>
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**Box 2 - Presentation of the suggested activity for the 2nd moment**

## 3rd moment (200 minutes)

The information contained in table 3 will clarify how the meeting to mediate the research and discuss the preliminary results already achieved by the teams in individual care will take place in order to monitor progress and mitigate difficulties.



<b>Planned activity</b> - Discussion of preliminary results (200 minutes)	<b>Planned activity</b> - Socialization of the illustrated parity complexes (40 minutes)
<p>This moment will focus on analyzing what the teams have researched so far within their themes. The teams will present the information they have found and the facilitator will discuss it with the class, clarifying doubts, guiding methods and making suggestions. At this meeting, the endemic environment within each team's region will also be defined and reconstructed in an illustrative way. From there, the research will be specific to that location.</p> <p><b>Attention, teacher!</b> Research mediation is a self-monitoring activity, and it is important to encourage students to reflect on their strategies in relation to their partial results. This self-assessment is fundamental for the cognitive development of the individual in relation to learning mechanisms according to self-regulation.</p>	<ul style="list-style-type: none"> <li>Once the illustrations have been completed, the groups will present their environmental setup and explain which points in the environment favored infection and which components of the parasite complex they had to add to it.</li> </ul> <p><b>Attention, Professor!</b> At the end of the activity, the results of the teams' research will be shared with the rest of the class in a playful way. This is the time to present information such as: which environment was selected? What are its characteristics? What components favor <i>T. cruzi</i> infection in this region? It is at this point that the assumptions of self-efficacy can be reached. The facilitator will need to encourage the teams to interact and discuss whether the elements of the parasite complexes illustrated in the environments are correct and why.</p>
<b>Box 3</b> - Presentation of the activity suggestion for the 3rd moment	<b>Intended activity</b> - Closing remarks (10 minutes)
	<p>This is a time when the mediating teacher will give his or her comments, suggestions and congratulations to the teams.</p>

**Table 4** - Suggested activities for the 4th moment

## EVALUATION

Assessment should take place throughout all the activities carried out, based on continuous content analysis and autobiography. Ongoing assessment should consider aspects such as commitment, interest, participation, performance in the illustrative representation of environments and their socialization and performance in research. It is advisable for the mediating teacher to create criteria to better tailor this assessment.

In the content analysis method, the mediating teacher must focus on qualitative aspects of the processes, considering different perspectives, valuing individualities and observing different symbolic values of the same axis in order to gauge the development of self-regulation.

For a more effective evaluation of the self-regulation assumptions, it is necessary to include the students submitted to the project in the self-assessment as a way of understanding each individual's views of the world and of learning, from the isolated to the collective.

<b>Planned activity</b> - Construction of selected endemic environments (150 minutes)
<ul style="list-style-type: none"> <li>With the results of their research, each team will illustrate the geographical aspects of the selected environment on cardboard;</li> <li>Now they will have to analyze this environment, discuss the possibilities among themselves and add to it the elements that are conducive to infection, such as the insect vector, palm trees, wattle and daub houses, animals and reservoirs.</li> </ul> <p><b>Attention, Professor!</b> The components added to the environment that provide the parasite complex must depend solely on the knowledge that the students have obtained during their research, the aim being to make the subjects understand that they are essential for parasitism to exist in our species. And the way in which each team reassembles this environment is unique and needs to be valued. This moment aims to promote the self-regulation of events, so the students are free to choose and test the most diverse illustration and painting techniques, and choose the one they deem most appropriate.</p>

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