

## Monitored Visits and Soil Education

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**Abstract:** The Research and Extension Program in Soil Education: Knowledge, Instrumentalization and Propagation has been developed since 2009, to the Laboratory of Pedology and Erosive Processes in Geographical Studies-LAPPEGEO of the degree course in Geography of the State University of Vale do Acaraú (UVA), in Sobral, Ceará, Brazil, and aims to disseminate knowledge in soils with a view to integrating nature and society, seeking to stimulate knowledge, exchange information, ideas and experiences. It operates in four modules: elaboration of didactic materials, training of teachers, interdisciplinary projects and monitored visits, is the last, being here, our object of study. Therefore, we aim to reflect the significance of the importance of the visits monitored in LAPPEGEO, facing the expectations, satisfactions or dissatisfactions of the students and teachers of the basic education teaching network and the monitoring students of the degree course of geography, when knowledgeable of the materials of didactic support produced in said laboratory. In the analysis of the results it has been realized that the proposed activities have been important methodological tools that help in the acquisition of scientific knowledge in an effective and significant way.

**Key words:** soil science teaching, basic education, didactic support materials

### 1. Introduction

The Geography Course of the State University of Vale do Acaraú/UVA, brings along educational actions to the Laboratory of Pedology and Erosive Processes in Geographical Studies (LAPPEGEO). It acts in the Research and Extension Program in Soil Education: Knowledge, Instrumentalization and Propagation, with the purpose of disseminating knowledge in soils in a perspective of integration of nature and society, seeking to stimulate knowledge, exchange of information, ideas and experiences (Costa Falcão & Falcão Sobrinho, 2011). In this educational process, people need to: know the soil element, understood as a component of the natural environment essential to development; to instrumentalize so that their understanding becomes accessible; and propagate knowledge, because the lack of information can have consequences for the environmental imbalance.

With the advent of the project “Itinerant Show of Education in Soils”, supported by the National Council of Scientific and Technological Development (CNPq) and inserted in a university extension proposal (Costa Falcão, 2014). The mentioned project is introduced at the State University of Vale do Acaraú (UVA) and postulates the congruence between Basic Education and higher level scientific knowledge, in a relation between School and University.

From this perspective, reciprocity is established, which creates the possibility for students, especially those in the public network, to appropriate a knowledge about a thematic, in which it requires other ways of approaching the teaching of soil, going beyond the existing knowledge in the textbook, as discussed by Silva et al (2008).

In this aspect, extension becomes fundamental to the development of this project, according to Falcão Sobrinho (2014), extension as a fundamental factor making interaction of popular and academic knowledge.

Among the modules that work, we have the monitored visits of students and teachers of the network of elementary, middle, upper and technical public and private schools. This is part of the project: “come to know the soil in LAPPEGEO: it will be fun and you will learn a lot”, which aims to present visitors with knowledge of soil, using didactic materials produced in the laboratory, relating the theoretical contents seen in classroom with practice.

The didactic materials produced are produced for the training of educators and students to be used as a tool to support the study of the soil (Costa Falcao, 2014). It has an innovative character; it seeks to facilitate the understanding of the understanding of the soil element in the context of the landscape, making them aware of the necessity of its conservation for the maintenance of life.

The pedagogical approach is based on Paulo Freire’s (1996) socio-constructivism, to which we envisage assuming as subjects of his learning, the construction of knowledge, making the learning process more meaningful and enjoyable, built through the exchange of experiences and knowledge.

Therefore, it aims to present the activities developed during the visits and reflect its meaning to the visiting students and teachers of basic education, as well as to the monitors academic students of the course of Degree in Geography. The questions are based on three questions: the activities during the visits will have contributed to the teaching-learning process of the students, especially in relation to environmental issues related to the theme of soil education? And the teachers, who accompany their students, have said some contribution to the content addressed in the classroom? What about student monitors, have you made any contribution to your academic background?

## **2. Coverage Area**

The mesoregion of the Ceara(Ceara is a state located in the brazilian northeast region), Northeast is one of seven mesoregions of the Brazilian state of Ceará, formed by the union of 47 municipalities grouped in seven microregions. The main cities are: Sobral, Tianguá, Acaraú, Camocim, Viçosa do Ceará, Granja and Santa Quitéria. Being Sobral due to its privileged geographic location, it is the main urban center of the region, where the State University of the Acaraú Valley is located.

