The oceans occupy almost three-quarters of the surface of our planet and affect many aspects of our life, such as fish production, climate regulation and people’s well-being and leisure. However, this importance is not transferred proportionally to the curricular content that students deal with during their education and usually remains unknown by a large part of society.

**Real-time tracking of an oceanographic cruise**

An attractive way to explain marine research is through real-time tracking of an oceanographic cruise. To this end, the scientific and technical teams of the Institut de Ciències del Mar (ICM) who are in expeditions at sea write a campaign diary in which they explain the scientific aspects of the ocean, how they carry out marine science and how they live on a research vessel (Simó 2017). Primary and secondary schools are specifically invited on some cruises, with the aim of putting them in direct contact with scientific and technical staff so that, guided by their teachers, they can apply the curricular content to marine sciences in an experiential and practical way. Sometimes, the ICM staff involved supplement the diary with educational activities and experimental proposals. Students can also ask questions to the scientific-technical staff on board, either through the internet or through real-time connections. This methodology is also complemented with talks in schools, teacher training and guided visits to oceanographic vessels. The diaries, as well as the questions from the schoolchildren and the responses of the on-board staff, are available to the public and are expressed amenably but with scientific rigour.

The origin of this practice goes back to several oceanographic cruises (Antarctica 2000 and 2003, Hawaii 2001 and Arctic 2004) whose diaries were published on the website of the Agència de Gestió d’Ajuts Universitaris i de Recerca (AGAUR). The diaries continued to be published on the Recerca en Acció website of the Fundació Catalana per a la Recerca i la Innovació (FCRI) (http://www.recercaenaccio.cat/) and are currently being recovered to be published in DIGITAL.CSIC, the repository of the Spanish National Research Council (Consejo Superior de Investigaciones Científicas, CSIC), which conserves and disseminates the CSIC’s research results in open access (Figure 1).

**The sea reaches the classrooms**

Since 2004, 34 oceanographic cruises have been monitored through the ICM Divulga website (http://icmdivulga.icm.csic.es/expedicions/), and since 2015, this pioneering initiative has been an essential task of the ICM’s expeditions. Seven of the 18 campaigns carried out since 2015 (Figure 1) have been specifically followed by 38 schools (29 primary schools and 9 secondary schools of 17 towns, mainly in Catalonia), reaching a total of 2,227 students and involving 88 members of the scientific and technical staff of the ICM (Figure 2).
The educational levels participating in the monitoring cover the stages of preschool, primary and secondary education in their entirety, although the schools aim the project at students between the fourth year of primary school and the second year of secondary school. In some cases, the project has been carried out in highly complex schools, where the teachers valued it as a very powerful educational alternative for their students.

Through the dissemination of oceanographic cruises, scientific topics are addressed from an experiential, cross-cutting and interdisciplinary perspective (Pedrós-Alió 2017). The contents cover disciplines such as life and earth sciences (physics, chemistry, biology, geology, marine sciences and astronomy), geography and history, nautical science, art and language. Issues related to the logistics and communication systems of oceanographic vessels and Antarctic bases are also discussed, as are the professions of the people linked to the cruise. Other topics dealt with include psychological and social issues such as scientific collaboration, teamwork and coexistence, and issues of current relevance such as marine pollution, the climate emergency and the role of women in science.

All this information is shown on the ICM Divulga website, from which the campaigns are disseminated and monitored, and the complete contents can be downloaded from DIGITAL-CSIC. The dissemination is reinforced with specific news on the ICM’s Twitter and Instagram channels. The schools also disseminate the project through their platforms with the aim of channelling this experience to the entire educational community. The SotaZero website received the 2004 eLearning Awards (European Schoolnet of the European Union) for the Antarctic cruise web ANT XXI / 2 (2003–2004).

Finally, most schools use school work on ocean-
Inspiring and engaging oceanographic cruises for exhibition on their open days because they see this activity as an added value to their educational projects.

**Education and awareness through the diaries**

This experience has been assessed as a valuable non-formal teaching resource in schools because it introduces the study of the sea, which is usually absent from curricula (Gasol 2004). On many occasions, the students have become members of the expeditions, even carrying out scientific experiments in parallel to those carried out by the staff. This project can be applied to all levels of education, but especially with 8- to 14-year-olds. The diaries offer the highly gratifying experience of sharing the experience of the sea in real time through questions, experiences and results obtained by the team on board and the participants. The project fosters curiosity, dialogue, reflection, a critical spirit and interest in science and its methods in a key stage for school and personal development, while making visible the work of professionals who study the sea, and especially the role of women in oceanography today. The concern that students have expressed about the state of the oceans is also highly appreciated. Environmental sensitivity must be dealt with effectively from the earliest educational levels. A young person who knows the sea from an early age will learn to respect it and to be actively involved in its conservation.

The result of monitoring oceanographic cruises has always been positive for both schools and research staff, who enjoy the opportunity to show their work and the research carried out at the ICM, promoting simultaneous learning between the scientific and technical staff, schools and society.

Acknowledgements: Elisabetta Broglio has been the promoter of the monitoring of oceanographic cruises on the ICM Divulga website since its beginnings. We would like to thank all the scientific and technical staff who have dedicated some of their valuable time on the cruises to writing in the diaries, answering questions and reviewing texts with scientific rigour and enthusiasm for their work and its dissemination. The cruises whose results are presented in this essay were financed by the Spanish Ministry of Science, Innovation and Universities. The FECYT Petits Oceanògrafs project (https://petitsoceanografs.icm.csic.es) includes the monitoring of oceanographic cruises within its objectives and five of the cruises presented were specifically followed by schools participating in this project.

**References**

   http://icmdivulga.icm.csic.es/icmdivulga/icm/mar_gel_i_cel.pdf

DOI: https://doi.org/10.20350/digitalCSIC/14128