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BlueNIGHTs: Bringing a Touch of Blue in the EU Researchers' Nights for a More Sustainable Use of the Ocean

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The main objective of BlueNIGHTs was to plant 'blue' seeds across Europe to improve Ocean Literacy (OL) and grow a new network of European Researchers' Nights (ERNs) focused on Ocean issues and the achievement of the Sustainable Development Goals (SDGs). The initiative, specifically targeting SDG 14, aligns with the United Nations (UN) Decade for Ocean Science, the EU Starfish Mission and major European initiatives dedicated to OL, such as EU4Ocean. Our aim was to show European citizens the different facets and faces involved in marine research by organising a series of interconnected ERNs. BlueNIGHTs brought together researchers from different European countries who collectively address Ocean challenges and solutions to demonstrate their deep understanding of the complexity of human-Ocean interaction.

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T. J. Kennedy (ed.), *Ocean Literacy: The Foundation for the Success of the Ocean Decade, Volume III*, Sustainable Development Goals Series, https://doi.org/10.1007/978-3-032-14477-5_4

In this chapter, we illustrate the process of developing such a project, from conception to partnership building and work package development. We believe that sharing this experience is essential because it fosters fruitful interactions between the scientific community and society, connecting researchers with pupils and teachers and bringing Ocean issues to local communities, both near and far from the sea.

Ocean Literacy (OL) · European Researchers' Night · Science & society · Human-Ocean interaction · Blue careers · Scientific approach

4.1 Introduction

4.1.1 The Background

In 2015, the UN General Assembly adopted "*a plan of action for people, planet and prosperity*": the Agenda2030 for Sustainable Development (UN 2015). It indicates 17 major SDGs to be achieved by 2030 to ensure a sustainable development that can benefit all. The choice of these goals reflects the major, interconnected global issues that affect society, from poverty to health care, quality education to gender equality, clean energy to sustainable economic growth, climate change to environmental degradation. Among them, SDG 14 is devoted to the "*conservation and sustainable use of the Ocean, seas and marine resources for the development of a new, inclusive, interconnected and healthier global (Ocean) literate society*". Two years later, the UN proclaimed the Decade of Ocean Science for Sustainable Development (2021–2030) to "*support efforts to reverse the cycle of decline in Ocean health and gather Ocean stakeholders worldwide behind a common framework that will ensure Ocean science can fully support countries in creating improved conditions for sustainable development of the Ocean*" (UNESCO-IOC 2021).

SDG 14 is indeed cross-cutting and interconnected to the other SDGs, beyond its relevance to Ocean issues themselves (Singh et al. 2018). A healthy Ocean contributes to poverty eradication (SDG 1) by creating sustainable livelihoods (SDG 2) and decent work (SDG 8) for over three billion people depending on marine and coastal resources. Ocean is also crucial for global food security (SDG 2) and human health (SDG 3 and 6). It is the primary global climate regulator (SDG 13), an important sink for greenhouse gases (SDG 7, 9, 11 and 12) and it contributes to clean water (SDG 6) and oxygen. Finally, the Ocean is an amazing reservoir of biodiversity (SDG 15). Furthermore, the importance of the Ocean for sustainable development is widely recognized by the international community and embodied in the Agenda2030 (UN 2015), the Johannesburg Plan of Implementation (UN 2002) and several decisions taken by the UN Commission on Sustainable Development. The EU Commission (EC) also received this message and elaborated the EU Mission Starfish 2030 strategy (Lamy et al. 2020) to define priorities and challenges regarding its Regional Sea Areas (RSAs).

4.1.2 Empowering the Connection Between Science and Society

Within this landscape, the global marine science community has been called upon to play an important role in driving change towards a more Ocean-literate society for a more sustainable use of the Ocean (Uyarra and Borja 2016; Claudet et al. 2020; Cappelletto et al. 2021). Among the available initiatives, we chose to take advantage

of the ERN that is already a consolidated and widespread event series across EU. This is one of the most important opportunities for public and media promotion of research careers across the EU, aimed at young people and their families. The ERN addresses and attracts people regardless of their scientific background (Jensen et al. 2021), with a special focus on families, pupils and students, and notably those who do not have easy access to and thus are less motivated to engage in STEAM fields and research activities. It takes place every year, on the last Friday of September, involving more than 1.5 million EU citizens every year, in an informal atmosphere in more than 350 cities across EU (Roche et al. 2017, 2018). Pre-events, prior to the main event, and related post-events, such as wrap-up meetings or small-scale follow-up events, are already an integrative part of the main event and, year by year, they act as a driving path between ERNs. The ERN also brings researchers to schools to interact with pupils at any time during the school year. The recently introduced *Researchers at School* initiative allows researchers and pupils to directly interact on societal and environmental challenges and on the key role of research to address them. Thus, pupils learn directly from researchers about their projects and initiatives related to key EU priorities thus becoming informed citizens with increasing skills and knowledge to actively participate in decisions and strategies for the Ocean (Devenport et al. 2021).

