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Raising awareness on global environmental challenges by bringing polar research closer to the society

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Running title: Bringing polar research closer to the society

Abstract: The effects of climate change are much more rapid and visible in the Arctic than in the rest of the globe. The Arctic is extremely attractive scientifically and cognitively. Therefore, polar regions may serve as some of the most captivating natural settings capable of engage society in discussions on environmental changes. The primary objective of this paper is to present selected initiatives implemented by the Institute of Geophysics, Polish Academy of Sciences that aimed to connect polar research with schools and society, and show evidence on their effectiveness, with special focus on pupils from primary and secondary schools. In this paper, an overview of the educational and science communication initiatives undertaken by the Institute of Geophysics PAS for schools and whole society is presented, with the focus on polar research. Next, some results of the evaluation studies for those projects, that conducted detailed impact assessment, are discussed. Based on the evaluation studies and on general not-structured feedback received from diverse audiences of Institute's activities, positive impact of bringing polar research closer to the society was observed. Using the Arctic and polar research as a vehicle to inspire interest in science and to raise societal awareness of the environmental challenges in various groups of non-specialists may be a very effective mean of science communication.

Keywords: Arctic, formal education, learning outcomes, science communication.

Introduction

The ongoing climate changes are larger and much more intense in the Arctic than in the rest of the globe. The Arctic is losing both sea ice and glacier ice, and the Arctic Ocean is changing

rapidly. The consequences of this polar transition extend to the entire planet and are affecting people in multiple ways (IPCC 2019). The warming in the Arctic is at least twice as fast as the global average in recent decades, whereas in Spitsbergen, where the Polish Polar Station Hornsund, managed by the Institute of Geophysics, Polish Academy of Sciences (PAS), is located, the observed warming was even six times higher during last four decades (Wawrzyniak and Osuch 2020). Therefore, the Arctic and polar research may be very effectively used to raise awareness about climate change, environmental challenges and the achievements of Polish researchers to various audience groups.

Moreover, polar regions represent one of the most interesting natural environments that can engage pupils in topics related to global changes (Macario *et al*. 2013). A vast array of processes and ecosystems can be observed in the Arctic. The Arctic is extremely attractive scientifically and cognitively due to several reasons. Unknown regions, such as remote or distant places, can trigger curiosity in pupils, leading them to seek out information and experiences to satisfy their curiosity. Exposure to unknown regions can promote cognitive development by challenging pupils' existing knowledge and encouraging them to think critically and creatively about new information. The Arctic is an extraordinary area that pupils from most European countries are likely to associate with, as it represents the idea of a faraway, almost unreachable and mystical space. Exploring the Arctic, even only virtually, can evoke a sense of adventure and discovery, which are inherently rewarding experiences for individuals. The difficulty to reach the Arctic makes it even more attractive (Goździk 2017). Psychological distance, including spatial distance, can influence individuals' perceptions and attitudes. Unknown regions, due to their physical distance from pupils' everyday lives, may appear more intriguing and appealing, as they offer a sense of novelty and escapism. Additionally, polar examples provide an excellent way to transmit basic concepts about a wide range of STEM (science, technology, engineering and mathematics) disciplines (Beck *et al.* 2014).

The Institute of Geophysics PAS has been conducting educational and science communication projects addressed to many groups of recipients for several years. The primary objective of this paper is to present chosen initiatives implemented by the Institute that connect polar research with schools and society and show evidence of their effectiveness, with a special focus on Polish schools. Therefore, an overview of the initiatives undertaken by the Institute for schools and society and focusing on the polar research is presented. Next, some results of the evaluation studies for those projects, that conducted detailed impact assessment, are presented and discussed.

Educational projects

The list of the polar educational initiatives conducted in recent years by the Institute of Geophysics PAS is presented below, in the chronological order.

EDUSCIENCE. — *Increasing school pupils' competence in the field of mathematics, natural and technical sciences with application of innovative methods and technologies* was the first big educational initiative run by the Institute of Geophysics PAS in 2011–2015. The key objective of the EDUSCIENCE project was to increase interest in mathematics, natural, computer and technical sciences as well as foreign languages - thanks to fundamental changes in the existing ways of teaching. The project offered direct contact with scientists from the Polish Academy of Sciences through video-conferences, online lessons, and visits at geophysical observatories in Poland. It served as an opportunity to get to know various aspects of science through satellite broadcasts run from the Polish Polar Station Hornsund in Spitsbergen and from the observatories in Poland.

