European society needs an innovative science education which shall enable today's and tomorrow's citizens to play a more active role in the Research and Innovation process, and to set young students on career paths in science, technology, engineering and mathematics (STEM). The EDU-ARCTIC project has developed a programme for secondary schools, dedicated to engaging students in STEM education through Arctic and polar research. EDU-ARCTIC, an EU H2020 funded project from May 2016 until July 2019, focused on using Arctic research and knowledge as a vehicle to strengthen
science education curricula and to encourage interest in STEM among secondary school students, aged 13-20 years, by providing an innovative and attractive educational programme and tools, accessible to schools all across Europe and beyond.

The Arctic is an area of opportunities and threats with its vast, harsh, intriguing and picturesque environment. It is home to millions of people and peoples of numerous ethnic origin and culture, hoping for a good and sustainable live for them and their generations to come. Its environment is fragile yet extremely diverse and colourful. Due to its richness of natural resources and other economic potentials, such as the opening of new shipping routes and tourism, the Global economic interest is raising. Advanced understanding of the regions impact on the Global climate is also furthering scientific and political interest. In order to understand and minimize the threats and allow for sustainable utilization of the region’s resources for the Global welfare we need to transform Arctic knowledge into skills.

Awareness on environmental issues and climate change is rapidly raising Globally, making the encouragement of STEM careers very relevant and impactful. To facilitate the foreseen need for increased and enhanced knowledge and skills among Europeans on Arctic related issues in the near and distant future the EDU-ARCTIC project has produced educational material, tools and educational approaches and established lasting links between the research and education communities.

The EDU-ARCTIC project developed and initiated a mix of different tools to bring a fresh approach to teaching STEM subjects, including: 532 online webinar lessons; a “citizen science” environmental monitoring program; three teacher training seminars; online “Polarpedia” portal in 17 languages with up to 486 terms and three students Arctic competitions through which six teams of students and teachers got the rare opportunity to visit the Arctic. Students have been provided with unique possibilities to get to know different research disciplines and the understanding of scientific research and careers.

An important objective of EDU-ARCTIC was to permanently increases the number of girls pursuing STEM careers. This has been approached by using methods and language sensitive to gender issues. The participation of girls in the Arctic Competitions is an indication that the objective has been met and highlighted by the Arctic Explorer Game App, based on a competition entry by a Faroe Islands female student. Lastly, the project has built the competences of teachers in STEM fields. Based on the positive and strong impact of the project and its highly favourable outcomes, the partners have all agreed to support and pursue the sustainability of EDU-ARCTIC and its replications. This includes an MoU between the partners, identification of new partners of strategic importance and the exploration of existing or possible financing schemes through public and private financing. First steps in the replication of the projects result have already been taken by project partners, including through participation in INTERACT III, application for EEA funding and discussions with other networks in and outside of the EU.

The most important achievements are:
- conducting 532 online lessons from polar stations and institutions
- creating and constantly enriching Polarpedia (486 terms created in English, many of them translated into 16 other European languages)
- organising 3 editions of the Arctic Competitions (with 277 applications from 3 continents) and 6

Work performed from the beginning of the project to the end of the period covered by the report and main results achieved so far
Arctic expeditions
- organising 3 EDUCATORS FORA for 70 participants and the Final International Conference for 64 participants from 21 countries
- creation of the EDU-ARCTIC monitoring system and its version in a mobile app (2355 reports received)
- creation of games and quizzes and a mobile app “Arctic Explorer”
- developing the evaluation methodology, conducting and analysing online surveys (5248 surveys obtained)
- recruiting schools to the program (1223 users from 765 schools from 59 countries)
- presentation of the project during various events (184 events), by popular science publications and in other media (88), in social media (2673 posts in total) and by scientific publications (5).
- networking activities: links with 80 various institutions, including educational and scientific institutions, governmental institutions, international associations and others (68 reported events)
- preparation of high-quality promotional and outreach material, project website, brochures in 10 languages, project videos in 8 languages

Progress beyond the state of the art and expected potential impact
(including the socio-economic impact and the wider societal implications of the project so far)

All the activities undertaken in the project have proven to lead to achieving the goals, which are as follows:

• Enhancement of knowledge about science and scientific research (expected impact +15%, actual impact: +24%)
• Enhancement of knowledge about nature, geography, natural resources, history, social and political specificities concerning polar regions and increase of sensitivity to environmental issues and climate change (expected impact +15%, actual impact: +29%)
• Establishing strong links between the worlds of research and young people/society (expected impact +20%, actual impact: +26%)
• Increase of the number of young people interested in STEM and scientific career (expected impact +25%, actual impact: 26%)
• Increase of the number of girls interested in scientific careers (expected impact +20%, actual impact: 26%)
• Implementation of innovative tools of teaching science on a regular base in schools (expected range: 10 European countries, actual range: 59 countries)

EDU-ARCTIC project had also exceptional impact owing to its characteristics:
1) increasing the awareness of the importance of the Arctic among the general public:
2) enhancement of the use of ICT and modern communication tools in schools
3) strengthening of networking and scientific collaboration between institutions dealing with polar research

Our ambition was to expand project’s impact globally. By the end of the project, schools from 59 countries on 5 continents were involved. We observed great interest in the project, expressed by end-users from multiple countries. Schools are interested in continuous participation in project activities and teachers declared including project tools into both curricular and extracurricular activities.

EDU-ARCTIC project has a special significance to often marginalized communities from smaller
The EDUARCTIC project has a special significance to often marginalized communities from smaller towns; giving an opportunity to participate in a global event, positive rivalry, direct contact with scientists and research stations, not to mention the ability to prepare their own scientific projects has proven to be a huge stimulus for development and incentive to follow scientific career path in numerous cases. It is also observed to contribute to lifting language barriers and eliminating technological exclusion.

Polarpedia with 9 categories of terms and 'games and quizzes' section
Hands-on activities for students

mobile app for the EDU-ARCTIC monitoring system
BONUS ACTIVITIES
Inspired by participants’ feedback and ideas

Online Lessons

Thematic courses, a comprehensive series of complementary topics. Each course has a set day of week and hour, available to include into school practice and curriculum.

Monitoring System

EDU-ARCTIC Monitoring System Mobile App

Mobile version, available for all citizens from any location. Gamification. Photos can be added.

Information on additional activities and outcomes

Engaging students in STEM education through AreBo research

Mobile App Arctic Explorer Game

Smart entertainment for everyone

Have fun and play a quiz game answering questions about polar regions. After each given answer you can read more about the correct one. It is also possible to submit your own questions.
EDU-ARCTIC website with information on main components

Photos from Arctic expeditions
"Mobile app "Arctic Explorer Game" - based on the idea of 13-year-old Arctic Competition finalists"