4.1.3 The Leading Idea

BlueNIGHTs relied on the idea to plant BLUE seeds across EU to strengthen OL for all and favour the growth of a new network of ERNs dedicated to Ocean issues and to the achievement of the SDGs, responding to the UN Decades of Ocean Science and to key EU initiatives on OL (e.g., EU Blue School Network). It was led by the National Research Council (CNR), Italy's main public research body, through the Institute of Marine Sciences (CNR-ISMAR). Since 2008, CNR-ISMAR has provided valuable support in the coordination and organisation of successful ERNs in several Italian cities. With the support of ACTeon sarl (ACTEON), a French consultancy and research company, coordinator of the EU4Ocean project, the CNR guided the partners towards a cost-effective implementation of local events in a wider network perspective.

The word BLUE of its acronym reflects the partners and activities common (Ocean) ground. Recognizing the challenges faced by ERN organisers in 2020 and 2021 due to COVID-19 pandemic (Jensen et al. 2021), BlueNIGHTs offered the opportunity to look beyond daily challenges in a more visionary way, building on past and present knowledge and understanding. BlueNIGHTs was an opportunity to remind participants that researchers from different disciplines working beyond geographic and political boundaries are a valuable resource for the society that can help address these challenges.

4.2 The BlueNIGHTs Project

4.2.1 Objectives

BlueNIGHTs aimed to strengthen the link between science and society, between marine researchers and the community in which they live, by preparing and organising ERN events and activities in cities representing major EU RSAs. The initiative brought together researchers whose daily work addresses Ocean challenges and solutions in a truly collective European initiative. Far from hiding in their laboratories and institutes, researchers from all disciplines were able to show how research is deeply rooted in and aware of the complexity of human-Ocean interaction.

BlueNIGHTs wanted to show how scientific researchers can:

- make a concrete contribution to design a better present and a more sustainable Ocean management;
- help change gears and direction to strengthen the resilience of society;
- give greater visibility to women and girls involved in marine science and research;
- strengthen relationships and networks by sharing different types of knowledge and skills in an equal, respectful and constructive relationship.

Another fundamental objective of BlueNIGHTs was to increase awareness on Research & Innovation (R&I) with special attention to kids, pupils, students and young adults. By sharing concrete examples and testimonials from the research actors, it demonstrated particularly to girls and women that research and science to address Ocean challenges represent empowering and exciting opportunities for their future life and careers.

BlueNIGHTs also wanted to accompany people to capture and understand key objectives, principles and priorities of the EU Mission Starfish 2030. It contributed to the growth of a generation of Ocean-literate EU citizens, in line with the objectives of EU4Ocean, highlighting the importance of the Ocean for our society. Its focus was on priority areas that are central to the EU by developing and realising suitable pedagogical material and toolkit for further education and training on these issues.

4.2.2 Strategy and Approach

BlueNIGHTs strategy revolved around the following main assets to ensure that the objectives were achievable and measurable:

(a) *Promote a variety of approaches*: some people enjoy listening to interesting topics, while others like a greater degree of involvement or prefer approaching science through gaming. Proposing a wide range of activities and events is a way to attract different kinds of visitors to interact with researchers;
(b) *Organise pre-events to build momentum*: pre-events in different venues and times can capture attention in different urban environments and are additional opportunities for direct interactions between researchers and citizens. Organised into the "Getting ready" specific program strictly related to the ERN, pre-events substantially contributed to increase public awareness and disseminate information;
(c) *Multidisciplinary matters*: ensure the presence of researchers with very different backgrounds (e.g., geology, biology, oceanography, economics, architecture) and skills (i.e., people who work on the field and/or in labs), and involving experts from social sciences and humanities, art and music together with marine scientists;
(d) *Exploit unusual/informal locations*: provide scientific contents outside its usual venues to engage people, such as scientific coffee held in popular hangouts, and guided tours in local cities and their surroundings. Events had an informal tone and gathered small numbers of participants as key ingredients to promote the engagement and closer interactions;
(e) *Engage Schools*: high school students (ages 14–18) are perfect ambassadors of research content aimed at the public and younger pupils. Dedicated school collaborations were organised, using already available networks (e.g., the Blue School Network) or creating new initiatives (i.e., Adopt a School);

(f) *Stakeholders matters*: make use of available networks of stakeholders (e.g., EU4Ocean Coalition) to build local connections for designing joint initiatives to enrich the cultural and scientific contents and help widen dissemination locally;
(g) *Make the ERN available to everyone*: activities and events were recorded and proposed on-line to allows higher participation, ensuring greater visibility during and after the project. It provides a practical solution to the challenge of distance as everyone can be within 'virtual walking distance';
(h) *Visible and easy to find*: indoor/outdoor activities were carefully described and advertised in various channels, including the distribution of printed programs as well as through targeted communication social media campaigns. Existing networks can play a crucial role as multipliers tools;
(i) *One MSCA team*: young researchers supported by the EU Maria Skłodowska Curie Actions (MSCA) were asked to join the ERN, in person or virtually, to interact with the public that could appreciate the broad variety of international research efforts and the EU role in supporting them.