Within the project a detailed evaluation of its impact was conducted by one of the partners and covered three editions of competence tests for pupils taking part in the project, three editions of surveys evaluating the project users' and recipients' satisfaction and their opinions on individual products, 120 in-depth personal interviews with school pupils and teachers (IDI), and 24 focus group interviews (FGI) with school pupils and teachers. The diagnostic material gathered in the course of the project implementation was impressive. In total the following was obtained: 5 579 CAWI surveys from school pupils, 914 surveys from teachers, 26 142 completed competence tests, as well as 120 individual in-depth interviews and 170 opinions from focus-based group surveys (Stankiewicz *et al*. 2015).

One of the most spectacular results of the project was the change in the pupils' general approach to mathematics and natural sciences. Nearly 88% of the teachers participating in the EDUSCIENCE project considered that there was an increase, or even a huge increase, in interest in mathematics and natural sciences among the school pupils. During the Focus group interviews, as well as in some informal discussions conducted by the project team with teachers participated in the project, the strong emphasis was put on the attractiveness of the polar part of the project. Both teachers and pupils were far more interested in activities, which concerned polar research and involved the staff of the Polar Polish Station Hornsund. Taking into account this positive feedback, the project team decided to implement the EDUSCIENCE good practices on European level.

EDU-ARCTIC. — *EduArctic - Engaging students in STEM education through Arctic research* was an EU-funded project (Horizon 2020, 2016–2019) focused on using Arctic research as a vehicle to strengthen science education curricula all across Europe. It aimed to encourage students aged 13 to 20 to pursue further education in science, technology, engineering and mathematics (STEM). The project was conducted by six organisations: Institute of Geophysics PAS (Coordinator, Poland), American Systems sp. z o.o. (Poland), The Norwegian Institute of Bioeconomy Research – NIBIO (Norway), Jardfeingi (Faroe Islands), Universite de Versailles Saint-Quentin (France) and The Arctic Portal (Iceland). Partners managed four polar stations, which were involved in the project.

The EDU-ARCTIC project used a mix of different interactive, innovative tools to bring a fresh approach to teaching STEM subjects. (1) Online lessons with polar scientists working at research stations and institutes. The lessons focused on natural science topics, polar research and why they are key in helping solve important challenges in society. In total, 523 lessons for 1223 teachers from 59 countries were conducted. (2) *Polarpedia*: An evolving online encyclopaedia, that contains a glossary of scientific terms and educational resources in several national European languages. It helped teachers and pupils to prepare for their participation in webinars by providing short explanations of scientific terms used by scientists. In total, 486 terms in up to 16 languages were provided. (3) Three editions of competitions for European pupils and their teachers, in which winners were invited to take part in a polar expedition to participate in scientific research; 277 applications were received. (4) Environmental monitoring program: All participating schools in Europe were invited to conduct environmental monitoring around their school. The program had a web-based interface allowing interested schools to report their observations in an open and accessible database dedicated to the project. The database could be used as a supplement to science classes, most notably in biology, chemistry, physics and mathematics. In total, 2355 reports were provided by participants via web and mobile app. (5) Three teacher workshops and training sessions aiming at giving teachers the right tools to use EDU-ARCTIC resources and become ambassadors of the project in their home countries; 70 educators participated.

Online lessons were the most commonly used part of the EDU-ARCTIC program. EDU-ARCTIC webinars for schools were a tool, which helped to establish strong links between the research and education communities by connecting in real time schools with scientists working in various places in the world. Online lessons conducted by researchers allowed to inspire students to engage in the learning process and to better understand the role of scientific research in the modern world, scientific messages and scientific language. They helped to increase their

knowledge about nature, geography, natural resources, and social sciences and to raise awareness about environmental issues and climate change. They also encouraged young people to choose STEM careers, so crucial for the development of knowledge-based societies (Goździk 2017).

EDU-ARCTIC 2. — The *EDU-ARCTIC 2: from polar research to scientific passion - innovative nature education in Poland, Norway and Iceland* project was funded within EEA program and implemented by some of the EDU-ARCTIC partners in 2020–2022. It was based on the belief that polar issues are an attractive motivator for students to pursue science education and a career in science, and promote social responsibility. The EDU-ARCTIC 2 project was dedicated to students aged 13–19 and their teachers. The aim was to implement an innovative method of teaching natural sciences in Poland and Norway. The program used Arctic research stations and biological, glaciological and other observations carried out there to raise interest in a scientific career, increase understanding of the scientific language and ability to interpret data, as well as awareness that changes in the Arctic are of global importance. The main outputs of the project are educational packages on polar and environmental issues that include videos, presentations, worksheets, mind maps, quizzes and other interactive activities. The packages were supplemented by >180 online lessons, which were recorded and published on the YouTube channel and on the project website. The methodological guides developed for each of the packages supported teachers in implementing the educational materials in classrooms. The project developed 66 packages (35 in English, 21 in Polish and 10 in Norwegian), that were made available on the project website and on the graasp.eu platform. 360-degree videos prepared in Polish and English were another result of the project. The project and its results were widely disseminated at teachers workshops and various national and international fora.

