Bringing the Ocean closer: an example of how to bind Research and Education and Outreach

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The justification:

Neither scientific knowledge nor the understanding of what science can really offer to society have not been brought effectively to the general public until relatively recently. Therefore, science was and is still seen as an activity which is relatively unrelated to the daily life of the man in the street. The most important challenge science faces today is, precisely, to become part of every day's cultural and leisure activities. Yet, the vast majority of the ways of popularizing science are based on passive activities, methods and products, rather than appealing to an active participation of the public, especially students, which should be a target group.
We are exploring the existing possibilities of contributing to the knowledge and education of primary and secondary school students directly from research centres to schools. We aim to broaden an educational opportunity which is usually made available to schools by official education institutions. We further take advantage of a unique figure in Spain: the "research project" required at high-school and secondary school, which is compulsory in Catalonia, and thus put more at hand the means and logistics of research centres to schools, thanks to which students and teachers may have access to top and current research through the collaboration with scientists.

The project: "The Sea at School"

We are currently developing an Education project -tested during the previous years as a pilot project- which aims to provide a series of activities and didactic materials about marine topics in order to include them in the educational programmes of schools; i.e. it aims to diversify pedagogic resources considering the lack of models and subjects about marine topics in the Spanish secondary school education. This project intends, moreover, to enhance consciousness about environmental topics, to promote scientific vocations and learning, to bring science closer to students and to provide teachers with new and current materials which they may use in their daily lessons. Together with teachers, researchers have developed and will develop a series of educational materials and activities in order to accomplish the objectives of the project. These educational resources include experiments, puzzles, workshops, videos, games, texts, and fieldwork. This resources, as well as the gathered information and results of the experiments performed by students, will be centralized in a webpage, where students and teachers will be able to download the materials and keep in constant touch with both scientists and students and teachers from other schools. Apart from this, a second step in the project will be the development of a set of materials which are more difficult to obtain and which schools will be able to temporarily borrow. Further, the consolidation of all these contents and activities into a traveling lab is also intended. During the whole project, the advice and evaluation of the materials by teachers has been and will be constant: scientists and teachers must work together in order to develop the most adequate materials.

3.- Researching coastal plankton:

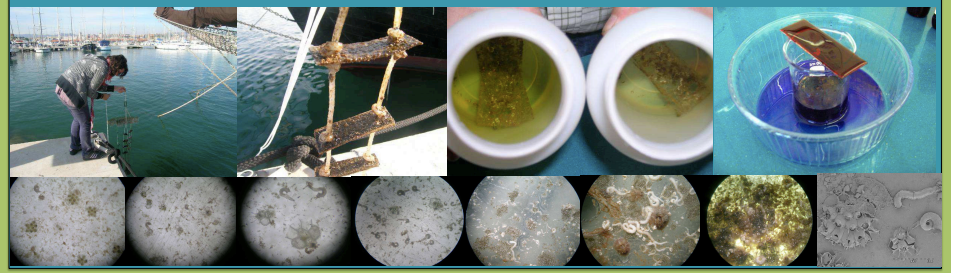
Students have been developing research on coastal plankton both from a boat and by more manual means (taking samples with a hand-net). The study of the plankton allows answering research questions about seasonality, spatial heterogeneity (both in the horizontal and the vertical axes) and biodiversity. In this sense, students may realize that although the sea seems very homogeneous if compared to terrestrial environments, seasons and spatial differences also affect marine ecosystems.

This study aims to unveil the relationships between environmental factors (temperature, currents, light) and the distribution of organisms in an innovative way: by introducing a topic scarcely looked into in primary and secondary school education and which is easy to experimentally manipulate and sample, as is the marine plankton (phytoplankton and zooplankton).

Some examples:

1.- Ecological succession at sea:

Ecological succession not only happens on land: marine organisms also colonize new surfaces. Installing some surfaces in a harbour and playing with the type of substrate (for instance, smooth or coarse, or with antifouling paint) and light conditions has enabled students to study the first stages of a marine benthic succession process and to establish the differences in this process according to the different environmental factors proposed. This approach allows for the experimental study of the temporary patterns of ecological succession, at a timescale which is suitable for secondary school students (a timescale of months, not the years required by similar experiments in terrestrial ecosystems).



2.- The hidden fauna:

The sand of our beaches seems at first glance almost devoid of life. By means of building hand-made light traps, students can study the fauna hidden in the sand at different places and times of the day: they may study the links between a particular substrate and its associated fauna, which is equivalent to studying one of the engines of speciation and evolution in the terrestrial environment, i.e. the association between insects and substrates. This experimental design, as well as the succession experiment, enhances the talent of students, as they are asked to design and build the materials and devices needed for the experiment themselves.

This research may be complemented with the study of the fauna associated to different types of algae (done by covering with a plastic bag an algae and letting the associated organisms come out).