The project was therefore built on the following principles:

- Collective and truly EU—mobilising organisations from each of the EU's RSAs to present their own scientific research activities, on the one hand, and provide general information and how the EU funds scientific and educational cooperation, on the other;
- Inter–/multi–/transdisciplinary—consortium partners reflected the EU's scientific cultural diversity, such as different disciplinary fields and research experiences focused on the Ocean and its complex connections with human activities;
- Immersive, inclusive and (inter)connected—combining an interactive, hands-on on-site experiences, with direct contributions and experiences from the public by doing, touching, playing, testing, exploring, as well as an interactive virtual experience to learn more about real working conditions of marine researchers.

4.2.3 Partnership and Collaborations

BlueNIGHTs involved ten participants six of whom work in the EU's scientific Research & Innovation field: CNR-ISMAR, with its five local branches, and the R&I consortium represented by the Venetian District of Research and Innovation (DVRI) in Italy, the Finnish Environment Institute (SYKE) in Finland, the Danube Delta National Institute for Research and Development (INCDDD) in Romania, the Department of Geosciences of the University of Malta (UNI TA MALTA) in Malta and the Centre for Environmental and Marine Studies of the University of Aveiro (UA-CESAM) in Portugal. ACTEON, the French National Sea Center Nausicaá, the Portuguese Association for Environmental Education (ASPEA) and the private company Holo3 have in-house researchers who are experts in various disciplines.

All partners already had experience in managing EU-funded projects, organising public events, awareness-raising campaigns and evaluating the impact of activities. Therefore, the responsibility for the different WPs was shared among the consortium members. The tasks were then allocated to partners taking into consideration their specific expertise. Thanks to the nature of BlueNIGHTs consortium, it was easy to enlist researchers involved in marine research and technology development, as well as other research activities (e.g., design, art, economics, social sciences, education). CNR, ACTEON, SYKE, UNI TA MALTA, INCDDD, UA-CESAM and DVRI ensured the multidisciplinary aspect by also including the socio-economic sectors. They also represent national networks or/consortia of researchers, each of them centres of excellence in their specific RSA.

The Steering Committee (SC), which consisted of the project coordinator (plus one deputy) and one representative (plus one deputy) from each beneficiary partner, acted as the main decision-making body of the consortium and was responsible for the overall direction, coordination and evaluation of the project, as well as decision-making and conflict resolution. The SC also supported and stimulated cross-cooperation between different practices, countries and locations, ensuring cohesion and consistency within the project. The planned Advisory Committee (AC) was not created mostly due to language problems and to the site-specific nature of the stakeholder involvement. Instead, local ACs were informally created by the partners, each of them including relevant stakeholders and end-users particularly interested in the organisation/participation of/to local events.

BlueNIGHTs project reflected a focus on gender balance in the composition of the SC and management structure, with four out of six female WP leaders, and six out of ten female SC members. Gender balance was also applied to the organisation of pre-events and in the selection of activities and related objectives that contributed to the ERNs. It was also crucial to give visibility to the many female researchers involved in the dissemination and diffusion of marine research results, who are often much more active than their male colleagues.

4.2.4 Topics Considered and Research Areas

BlueNIGHTs partners solicited spontaneous contributions from all researchers of participating organisations and local/national/international stakeholders.

The wide range of research areas available within the project included, among others:

- marine sciences to understand, on the one hand, how the Ocean is made and how it works, and, on the other hand, how marine space and resources are/can be managed sustainably;
- marine technologies to understand how and why to monitor the Ocean system, including its connection to climate;
- educational sciences to analyse and understand people's attitudes towards the Ocean;
- economic sciences to grasp the economic and social importance of the Ocean and the ecological services the Ocean provides to society;
- communication sciences to highlight the role of science and media literacy in understanding the factors necessary for people's OL;
- humanities to explore the role of the Ocean as supporting social and economic development throughout history;
- digital technology and design to investigate new ways of approaching Ocean issues;
- arts to make science more inclusive, accessible and engaging.

4.2.5 The Implementation

The project was structured into five Work Packages (WPs) following the EC rules, plus an additional WP (i.e., WP2) added to help visitors virtually enter Ocean research.

The WP1 objective was to organise the awareness-raising campaign including the design of the visual identity, the creation of the website and social media, the promotion of all ERN events and several joint pre-events of different RSAs (Fig. 4.1).

To develop an effective awareness-raising campaign, we first had to define who would be the target audience for the different events/activities and how best to reach these audiences. We identified the following categories:

- researchers,
- pupils and teachers,
- students/young researchers,
- citizens.