INTERACT. — *International Network for Terrestrial Research and Monitoring in the Arctic* is an EU-funded Horizon 2020 project (2020–2024), which has a main objective to build capacity for identifying, understanding, predicting and responding to diverse environmental changes of the Arctic. It is a circumarctic network of 74 terrestrial field bases in the Arctic, sub-Arctic and in northern alpine areas. The education and outreach component of INTERACT aims at promoting Arctic and environmental issues in education in order to enhance Arctic literacy and students' awareness on global challenges, including the climate change so strongly affecting the North.

INTERACT offers educational resources developed by the Institute of Geophysics PAS and the Norwegian Institute of Bioeconomy Research (NIBIO) for teaching about Arctic environmental challenges (climate change, glaciers, permafrost, biodiversity and pollution) in

schools. Spectacular, though easily-implemented experiment scenarios for primary schools and extensive, containing various materials tool-kits for secondary schools are available for teachers. The INTERACT tool-kits have an extensive and comprehensive structure and provide teachers with a set of materials and activities. The educational material is foreseen as a tool for promoting natural sciences to students and early involvement of future potential polar researchers. The educational materials contain three tool-kits dedicated to the biggest challenges, which currently the Arctic is facing: *The changing Arctic* dedicated to the changes observed in the Arctic connected with climate change, *The polluted Arctic* dedicated to the different types of pollution that have been observed and studied by the scientists over the last decades in the Arctic and *The invaded Arctic* dedicated to invasive species, which appear in the Arctic. Additionally, a tool-kit *Studying past environments* is dedicated to the changes in the past environments and studies of paleoclimatology and looks to the past to better understand the present. Each toolkit consists of syllabus with introduction, list of basic concepts to remember, a glossary, material for teachers, lesson plan, worksheet for students, some online activities, presentation and recording of author's lecture. An additional part of the tool-kit is an experiment scenario, which could be performed without special equipment in classrooms.

Additional offer for schools provided by INTERACT staff was a set of online lessons. The range of research topics of online lessons delivered within INTERACT was wide and covered environmental sciences, geography, climatology, climate change, ecology and terrestrial biology. Topics of online lessons were generally related to polar or subpolar areas and their natural conditions, some polar stations, mainly the Polish Polar Station Hornsund in Svalbard and NIBIO-Svanhovd station in Norway, and the research carried out there. In total, 70 INTERACT online lessons were offered and 176 groups participated.

Science communication projects

After implementation of several educational initiatives, the Institute of Geophysics PAS started a new range of projects funded by the Ministry of Science and Higher Education and, subsequently, the Ministry of Education and Science in Poland. The projects offered activities not targeted to teachers and pupils, but to the entire Polish society. The most significant initiative of the Institute of Geophysics PAS addressed to the general public was the EDU-ARCTIC.PL project, financed by the Ministry of Science and Higher Education under the DIALOG program (2019–2022). Its aim was to increase the recognition of the achievements of Polish science, especially in polar regions, as well as raising the level of public interest in them and awareness of

their importance. Several various initiatives were organised within the project that were dedicated to various audiences: general public, non-specialists interested in polar science, students of third-age universities and children universities, families and children. In an extensive outreach effort to enhance public engagement with polar science, various educational formats were employed with considerable success. Project's website facilitated the dissemination of knowledge through 47 popular-scientific articles published on the edu-arctic.pl portal, reaching an impressive audience of over 209 000 views, indicating a strong public interest in polar topics. Additionally, a series of 31 expert videos titled *(Ant)Arctic without secrets* further catered to this interest, amassing 46 174 views. The educational initiatives also included 51 specialized lectures targeting both the general public and students from universities for the elderly and children's universities, engaging a total of 5 764 participants. Moreover, the Polar Festival brought together numerous institutions involved in Arctic and Antarctic research, attracting 800 participants and providing a family-friendly platform for science communication. Another initiative that gathered the largest group of participants was the use of video-mapping technology, where *One year in the Arctic* was projected during winter weekends at Wilanów Palace, captivating attention of 244 364 visitors. The outreach also extended to interactive competitions, with two editions designed for various age groups that included expeditions to the Polish Polar Station Hornsund in Spitsbergen and two scientific camps for youth, engaging 24 young enthusiasts in hands-on polar research experiences. Additionally, the creation of various games and quizzes aimed at children and families helped to further stimulate interest and understanding of polar regions among younger audiences. These multifaceted efforts underscore the potential of diverse educational and communication tools in enhancing public understanding and engagement with scientific research.

