

A lesson from science in polar extreme environments: ethics and social values for primary school

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1 Geoethics in the Polar Sciences

Geoethics is a discipline addressed to drive the society to choose the proper behaviours to be adopted in the concrete problems of the human beings, trying to find solutions suitable to the territory and to the nature protection. The outreach of the polar sciences, one of the branches of the Earth systems sciences tree, represents a unique opportunity, not only for its importance, multidisciplinary values and relapse of the polar researches, but, mainly, because it addresses and transmits ethical and social values as example of strong integration between human beings and extreme environments.

In this frame, the idea to communicate and to share the experience of the scientific research in Antarctica with the public and with the school is a challenge that a team of INGV researchers, engaged for many years in scientific missions in Antarctica, carries on with great enthusiasm within the several outreach activities of the Italian National Program for Antarctic Research (PNRA).

The outreach activities, aiming to disseminate the knowledge and the culture of the polar regions, have been mainly addressed to a public of adults and students of the secondary school (11-19 years). Recently, the researchers matured the need to realize outreach paths addressed to pupils of the primary school (8-10 years), taking the advantage of the multidisciplinary themes offered by the Antarctic research.

The present work reports the experience of the outreach laboratory "On a mission to the South Pole", realized in the frame of events organized by INGV (ScienzAperita 2012 e 2014) and dedicated to the primary school.

2. Sheet of the didactic laboratory "On a mission to the South Pole"

AIM

The experience of taking part to a scientific expedition in Antarctica is unique both from human and from scientific point of view. To propose such experience as an educative path enables people, who have never live an Antarctic expedition, to acquire knowledge and values, to develop capabilities and competences, both at individual and at collective level, getting involved as in a real Antarctic mission.

TARGETS

The laboratory, targeted on the second cycle of the primary schools (8-10 years old), has been experimented with some schools of Rome in the frame of outreach events since 2012.

DESCRIPTION

The laboratory is organized according to the different phases of the scientific Antarctic expeditions. The children, together with the INGV researchers, play the participation to a scientific mission to the South Pole, receiving the information to prepare the expedition, experiencing the life in the scientific station and the practise of an outdoor trip, far from the station. Then, they are asked to share their experience.

The laboratory closes with a teleconference with the researchers participating to the winter-over in the French-Italian station of Concordia. The teleconference gives to the pupils the possibility to share the played expedition with the researchers that are actually living that experience.

OBJECTIVES

The educational themes developed within the laboratory concern the research in Antarctica, with particular focus on the human aspects, the geophysics and the progress of new technologies. The innovative aspect of the laboratory stands in the strategy to deal with Antarctica with an educational aim, proposing Antarctica as a natural laboratory, not only from a scientific point of view, but also as a laboratory of shared human experiences.

METHODOLOGY

The didactic path, based on interactive methodology that uses the role-play and the experiential activities, enable the children to acquire the knowledge on Antarctica (knowledge); to explore the Antarctic characteristics as a natural laboratory and to experiment an emotional education through individual and team experiences (doing); to develop civics path linked to "sense of belonging and citizenship", that will make the children aware that Antarctica does not belong to anyone but it belongs to everybody: it is a common and unique good (being).

3. The preparation

In the preparation phase the children acquire the basic knowledge of the Antarctic continent and of the roles of the personal enabling the scientific stations operations.

The researchers, supported by the slides, introduce the educational contents that concern: the main geographical aspects and the difference with respect to the Arctic, the fauna, the extreme climatic conditions, the seasons, the geopolitical aspects and the scientific researches. Some additional detailed information are provided to enable the role-play.



A part of this phase is dedicated to the exploration of the human and social aspects that characterize the organization of the life in the Antarctic stations and the cohabitation into extreme environments over long periods. During that activity the researchers, taking advantage of their own experience, stimulate the children curiosity involving them into the mimed experience.

In this context, the researchers introduce the fundamental roles to effectively run an Antarctic base: Station Leader, Scientist, Air traffic Controller, Technician, Scout, Doctor, Cook and Pilot/Driver.

At this point, the pupils have achieved all the elements needed to face the role-play on Mission the South Pole.