Then we had to develop the following elements:

- an attractive visual identity,
- the website and social channels, and guidelines for their use,

Fig. 4.1 Examples of the communication materials: a) website home; b) social pages; c) post-cards; d) the virtual platform

- relevant communication materials and their adaptation to different countries/contexts/languages,
- the organisation and realisation of pre-events in different categories.

The aim of WP2 was to co-develop a digital twin of the real Aranda Research Vessel (R/V) in service at SYKE. This activity acted as a connector of knowledge being open, transversal and interdisciplinary according to the shared goal of connecting research places and activities and addressing the Ocean as a common object of study. This product (Fig. 4.2) presents the activities and work of the researchers onboard during oceanographic campaigns.

The virtual reality experience helped visitors to project themselves into the Ocean in a variety of situations and contexts that few could experience, such as diving to monitor the state of the marine ecosystem, collecting water and sediment samples or exploring the geomorphology of the seabed from the control room. This application is designed to evolve, become richer, obtain content extensions and enjoy a cost-effective annual update over its lifetime.

The WP3 (Fig. 4.3) was dedicated to design and implement all events and activities carried out during the two ERNs editions in the different RSAs: Tulcea/Galati (Romania) for the Black RSA; Bologna/Capo Granitola/La Spezia/Naples/Roma/Trieste/Venice (Italy) and Valletta (Malta) for the Mediterranean RSA; Cascais/Horta/Lisbon/Torreira (Portugal) for the Atlantic RSA; Boulogne-sur-Mer (France) for the English Channel/North RSA; Helsinki (Finland) for the Baltic RSA. In coherence with its truly EU character, activities were also organised in Strasbourg (France), one of the EU capitals hosting more than 20 EU institutions including the EU Parliament, the Council of EU and the EU Court of Human Rights.

The ERN programs were defined through a bottom-up approach starting from researchers' proposals, in close collaboration with the project coordinator and the SC to account for practical and conceptual needs. Collaboration with local cultural and/or scientific organisations (e.g., academia) was also crucial to the success of the events, as was the choice of informal and/or well-known venues. Proposing up-to-date and interesting topics and contents for the events was

Fig. 4.2 Some examples of the virtual R/V Aranda prototype: a) aerial overview of the ship; b) captain's bridge; c) control room; d) Rosette sampling room; e) wet lab; f) rear deck

Fig. 4.3 ERN activities in: a) Torreira; b) Faial; c) La Spezia; d) Valletta; e) Lisbon; f) Bologna; g) Valletta

important to attract schools and citizens. Practical activities were considered the most interesting and received very positive feedback.

The WP4 was dedicated to meet the schools (Fig. 4.4). BlueNIGHTs brought researchers into schools and/or pupils to their own working spaces to raise awareness on the importance of research methods and approaches, strategies and results. By offering interactive lessons, hands-on activities and guided tours, researchers directly engaged

Fig. 4.4 Some activities realised within the WP4 with primary (ages 6–10), middle and secondary schools (ages 11–18)

pupils in their scientific activities. We also wanted to create local learning communities to promote the insertion of marine sciences into school curricula to grow a more Ocean-literate new generation and to promote the participation of pupils and teachers to ERN activities and pre-events.

Within this WP, we built a special program to promote a free space of interaction between researchers and pupils called *BlueScience meet BlueSchools*, focusing on blue challenges and the key role of marine research in addressing them. Each partner contributed to this WP with already consolidated or new activities related to its own research areas to contribute to grow *A new 'blue' generation*. In addition, several schools were deeply involved in the project through the *Adopt-a-School* initiative. The aim was to support pupils during the school year to enable them to participate in the ERN as *Young researchers to renew the BlueNIGHTs*, as well as the training of teachers to enlarge the *Network of Ocean Literate teachers*. Previous experiences and best practices of BlueNIGHTs partners in blue education were the basis for the development of a common shared pathway within the initiative offered to pupils to learn about research careers, marine research and initiatives addressing key EU marine challenges and priorities.

The offered lessons and interactions were to be adapted to the age of the pupils and they used alternative approaches such as tinkering, learning-by-doing, virtual reality, gaming, audiobook, photo competitions and hands-on activities adapted to several ages starting from primary school (ages 6–10).

In WP5, a thorough impact assessment (see Sect. 4.3 for more details) was carried out to assess the benefits and added-value of the different activities organised under BlueNIGHTs, from the pre-events (WP1) to the school-dedicated events (WP4), up to the two ERN events (WP3). The assessment gave particular attention to the: (a) truly EU identity of BlueNIGHTs, offering the opportunity to discover scientists from other EU countries and regional seas; (b) diversity of disciplines presented and how this helped to "find her/his way" to science topics closer to each person's interest; (c) complementarity between activities organised in person and those organised at a distance; (d) added value of the virtual Aranda R/V in facilitating the understanding of researchers' work and life.