In recent years, the Institute of Geophysics PAS has been implementing several science communication projects dedicated to general public, which aim to promote geophysics and Earth sciences, financed within programs offered by the Ministry of Education and Science: *Geophysics for everyone* (2021–2023), *Fascinating Earth* (2022–2024) and *GEOGADKA – Promotion of geophysics and Earth Sciences* (2023–2025). Even thought, the thematic scope of these projects is not directly connected with polar research, the polar topics are widely included and they attract a wide audience and arouse great interest.

Impact and Outcomes: Assessments of the EDU-ARCTIC and EDU-ARCTIC2 projects

Within the EDU-ARCTIC project a detailed evaluation of projects' impacts and results was implemented in the form of teachers' assessment of pupils' skills and knowledge. An observation sheet for skills assessment to be filled in by teachers participating in the EDU-ARCTIC activities was prepared (Jończyk and Man 2016). The technique used for collecting data were Computer Assisted Web Interviews (CAWI). CAWI research technique is an interview in which participants fill in an online questionnaire or survey received via the Internet. The CAWI method is one of the most popular and fastest-growing research methods (Sharp *et al.* 2002). Compared to other methods, with a sense of anonymity and the opportunity to participate in the study at a time convenient for the respondent, it allows to collect more accurate data.

Within the project we conducted two skills assessment surveys using the same observation sheet. The first (entry-skills assessment) was conducted before the implementation of the project activities and filled in by 379 teachers and took into account 41 630 pupils (20 473 schoolgirls and 21 157 schoolboys). The second survey (after-skills assessment) was filled in by 89 teachers and considered 3 849 pupils (1 926 schoolgirls and 1 923 schoolboys). The survey included questions divided into three main categories: (1) STEM skills (2) knowledge about science and scientific research, as well as their place in the modern world, (3) knowledge about nature, geography, natural resources, history, social and political matters concerning the Arctic and increase of sensitivity to environmental issues and climate change. In the next section, replies in the third category are described.

Within the EDU-ARCTIC2 project a considerably less extensive survey was prepared and distributed to teachers only after the implementation of the project activities. Thirty participants filled in the impact CAWI type survey.

Results

In the EDU-ARCTIC skills assessment, the third category of questions is of the highest importance for the scope of this paper. In case of interest in the general results from the surveys, one may read the full evaluation report (Jończyk 2019) or the scientific paper (Wam *et al.* 2022). In this paper, main emphasis is placed on the changes in sensitivity to environmental issues in polar regions and knowledge about climate change of polar regions, which was assumed the most essential for raising awareness of environmental challenges.

As Polish teachers formed the largest and most active group in the EDU-ARCTIC community, in the analysis a comparison between all countries participating in the surveys

(including Poland) and Poland is presented. In the entry-skills assessment survey ('pre-survey'), 379 teachers from 42 countries participated, however we took into account only the surveys fully completed by 251 teachers, who responded to all questions in the survey (35 countries). Among 251 teachers with 19 416 pupils, 73 teachers with 3 880 pupils were from Poland. The after-skills assessment survey ('post-survey') was completed by 73 teachers from 21 countries, who evaluated learning outcomes of their 3 428 pupils. 15 teachers from Poland evaluated outcomes of 551 pupils in the post-survey. In Table 1, the general results of teachers' evaluations before and after implementation of the EDU-ARCTIC activities are presented.

Table 1.

Results of teacher-evaluations (online surveys) of learning outcomes for pupils aged 13–20 participating in EDU-ARCTIC (2016–2019). Results pertain to the teacher's collective assessment of the pupils in their class. N = 251 teachers with 19 416 pupils (including 73 teachers and 3 880 pupils from Poland) in the pre-survey, and 73 teachers with 3 428 pupils (including 15 teachers and 551 pupils from Poland) in the post-survey. Scores denote levels of knowledge among the pupils, on scales 1–5, where 1 = lowest and 5 = highest.

