

Geoscience workshops on Sicilian active volcanoes: implementing the school education through collaboration among different institutions

Diliberto I.S.*¹, Calabrese S.² & Gioia C.³

¹ Istituto Nazionale di Geofisica e Vulcanologia, Sezione di Palermo

² Associazione Naturalistica GEODE, Palermo

³ Liceo Ginnasio di Stato "E. Montale", Roma

* Corresponding email: iol.diliberto@ingv.it

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The attention devoted to our valuable geological heritage land has been often lacking in Italy. We have experienced it, as field experimentalist or as science teachers. So, we need to improve the knowledge of Earth-science at any educational level and we think an empiric approach, can be the proper beginning for a successful scientific cognitive path. The geo-tourism essentially attracts foreigners. During our field experiences on active volcanoes, we are still surprised by local visitors who enjoy seasonal activities, like skiing on the flanks of Etna, or doing sea activities on the coastal beaches at Vulcano and Stromboli, but who are not interested in the ongoing volcanic processes. Consequently, we have integrated the social impetus that drives active citizenship with school education in order to relate our scientific knowledge to the professional and existential needs of young students. Two scientific workshops have been carried out in collaboration with the science school teacher, the researcher of a naturalistic association (Geode), and researchers of the INGV. The first (A.Y. 2015/2016) was targeted to the Aeolian isles of Vulcano and Stromboli, the second to M. Etna (2016/2017).

Set goals:

- to increase the sensibility, respect and care for natural environment, as well as the awareness of the natural phenomena characterizing it;
- to overcome the traditional school setting organized in the classroom, using both field and laboratory approach;
- use a more effective (and attractive) teaching style to increase young people cognitive abilities, training also the relational skills, like work ethics, orally speaking, and teamworks;
- to foster the multi-disciplinar approach for solving complex problems;
- to contaminate disciplines with digital technologies highlighting instrumental potentiality and versatility;
- to orient young people into future professional applications.

The didactic pathway provided information on geology, volcanology and on botanic-naturalistic aspects of the Aeolian archipelago, Mount Etna and surrounding areas. We formed groups of students, heterogeneous for class and address, ranging from 28 to 35 items. The didactic experience consisted into theoretical lessons in the classroom and excursions by land and by sea, through the most significant itineraries of Vulcano, Stromboli and Etna (Monti Rossi, Alcantara Gorges). The students were introduced to the volcanologist's task in the field of volcanic surveillance, through an operational approach. Volcanic surveillance is a fast evolving multi-disciplinar research field, aimed to the mitigation of risk. The application of geochemical and of geophysical principles and instrumentations, allow to monitor some changes of energy release occurring in volcanic system.

Field activities have provided: a) learning of the main notions of orienteering (geographic map reading, compass, GPS, Google Earth); b) petrologic recognition in field and by microscope; c) sampling of volcanic fluids emitted from the fumaroles on the rim of the crater; d) simulation of geochemical explorations, using temperature and pH sensors on a mesh of acquisition points; e) identification of the main botanical species, typical of the visited areas.

By returning the campaign data, students shared the acquired data and prepared a final presentation with some digital software: virtual padlet, power point presentation, genially presentation. The students' cognitive and soft skills were evaluated as inputs and outputs from the workshops, to qualify the experience, highlighting strengths and weaknesses in the perspective of continuous improvement.

Following the release of L.107 / 2015 "La Buona Scuola", this workshop experience has been recognized as a school-work didactic method ("Alternanza Scuola Lavoro") for high schools (L.107/2015 art.1, 33 – 43). In fact, one of the training objectives set out in Art. 1c.7e;i, is the deepening of the methodological dimension by expansion and innovation of teaching strategies.