The WP6 ensured coordination and technical evaluation of the project, including administrative, legal, financial and accounting management (see Sect. 4.2.3 for more details). By jointly tack-

ling common challenges such as activity reporting, bureaucratic-administrative issues and logistical coordination of events, BlueNIGHTs created cohesion and a spirit of cooperation among the partners and a greater awareness of the importance of this EU event. This demonstrates that the enormous effort to create shared structures, tools and strategies within the consortium during the first year of the project provided the valuable substrate to enable the partners to better organise themselves and exploit their potential during the second year of the project.

4.3 Impact Assessment and Obtained Results

The main objective of the WP5 was to assess the impact of BlueNIGHTs activities and events at all locations. Among the specific objectives, we had the: (i) assessment of participation and overall appreciation of the proposed activities/events; ii) evaluation of attitude to attend similar events in the future; (iii) assessment of the number of attendees and their socio-economic and cultural characteristics (e.g., age, sex, occupation, background); (iv) assessment of the most/least successful activities; (v) evaluation of changes in attitudes toward science and researchers with special reference to benefits that researchers bring to society, reduction of stereotypes about researchers and their profession that hinder the choice of a scientific career, and the role of the EU in supporting research.

4.3.1 Content and Implementation of the Assessment Methodology

The consortium designed a common system to monitor the impact of initiatives by defining quantitative and qualitative indicators to ensure their success and evaluate their usefulness. At the beginning of the project, we shared assessment methods and strategies to design standard materials and tools to be used for BlueNIGHTs.

We carried out multiple assessment studies (see Table 4.1). These consisted of: a) onsite and

Table 4.1 The different clusters used to group the questions in the survey questionnaires (from Villa 2024)

Cluster 1: Enjoyment and Effectiveness	How satisfied are you with the event?
	How would you quantify the increase in your knowledge after the event?
Cluster 2: Participant Information	What gender do you identify with?
	How old are you?
Cluster 3: Approach to Science	What is your most used source of scientific information?
	Have you ever participated in another European event such as the EU researchers' night?
Cluster A: Participants of pre-events; Questionnaire of pre-events	What is your profession?
	How did you find out about the event?
Cluster B: Researchers at school; Questionnaire for schools	Focusing on science subjects, do you think they are: Interesting? Burdensome? Boring? Easy?
	Have you ever thought of becoming a scientist?
Cluster C: ERN participants and science Questionnaire for the Night (public)	How did you find out about the event?
	Which of the topics discussed interests you the most?
Cluster D :Researchers and Outreach Questionnaire for Researchers	How comfortable were you with communicating with the public?
	Have you ever been educated on how to best disseminate science?
	Do you think you need a course to learn how to disseminate science?
	For each of these activities, how important do you think it is to have a targeted education in communicating with the public:
	—communication to non-academic audiences through traditional media.
	—communication to non-academic audiences through mass media and online.

online surveys, and face-to-face interviews with pre-events' attendees within WP1, as well as within WP3 on the ERNs; b) onsite and online survey and face-to-face interviews during the WP4 with school pupils; c) online questionnaires and face-to-face interviews with researchers. These data were analysed using quantitative and qualitative (e.g., content analysis) approaches (Villa and Sartori 2023; Villa 2024).

4.3.2 Assessment Results

The project encouraged skills development and fostered commitment to environmental stewardship through related initiatives such as EU4Ocean and the #MakeEUBlue campaign. Past assessments have shown significant positive shifts in perception as well as increased scientific knowledge among participants, validating the project's approach and reinforcing its potential future continuation (e.g., Pietrantoni et al. 2020). Moreover, around 90% of high school (ages 14–18) pupils found that interacting with researchers increased their awareness of research benefits for society.

The BLUE ERNs continued to showcase the role of research in sustainable Ocean development across various regions, facilitating public engagement with researchers and diverse topics. Researchers demonstrated how their work contributes to Ocean sustainability, including green (and blue) energy, predictive models for safety, personalized medicine, and marine biodiversity conservation. This insight helped citizens understand scientists' contributions to the marine environment's current and future health.

Stereotypes hinder young people, especially girls, from pursuing research careers, reflecting the low representation of women in STEAM fields. Events like ERNs aim to inspire youth, particularly girls, towards scientific careers by challenging gender biases. Surveys conducted during and after ERN activities gauged attitudes towards scientific careers and stereotypes (Table 4.1, Cluster B). BlueNIGHTs prioritized diversity among researchers to highlight diverse career paths and perspectives, fostering interest in STEAM studies and jobs. The virtual experiences on the R/V Aranda offered insight into researchers' daily lives, further enhancing understanding and engagement.