Question	Pre-survey		Post-survey		Difference (%)	
	All countries	Poland	All countries	Poland	All countries	Poland
Knowledge about nature of polar regions	3.73	3.22	4.06	4.26	8.9%	32.4%
Knowledge about geography of polar regions	3.81	3.40	4.17	4.25	9.6%	25.0%
Knowledge about natural resources of polar regions	3.72	3.25	3.94	4.04	6.0%	24.2%
Sensitivity to environmental issues concerning polar regions	3.65	3.01	4.00	4.03	9.6%	34.0%
Knowledge about climate change of polar regions	3.75	3.29	4.06	4.21	8.2%	27.8%

The teachers reported significant increases in all evaluated aspects of the learning outcomes (Table 1). The reported levels increased on average from 3.73 to 4.05 for all countries, whereas from 3.23 to 4.16 for Poland.

Within the survey, we also examined the differences in learning outcomes between schoolgirls and schoolboys. In most aspects of the learning outcomes, the differences between schoolgirls and schoolboys were rather insignificant. However, in case of sensitivity to environmental issues concerning polar regions the differences were visible (Fig. 1). Interestingly, the opposite trend of differences in pre-survey among all countries and Poland was observed. Teachers generally assessed that before the implementation of EDU-ARCTIC activities schoolgirls had higher sensitivity in this aspect in comparison to schoolboys (3.80 to 3.51), whereas in Poland schoolboys had higher sensitivity than schoolgirls (3.14 to 2.91).

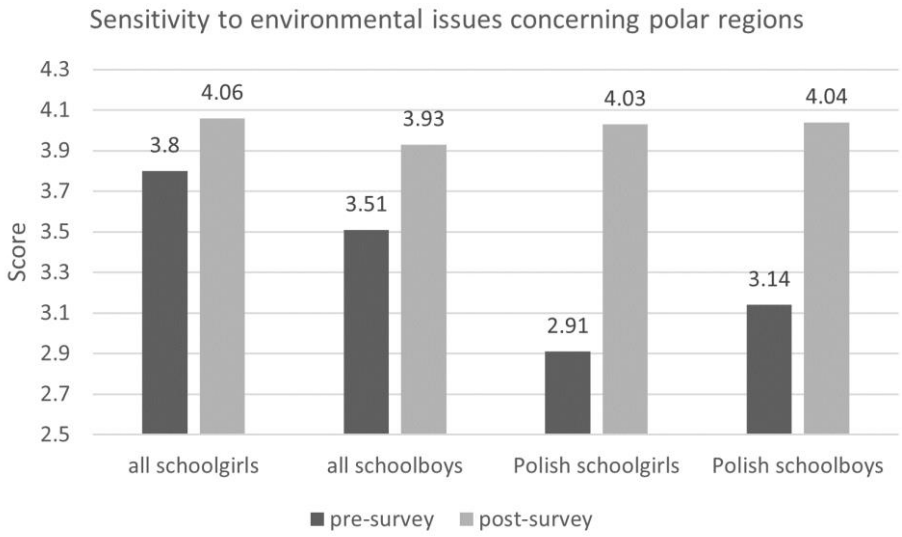

Fig. 1. Results of teacher-evaluations (online surveys) of sensitivity to environmental issues concerning polar regions among pupils aged 13–20 participating in EDU-ARCTIC (2016–2019). Results pertain to the teacher's collective assessment of the pupils in their class. N = 251 teachers with 9 240 schoolgirls and 10 176 schoolboys (including 73 teachers, 2 140 schoolgirls and 1 743 schoolboys from Poland) in the pre-survey, and 73 teachers with 1 776 schoolgirls and 1 652 schoolboys (including 15 teachers, 321 schoolgirls and 230 schoolboys from Poland) in the post-survey. Scores denote levels on scales 1–5, where 1 = lowest and 5 = highest.

