“Blue Paths” and SeaCleaner: two innovating approaches for scientific education and research in environmental and marine sciences

Erika Mioni¹, Silvia Merlino², Mascha Stroobant³, Roberto Traverso¹

¹Istituto Comprensivo Statale n°2- Complesso “2 Giugno”, Viale Aldo Ferrari, 19121 La Spezia – Italy
²Istituto di Scienze Marine ISMAR-CNR, Forte Santa Teresa, Pozzuolo di Lerici, 19032 La Spezia
³Distretto Ligure per le Tecnologie Marine DLTM, Via delle Pianazze 74,19136 La Spezia

Nowadays, the urgent need of long-term data series for solving environment related problems (such as biodiversity loss, beach litter etc.) can be satisfied by the so-called "citizen science", i.e. involvement of citizens and their active participation in scientific projects. This kind of scientific research, partly or wholly conducted by amateur or nonprofessional scientists, has been demonstrated in several studies to be effective both from the scientific and social point of view, since it brings people closer to STEM (Science, Technology, Engineering and Math) disciplines, fills the gap between who produces science and technology and who benefits from it.

Nevertheless, motivating and enabling all these volunteers in a long-term commitment to a scientific problem represents an essential problem. “Percorsinel BLU”/“Blue Paths” and SeaCleaner are a perfect example on how this long-term commitment can be guaranteed through a comprehensive educational path that involves (mainly 1° and 2° Grade) students, not only in data collection but also in problem definition and data analysis.

Both projects try to identify and implement effective approaches for improving STEM teaching and learning - for students from 4 to 18 - by harmonizing the existing educational plan, and prioritizing hands-on learning to increase student engagement, interest, and achievement in the STEM fields.

Moreover, the success of these two projects is strongly related to two recent Italian educational programmes: Unified School Districts (USDs) and work-related learning stages for High-school students.

“Percorsinel BLU”/“Blue Paths” is a project - carried out by a Science teacher of a Unified School District in La Spezia - aimed for teaching scientific methods based on interactive learning and operational research, for monitoring and conservation of marine habitats. Italian Unified School Districts (USD Istituto Comprensivo) date from the late nineties, they were initially “designed” for grouping schools¹ in mountain areas usually isolated and depopulated (Law 31.01.1994, n. 97). Since then, this form of aggregation has spread throughout the country following the liberalization (Law 23.12.1996, n. 662), and represent nowadays more than 56% of all the assets of Italian primary and lower secondary schools [1,2]. Some of the immediate advantages of USDs, are: (i) effective educational continuity (vertical curriculum) for children from 3 to 14 years; (ii) more flexible management of the organization (educational autonomy); (iii) closer relationships with parents and the territory (social integration). SeaCleaner, instead, is a project carried out by a Research Centre - ISMAR-CNR - involving higher secondary school students trough internships and aimed for raising

¹A USD usually comprises at least one kindergarten, a primary school and a secondary school of a same territory with a common secretariat and headmaster.
awareness on the impact of marine debris and the importance of appropriate management strategies for solving this problem. Internships are compulsory and regulated by Legislative Decree n.77 of 15.04.2005 [5]: students work and/or support on going activities being supervised directly by the Research Centre/Enterprise personnel (e.g. senior researchers, graduate students, managers etc.) who hosts them. “Percorsinel BLU”/“Blue Paths” and SeaCleaner are actually cooperating and sharing some goals, methodologies and sampling sites of the coastal Tuscan and Ligurian Protected Areas (National Park of the Tuscan Archipelago, Natural Park of Migliarino-San Rossore-Massaciuccoli, Marine Protected Areas of Cinque Terre, of Portovenere and the Regional Natural park of Montemarcello-Magra).

The scientific results of this cooperation are indeed interesting, as presentation of preliminary results during European [7] and International [8] Conferences; but some other outcomes should be pointed out:

- the involvement of over 1,700 students and families, collecting international awards and grants (Special International Award Ramoge “Alain Vatricain” 2012, European Days for Scientific dissemination, acknowledgement of best-practice of work-related learning during the 1st National Convention on work-related learning, ‘Salone dell’Orientamento’ ABCD of Genoa, Novembre 2013;
- a spontaneous ‘peer education’ approach is raising: high school students teaching to their small ‘brothers’ and viceversa. Educational continuity goes beyond, and a fourth level is being added in the existing vertical communication among kindergarten, primary and secondary schools of USDs;
- hands-on experiences are successful in influencing individual behaviour for preventing and reducing, as possible, marine pollution and for perceiving the importance of environment conservation.
- both projects are supporting school’s task in forming future citizens, able to identify and develop the necessary skills and competences which will help them to “participate in an effective and constructive way in social and working life in an increasingly diverse society”[6]. Developing citizenship is a shared task, and must involve students, teachers, headmasters and headmistresses, non-teaching staff, all other institutions, public bodies, local government: in brief, the whole community, both inside and outside the school;
- scientific method is the base of critical thinking, and must be conveyed since primary school;
- cooperation between the projects show a clear example of interdisciplinary methodology in scientific research;
- synergy among very different partners (marine parks, researchers, local authorities, citizens, environmental education centres, teachers and students) represent an effective push-pull impulse for maintaining a long lasting engagement in scientific research. Moreover it allows to plan several activities within a wider framework, that satisfies the need of scheduled sampling campaigns;
- activities carried out in parks are effective for increasing the interest and importance of these areas and to consider tangible actions aimed at preserving the environment.

References

[1] Focus “Sedi, alunni, classi e dotazioni organiche del personale docente della scuola statale A.S. 2013/2014” Ministero dell’Istruzione, dell’Università e della Ricerca Direzione Generale per gli Studi, la Statistica e per i Sistemi Informativi – Servizio Statistico

(http://hubmiur.pubblica.istruzione.it/alfresco/d/d/workspace/SpacesStore/ceafc890-20eb-4c5f-859b-baed726d22d0/avvio_anno_scolastico2013_2014_10.pdf)