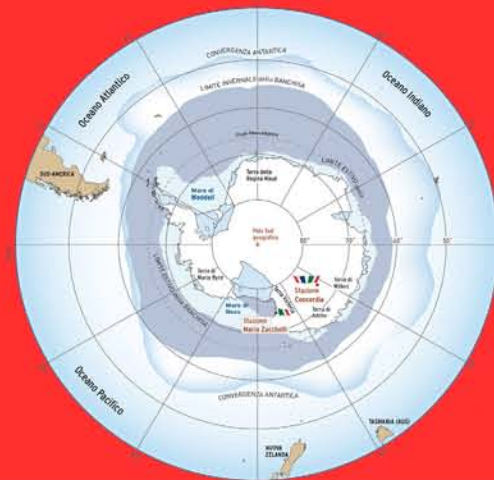
The Role play: on Mission to the South Pole

4. The selection and the departure



play. Other items concern the specific tasks of each role. The correction of the given answers, made by means of the group play, for the children represents the verification of the learning of the laboratory contents and, concurrently, for the researchers the opportunity to explain better the topics not correctly understood.

At this stage, the pupils that have been selected wear the technical clothing and are ready to leave to Antarctica!



In the succeeding phase the role-play directors organize the pupils into small groups, assigning them the roles and kicking off the selection game. The game consists of a questionnaire of 10 items to be filled in. Some of the items are addressed to verify the general knowledge on Antarctica and on the human and social aspects characterizing the scientific expeditions. Such items are the same for all the roles in

5. The life in the base and the scientific missions

In this phase the actual role-play game starts. The atmosphere of the life in the base is reproduced in the classroom: the principal screen displays the photo of the Italian Antarctic bases, some signboards identify the sites of each role (Station Leader, Air traffic Controller, Technician, Scout, Doctor, Cook and Pilot/Driver), other screens display images recalling the outdoor missions.



The directions to play are available at each signboard. During the simulation of the outdoor missions, the children playing the scientists role have to carry on the following researches:

- the meteorologists, by means of the balloons launch, learn to measure the wind velocity and the temperatures;
- the physicists learn how to observe and recognise the characteristics of the aurorae;
- the biologists observe the penguins colonies and learn to recognise the characteristics of the different races;
- the geologists observe the icebergs and learn to recognise their different shapes.

All the other roles (Station Leader, Air traffic Controller, Scout, Pilot/Driver, Technician, Doctor, Cook) are involved in the missions to support, with different tasks, the correct run of the researches.

At the end of the simulation, the leaders collect the feedbacks of the children with respect to the game just experienced.



6. The teleconference with Antarctica



At the end of the laboratory the children pass from the virtual experience of the role-play that simulates the South pole expedition, to the actual contact via teleconference with the researchers hosted by the Antarctic station of Concordia. This experience represents an occasion of intense emotional sharing generated by the questions of the pupils to the researchers.

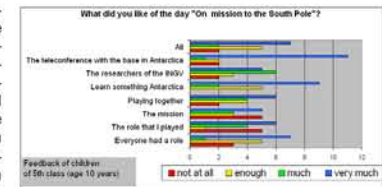
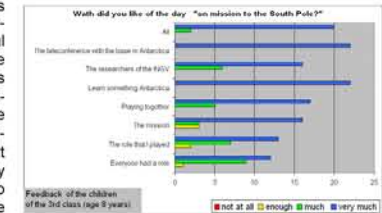
7. Evaluation of the laboratory

The first results of the evaluation of satisfaction, collected in the first edition of the laboratory and reported in the plots, are on average good. The differences in the two evaluations, both precious, are substantially due to the different ages of the children involved.

The evaluation, resubmitted at the end of every edition of the laboratory, allows to obtain information useful to improve the effectiveness and the satisfaction of the outreach activities. In the next month of May we foresee two editions of the laboratory.

We are convinced that the experimentation of the proposed methodologies will constitute the base to put in place educational paths on polar sciences and that, through an active collaboration between researchers, teachers and children, will be possible to structure such paths as projects integrated in the curricular programs of the primary school.

To conclude, we believe that the proposed work represents an example of how is feasible, through the educational paths, promote and support integration values between human beings and environment even in extreme regions like the Antarctic continent.



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