These municipalities attract students to the UVA, who travel daily from their cities to Sobral, depending on the place of origin students travel daily on trips that last up to three hours, so the origin of students is a peculiarity of the university. When they finish the course, they return to their cities, and graduates in geography mostly take over the classroom.

This fact becomes quite positive, since former students become teachers, and already knowing of the existence of LAPPEGEO they add this activity in their pedagogical planning. These occur according to the university’s lesson schedule, and the availability of visitors' time. They are previously scheduled by teachers or pedagogical coordinators of primary education schools, mainly primary and secondary education.

### 3. Material and Methods

The monitored visits take place in the laboratory of Pedology and Erosive Processes in Geographical Studies-LAPPEGEO, of the degree course in Geography. They are guided by scholarship students from PIBID, FUNCAP, CNPq, PBU, laboratory technician and teachers. It aims to explore contents that approach the subject of soils, associating theory to practice with activities using didactic materials and experiments. They seek to promote an exchange of knowledge produced in the university with teachers and students of Basic Education schools.

The materials are exposed to the students and visiting professors of the laboratory, they are authored by Costa Falcão (2014), as follows: a) color library; b) memory game; c) macropedolites; d) soil porosity funnel; e) minhocário; f) terrarium; g) erosion simulator; h) game of checkers, i) board game: “treading the knowledge of the ground”; and, j) LAPPEGEO tour.

According to the author, colorectal (Figure 1) is a collection of soil colors. The objective is to demonstrate the different types of colors that the soil can present in the landscape. The materials used for their preparation are soil samples, with color variations and different types of small plastic containers, composed of plastic lids or bags, as well as labels and boxes made of wood or a resistant material.



**Figure 1 Color Library**



**Figure 2 Memory Game**

The memory game, shown in Figure 2, is a material that allows students to practice memorizing the game from similar pieces. It consists of twenty-four pieces that reflect iconographic representations of elements and situations related to the game. The theme is soil formation.

As regards macropedoliths (Figure 3), they design a soil profile in the laboratory or in the classroom. It is conceptualized as a significant didactic resource that helps to understand the soil profile, mainly when it comes from the absence of field work, and is also easy to assemble and satisfactory interpretation, to visualize the soil

and to understand its characteristics. The objective of this work is to analyze the characteristics of different soils of the region, through an instrument that represents this profile.

As far as soil porosity funnel (Figure 4) is concerned, this allows explaining and encouraging students to perceive the factors that condition the passage of water in a soil profile through events that portray this phenomenon. The objective is to compare the permeability of different soil samples. The materials necessary for its preparation are PET bottles, string, fine textured cloth, sandy soil, clayey and, with the presence of organic matter, adhesive tape, and, brush.



**Figure 3 Macropedoliths**



**Figure 4 Porosity Funnel**

The wormhole (Figure 5) represents the environment in which earthworms live, and it is possible to analyze the work that they exert in the revolving of the earth and its influence along the horizons of the soil. For its assembly, there is a large glass container; soil, consisting of organic matter remains; light-colored soil; and, earthworms.



**Figure5 Wormhole**



**Figure 6 Terrarium**

Regarding the erosion simulator (Figure 7), it reproduces a simple instrument that demonstrates the process of soil erosion and its purpose is to lead the student to reflect on the importance of vegetation cover in soil conservation. In order to make the erosion simulator it is indispensable to use a PET bottle; dry leaves; and grass, or small plants. We still need soil and water.

Explaining about the game of checkers (Figure 8), it is understood to be this resource arising from an initiative that promotes the relationship and interaction between students, from an educational practice, in the case, education in solos. It is a classic game, worked with twenty-eight pieces, made with different textured soil, which allows its handling and play by the visually impaired.



**Figure 7 Erosion Simulator**





Figure 8 Game of Checkers

The board game (Figure 9), titled “treading the knowledge of the soil”, resembles a trail to be covered by the students, containing forty-nine questions concerning the content, origin and formation of the soil, among others, and this content, treated in the textbook, becomes dynamic and differentiated, where the student is an active participant in the learning process.



Figure 9 Board Game



Figure 10 LAPPEGEO Crew

#### 4. Results and Discussions

The visits initially had only priority to receive students from public schools in the primary and secondary school, but later, there were requests by private schools. It is also worth mentioning that the programming developed during the visits are only introductory, because for some teachers, the visit already integrates the annual planning of school planning and schedule the second visit to work with specific content treated in the classroom.