Throughout all pre-events and activities organised by BlueNIGHTs, a deliberate emphasis was placed on fostering interaction and collaboration between the public and researchers. Whether in person or through the virtual platform, visitors had the opportunity to engage with a diverse array of scholars representing various ages, genders, nationalities, and cultural backgrounds. This heterogeneous representation offered visitors a comprehensive view of the multifaceted nature of research and the people who carry it out.

In addition, visitors had the opportunity to connect with representatives of organisations that use the work and findings of researchers to inform decision-making processes, to design educational initiatives, and to organise awareness-raising campaigns. These interactions provided valuable insights into the practical applications of research to address pressing global challenges such as climate change and marine litter pollution. By facilitating these exchanges, ERN projects may not only facilitate knowledge sharing but also highlight the vital role of research in promoting positive changes in society and environmental management.

Encouraging young people to pursue careers in research is key to promote innovation and address global challenges (Akkok et al. 2021). Researchers (in any field) play a key role in advancing knowledge and finding solutions in various fields, from medicine to environmental sciences. Furthermore, investing in research training prepares young people for the demands of the economy of the future, where these skills will be increasingly valuable (Devenport et al. 2021). By fostering a passion for research, we empower young people to make a meaningful contribution to society, address global environmental changes and inequalities, and realise themselves.

Globally, with regards to the selected questions for the WP5 deliverables (Villa and Sartori 2023; Villa 2024), as well as for most of the other questions, the data showed:

1. A high outcome in the overall level of satisfaction derived from the participation to both ERN 2022 and 2023, ranging from 29% of "satisfied" participants to 66–68% of "very satisfied" participants;
2. An increase in the level of self-assessment of the knowledge acquired by pupils, improved by "a lot" for 33% in 2022 and for 96% in 2023;
3. A decrease in the age range of people who participated in the ERN 2023 (i.e., 63% of participants were under 30 years old);
4. A much wider participation of pupils in 2023 pre-events (i.e., 2800 in 2022 vs 7150 in 2023);
5. An increase of people that participated for the first time ever in the pre-events from 50% to 84% in 2022 and 2023, respectively, showing we reached a wider and "brand new" audience;
6. A much higher level of interest among pupils in science topics (Fig. 4.5);
7. The websites and social media for both years as the main source of scientific information for participants showing how important is, nowadays, to invest in the digital platforms;
8. A significant increase in the number of people reached by the consortium mailing lists, very important sources of information on the project activities;
9. In both years (42–52%), pupils responded that they had never thought about becoming researchers, implying that BlueNIGHTs was able to spark inspiration and curiosity for the first time in their lives;
10. A very high percentage of people (88–92%) who responded in both years that there should be more interaction between researchers and citizens;
11. Biodiversity & Conservation, but also Climate Change and Environment, are the topics that most of the attendees chose when asked about the themes they were more interested in (Fig. 4.6), again showing the BlueNIGHTs was indeed a kind of projects that well responded to the communities' interests;
12. In both years, researchers stated that they had learned to communicate their research through past experiences. But in 2023 (Fig. 4.7) there was an increase in people responding that they had attended a dedicated course in science communication, possibly because of the 2022 BlueNIGHTs experience and/or the availability of dedicated training courses organised within the framework of similar projects (e.g., SOCIETY riPENSAci).

Overall, we reached out to more than 2000 researchers, involved more than 25,000 citizens, organised more than 200 pre-events and 26 ERNs, and created a strong network of organisations that will take what they learnt during the BlueNIGHTs project into future OL-related

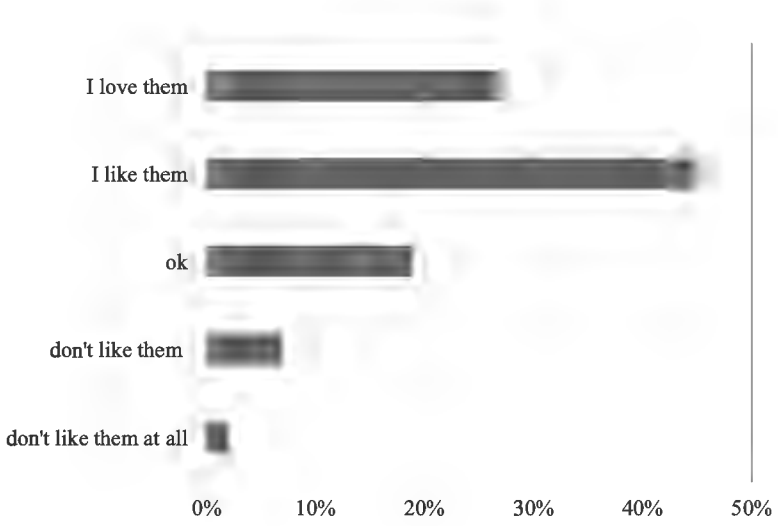

Fig. 4.5 Expression of interest towards scientific subjects by young participants in 2023 (from Villa 2024)

