

Fieldwork activity in Serra of Sicó (Central Portugal): a innovative strategy in teaching and learning Geology

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Abstract

In Portugal, the official curriculum of Natural Sciences (NS) in middle and high schools has highlighted the importance of a greater school-environment relationship, and calls for the need to complement activities in the classroom with the development of practical activities in the field. The development of activities of this type, taking into account the curriculum and the potentialities of the region where the schools are located, is considered an innovative and motivating strategy to be implemented in middle and high schools, in Science Education in general, and Geosciences in particular. Recognizing the importance of these activities in teaching and learning Geology, a fieldwork activity planned and applied to students of the 7th grade, in the discipline of NS, was carried out at the end of the 2017/2018 academic year, at Pombal Middle and High School. The field activity took place in the Serra of Sicó (central Portugal), in the Leiria district because this area has a great geological interest, namely diverse karst formations and geological structures. The organization of the fieldwork followed the guidelines of the Orion model and the field script that was presented made it possible to understand scientific concepts, to favour the participation of students in their learning, to promote the scientific education of school-age citizens and to stimulate awareness of the value and preservation of the geological heritage. The results of the activity evaluation indicate that the students considered their experience in this fieldwork activity very helpful, and that it helped in the acquisition of knowledge and development of skills.

FIELDWORK ACTIVITY IN SERRA OF SICÓ (CENTRAL PORTUGAL): A INNOVATIVE STRATEGY IN TEACHING AND LEARNING GEOLOGY

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Goal

To present a planned, implemented and evaluated fieldwork activity, within the scope of the curricular unit "External dynamics of the Earth", in the discipline of Natural Sciences in a Portuguese middle and high school. The field activity took place in the Serra de Sicó (Central Portugal), in the Leiria district, once this area is of great geological interest, namely because of its diverse karst formations and geological structures (Figure 1).

Methodology

The planning of this fieldwork activity followed the orientations of the Orion model (1993) with the development of the three stages: 1. Preparatory Unit (before the field trip); 2. Field trip; 3. Summary Unit (after the field trip).

Participants

The participants (156) were 7th grade Escola Marquês de Pombal (Middle School) students, a school in the centre of Portugal, in the Leiria district.

Instruments

A fieldwork guide book and evaluation tools were developed. The evaluation tools included fieldwork observation grids and a questionnaire.

Procedure

1. Preparatory Unit (before the field trip)

Preparatory Unit (before the field trip) – When planning the fieldwork activity, there was effective attempt to minimize the limitations that often prevent these activities (e.g. distance from the school to the study area, administrative/financial costs, syllabus development, other classes you have in your schedule at the school trip time, weather conditions). The students were informed they had to answer the questions included in the fieldwork guide book, as well as the obligation of note-taking (e.g. observations, identification of structures, ...), for group discussion in the summary unit class.

2. Field Trip

The field trip goal were: a) to observe and understand the general geomorphology of the Serra de Sicó; b) to get to know and characterize the predominant lithologies in Serra de Sicó; c) to observe and analyze karst geological structures; d) to discuss the effects of human activity on the landscape and e) to value and conserve the geological heritage.

This field trip took place in the 2017/2018 scholar year, with 5 stops during which students briefly observed and some aspects of the field script (Table 1).

3. Summary Unit (after the field trip)

In the context of the classroom, the lime samples collected in the field were macroscopically compared to the ones in the school lab and finally the students did a Kahoot quiz.

The participants filled out a activity assessment questionnaire (Figure 2).

"Messages to take home"

- This activity motivates the students to study the sciences contributing, acquisition of knowledge and development of skills.
- The development of practical fieldwork, taking into account the curriculum and the potentialities of the region where the schools are inserted, is considered an innovative and motivating strategy to be implemented in middle and high schools, in Science Education in general and Geosciences in particular.

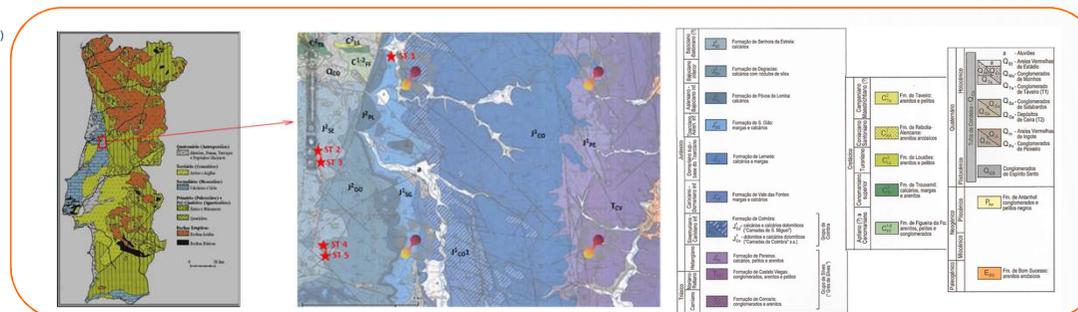


Figure 1 - Location of Serra de Sicó (Portugal) and itinerary with stations stops (adapted <http://geoportal.lneg.pt/>).

Table 1 - Tasks at each station of the itinerary.

Stations	Station 1 - Spring of Alcabideque river	Station 2 - Dolina	Station 3 - Field of lapíás	Station 4 - Casmilo Buracas	Station 5 - Cryoclasts
					
Tasks	<ul style="list-style-type: none"> - Record the names of some of the living beings observed at the source. - Infer the water route of this spring. - Determines the water pH. - Characterize the spring flow rate and it's speed (with the use of a stopwatch). 	<ul style="list-style-type: none"> - Observe the dolina and check if it has water or not. - Describe the process of sinkhole formation. - Collect a sample of rossa and calcite ground, placing each of them in a properly labeled plastic bag. 	<ul style="list-style-type: none"> - Locate this area with the aid of the topographic map and a compass. - Identify the predominant rock in the landscape. - Refer to the contribution of the alteration agents/erosion in the formation of the fields of loops. 	<ul style="list-style-type: none"> - Infer the process of these holes formation. - Collect limestone samples, place 5 drops of 5% hydrochloric acid on one portion and recording what is observed. - Try to explain the meaning of karst modeling. 	<ul style="list-style-type: none"> - Explain the process of formation of the cryoclasts formation. - Identify man's intervention on the landscape. - Make a critical judgement of man's intervention in the landscape.

Results

Activity assessment questionnaire

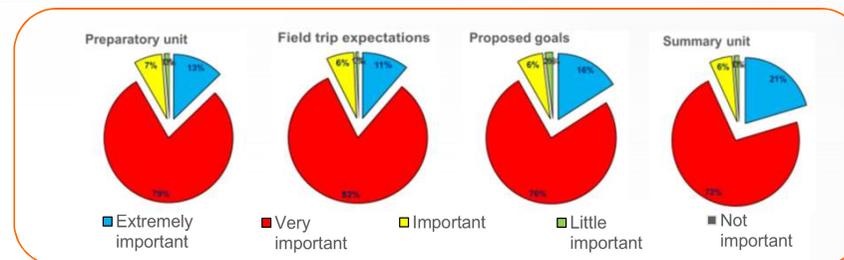


Figure 2 - Overall evaluation of the activity assessment questionnaire.