The activities first start with a moment of reception of the visitors in the auditorium by the coordination of the laboratory, receive information about the courses existing in the university, mainly the geography course, the LAPPEGEO surveys and, finally, the presentation of the monitors. After being welcomed, they are directed to the multimedia room for the screening of the film “meeting the ground”, prepared by the Solo in School Program (2013). This moment is opportune to make students aware of the importance of soil knowledge for the dynamics of the functioning of terrestrial ecosystems. After, there is moment of relaxation, students are encouraged to express themselves about what they understood the film. In a second moment they are directed to the Museum of Minerals and Rocks, where one has the recognition and contact with the minerals, rocks and fossils of the region. It aims to recognize the importance and application of minerals in our daily life motivating the questioning seeking to contribute to learning.

Subsequently, the students are directed to know the researchers developed in the laboratory, the equipment and materials of didactic support that has been produced through the project “production of didactic material in the collaborative context to teaching soil”, since 2009, developed by scholarship students from FUNCAP, CNPq, PIBID, PBU and student volunteers. According to the availability of students' time, we also have the possibility of performing practical activities using the experimental kits relating the theory to practice: porosity funnel, erosion simulator, among others (Costa Falcao, 2014a).

The permanence of the visit occurs in two ways, in the schools of the urban zone, the students stay until two hours and the students of the more distant municipalities they remain from three to four hours, because there is a difficulty of getting transport to the displacement until the university, so they try to make the most of their time.

During informal conversations with principals and pedagogical coordinators, they report the importance of the students' contact with the university, since the great majority of the students do not have the objective of completing high school, since the family income in the great majority is of up to two minimum wages, from there they immediately seek to enter the labor market.

For the laboratory monitors, they evaluate the activities as a very rich and pleasant moment in being able to share the knowledge acquired in the university with the students in the education. They also report, with the use of didactic materials, a greater concentration of the students, the explanation becomes more dynamic and the students more participatory. This fact has already been observed in Nascimento et al. (2015).

“I noticed the change in the behavior of one of my students during the explanations, he interacted very positively, asked questions, comments and managed to concentrate, unlike what happens in our classroom, made me quite happy”.

It is understood that the materials, besides serving as teaching tools, may instigate the students to produce new instruments, strengthening the theoretical basis and making the study more enjoyable, as already evidenced in (Gomes et al., 2015; Falcão Sobrinho et al., 2017). This fact is already happening, some teachers report that they began to produce some materials in the classroom, with encouragement from the students themselves, and that there is already the intention to form their own materials. Another Professor asked to run workshops in schools to

induce students to set up their own laboratory.

When the use of the games presented quite satisfactory for both the students and the teachers, when they affirm in their answers that they can encourage interest in the study of the soil, through playfulness, illustrating the concepts making the class more interesting and the most enjoyable content as well as stimulate autonomy in the construction of learning and develop the ability to work in groups and deal with rules.

In the evaluation the visit becomes very positive, as the explanations, the materials and the experiments, translating in their lines: “this way the classes are more joyful”, “agent can understand easy, we do not need to decorate”, “I liked it a lot and I learned a lot”.

Teachers report that students arrive with great enthusiasm and ask to schedule a second visit with more time to develop an activity. It is possible to perceive the curiosity, the amazement and the excitement of the students in front of the materials, especially the play materials.

In the course of the activities, it is noticed that the use of didactic materials leads to affectivity, living ethical rules and a very positive social relationship. It is also timely to emphasize the dynamics of the students, creating a diversity of situations that explore the differences of abilities in perceiving the material and creating alternatives of use. Thus, the observations and contributions of Falcão Sobrinho et al. (2017), among others, emphasize the importance of play and playfulness in school learning, so the results confirm the approval of the use of materials as a support tool that assist students in acquiring scientific knowledge in an effective and meaningful way.

## 5. Final Considerations

It is noticed that the activities proposed during the visits are important methodological tools to contribute to learning and teaching of soil. Therefore, the work and flexibility of the teacher in adopting methodologies and didactic resources that can correlate the contents in order to expand the reasoning, systematize the knowledge and arouse the interest of the student becomes essential and of fundamental importance.

With the activities, it was verified that this relationship has only benefits. Knowledge, knowledge exchange is mutual, because it tends to favor both sides (university/school community). From the moment that the university students identify themselves as such, the interest of the students in knowing more about the academic reality arises, awakening on the possibility of entering in this reality.

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