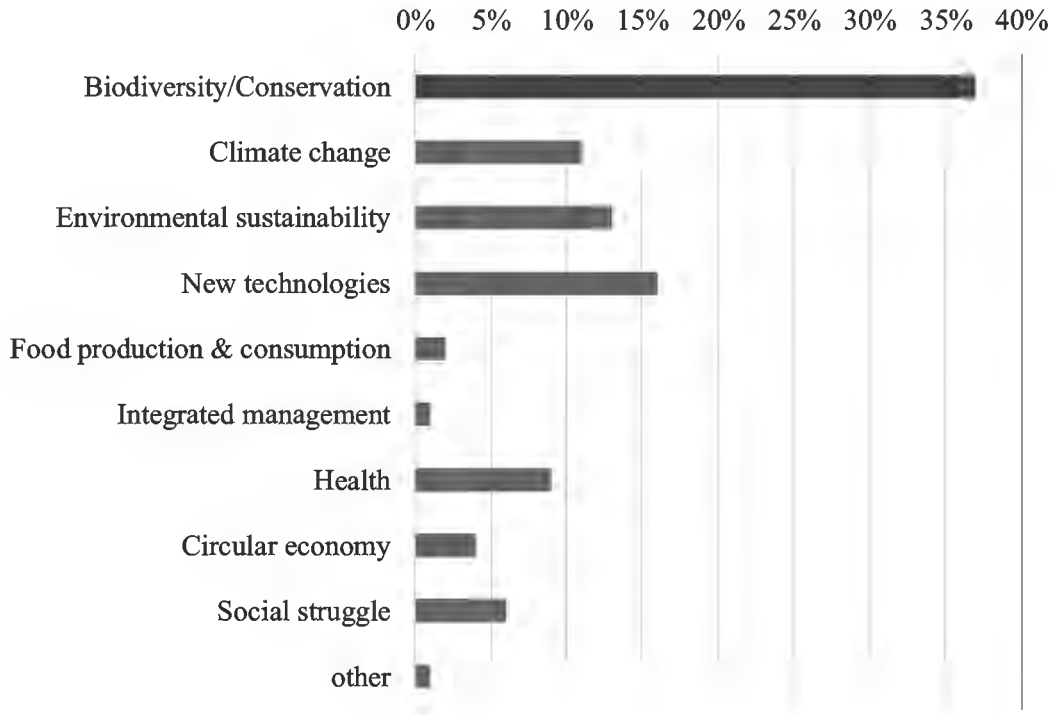

Fig. 4.6 Topics of most interest to participants in 2023 (from Villa 2024)

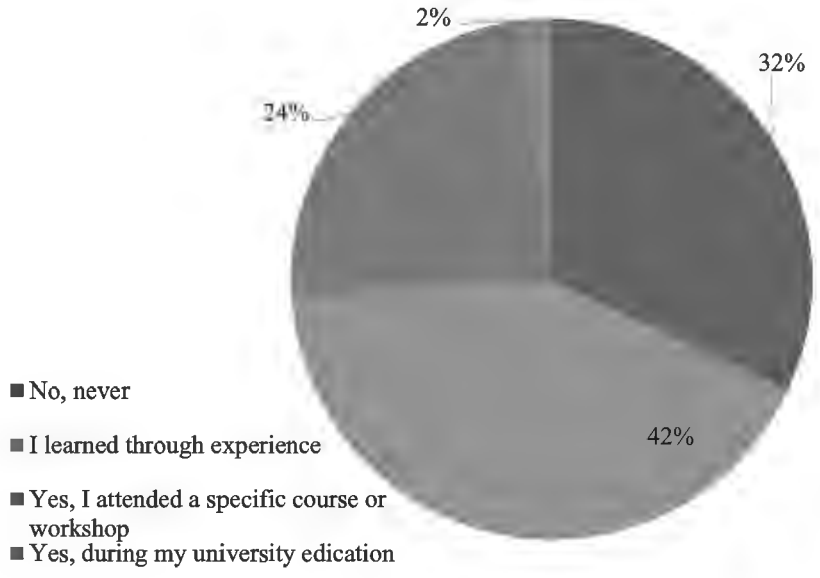

Fig. 4.7 Training experiences of researchers on scientific dissemination in 2023 (from Villa 2024)

activities. We have gathered evidence that demonstrates a strong need for people (young and old) to learn more, to get more involved and to find out (and understand) what researchers do and think. For their part, researchers want to learn how to talk to the citizens about their extraordinary careers to ignite curiosity and inspiration in future generations and to help shape a better future for our planet through their work.

4.4 Conclusions, Lessons Learnt, and Recommendations

Thanks to the work done in the BlueNIGHTs project, the consortium managed to create a large, interconnected team at EU level to promote OL through the ERN. Furthermore, by sharing best practices and strategies between different actors and organisations that had no experience in this type of project, the various partners were able to co-organise a series of interconnected events and activities with greater self-sufficiency and efficiency and to start germinating the blue seeds planted during the project.

By tackling common challenges together such as reporting activities, bureaucratic-administrative issues, the coordination of logistics in many different cities and places in EU, the expansion of the participation of new schools and stakeholders, it has created greater cohesion and spirit of collaboration between partners and greater awareness of the importance of this EU event. This demonstrated that the enormous effort aimed at creating shared structures, tools, and strategies within partner consortia during joint projects constituted a valuable substrate to allow the partners to better organise and exploit their potential during and after the projects.

About interaction with schools, it was sometimes difficult to manage the discrepancies between school schedules and activities prepared by researchers (e.g., research fairs and outdoor activities). With an early and shared planning with teachers, however, it is possible to solve some of the main problems and help pupils and teachers by training them appropriately. Transport costs and organisation to take pupils out of the school are also often a problem. Therefore, to stimulate their interest and commitment to participate, it is necessary to provide dedicated funds by also synergising with other funding programmes (e.g., Erasmus+).

In conclusion, the improvement in the general level of satisfaction of both partners and citizens/stakeholders resulting from participation in the ERN, the high percentage of people asking for greater interaction between researchers and citizens, and last but not least the fact that the researchers said they learned to communicate their research better thanks to this experience, confirmed that the ERN projects are a wonderful chance to create a permanent link between science and society.

Finally, the strong need on the part of citizens to know more, to be more involved, to find out what researchers do and, on the part of researchers, to learn to tell their extraordinary careers to the public in order to arouse curiosity and inspiration in the next generations, confirms how important it is for the EU to continue investing in this type of initiative, giving more and more researchers the opportunity to meet EU citizens in every corner of the continent and beyond its borders.

4.4.1 Summary

Key concepts explored in this chapter include:

- BlueNIGHTs is a pan-European initiative designed to promote Ocean Literacy by integrating marine science themes into European Researchers' Nights (ERNs) across diverse regions and disciplines.
- Human-Ocean interaction was a central focus, explored through informal, immersive events that made marine science approachable for citizens of all ages, cultural background, and scientific familiarity.
- Virtual tools like the digital twin of the Aranda R/V offered novel ways for the public to experience marine research and understand scientific practices onboard.
- STEAM education and gender equity were promoted by highlighting diverse researcher profiles and encouraging youth, especially girls, to see marine science as a viable and rewarding BLUE career path.
- Collaborative networks were strengthened among schools, researchers, and institutions across the EU, supported by EU initiatives such as the Mission Starfish 2030 and EU4Ocean, with a strong emphasis on inclusive, accessible engagement.

- Impact assessment demonstrated increased public engagement, improved understanding of Ocean science, and reinforced the importance of sustained dialogue between scientists and society to achieve the Sustainable Development Goals (especially SDG 4, 5, 11, 12 and 14).

4.4.2 Recommended Resources

The following resources provide further insights and support on this topic:

- European Researchers' Night: https://marie-sklodowska-curie-actions.ec.europa.eu/actions/msca-citizens/join-a-celebration-of-science
- BlueNIGHTs—A touch of Blue in the EU Researchers' Nights for a more Sustainable Use of the Ocean: https://bluenights.eu/
- United Nations Decade of Ocean Science for Sustainable Development (2021–2030): https://Oceandecade.org/
- EU4Ocean initiative: https://maritime-forum.ec.europa.eu/theme/Ocean-literacy-and-blue-skills/Ocean-literacy/eu4Ocean-coalition_en
- European Marine Science Educators Association (EMSEA): https://www.emsea-net.eu/
- National Research Council (CNR)—Institute of Marine Sciences (ISMAR): https://www.ismar.cnr.it/
- University of Aveiro (UA)—Centre for Environmental and Marine Studies (CESAM): https://cesamteste.web.ua.pt/
- Venetian Research and Innovation District (DVRI): https://www.distrettovenezianoricerca.it/
- Holo3: https://holo3.com/
- Danube Delta National Institute for Research and Development (INCDDD): https://ddni.ro/
- Portuguese Association for Environmental Education (ASPEA): https://www.aspea.org/
- University of Malta—Oceanography Research Group (UNI TA MALTA): https://www.um.edu.mt/research/Oceanographymalta/
- Nausicaá National Sea Centre: https://www.nausicaa.fr/
- ACTeon sarl: https://www.acteon-environment.eu/
- Finnish Environment Institute (SYKE): https://www.syke.fi/

Acknowledgements The authors would like to thank all the members of the partners' teams and all the researchers involved in the project for their contribution to the success of this initiative, the teachers and pupils at all involved schools for their fruitful cooperation, interest and suggestions for better and more fruitful interaction, all stakeholders, supporters, sponsors and collaborators who helped us to spread OL throughout Europe. BlueNIGHTs was co-funded by the European Commission under the HORIZON-MSCA-2022-CITIZENS-01 action (GA 101061605).

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