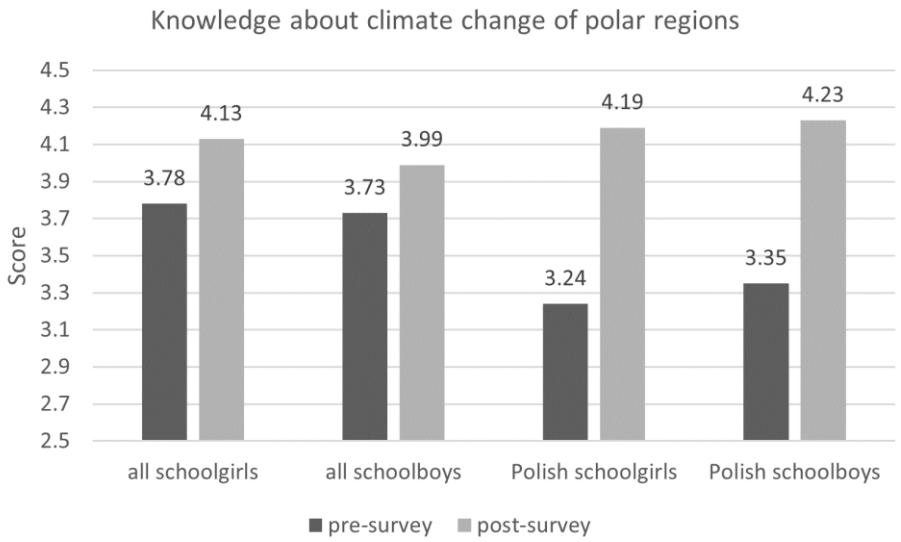

Fig. 2. Results of teacher-evaluations (online surveys) of knowledge about climate change in polar regions among pupils aged 13–20 participating in EDU-ARCTIC (2016–2019). The evaluation group and scores are the same as in Fig. 1.

Similar increase of knowledge among genders was observed in the results of the evaluation part dedicated to the level of knowledge about climate change in polar regions (Fig. 2). The results for all countries in pre-survey showed relatively small differences among schoolgirls and schoolboys, *i.e.*, by 0.05 in favour of schoolgirls. The results for Polish pupils demonstrate opposite effect, *i.e.*, the difference is higher (0.11) and in favour of schoolboys. To find justification for these differences, an in-depth analysis of data from various educational programs would be necessary. Interestingly, the results of post-survey showed only insignificant differences between schoolgirls and schoolboys.

As for the EDU-ARCTIC2 project, based on the results from the impact evaluation, all the specific objectives were achieved to a higher degree than originally assumed. Two aspects important from the perspective of this study consider the impact of the project on pupils' knowledge about nature, geography and natural resources of the polar regions and their sensitivity to environmental problems and climate change. Teachers (1) observed increase of the knowledge in terms of Arctic issues among 91% of participating pupils and (2) declared that sensitivity to environmental problems and climate change increased among 95% of participating pupils.

Discussion

There are two main limitations of the evaluation study presented above. The first limitation relates to the study participants. We are aware that pupils' learning outcomes could be better assessed if pupils were reached directly within the study. Due to the General Data Protection Regulation (EU rules) and ethical restrictions foreseen by the European Commission in the project, only teachers were registering to the program and they were also asked to assess the project's impact on their pupils. Assessment of pupils achievements may be subjective due to the teachers' desire to demonstrate their effectiveness. Even though in many projects this approach is implemented in order to avoid complicated procedures of gathering consent forms of legal guardians of minors, the results of evaluation might be affected by the chosen approach.

The second limitation is connected with the low number of completed post-surveys. The surveys were very extensive and required a lot of time and work from teachers to complete them precisely. They demanded analysis of each pupils' skills and knowledge and the progress in over 30 thematic areas grouped in three main categories: STEM skills, knowledge about science and scientific research and knowledge about nature, geography, natural resources, *etc*. concerning the Arctic. The project evaluation team realized that the complexity of the survey and too many questions were the main obstacles that discouraged teachers from completing the survey. It was noted during collecting answers to the post-survey and resulted in a relatively small number of fully completed surveys in comparison to the pre-survey and the general number of active participants of the EDU-ARCTIC program.

Despite these limitations, the number of pupils assessed within the surveys is high and allows further analysis and drawing conclusions. Thanks to the large number of Polish teachers participating in both surveys, it allows for a comparative analysis of the impact of the project on Polish *vs.* all pupils. Although we observed the increase in knowledge in all groups of pupils between the pre-survey and post-survey, the results for Polish pupils were significantly higher. The reported score increased on average from 3.73 to 4.05 for all countries, whereas from 3.23 to 4.16 for Poland. Taking into account such large differences both in the initial results, *i.e.*, much lower level in Poland than for all countries, and in the final results, *i.e.*, higher level in Poland than for all countries in post-survey, possible reasons for this situation were analysed.

First, the level of teachers' involvement and participation in project activities was investigated. For this purpose, *EDU-GAME* points were used, which were awarded to teachers for the participation in main project activities, including online lessons, arctic competitions, monitoring program, translation of *Polarpedia* terms and other, in order to motivate them for higher engagement in the program. By analysing the *EDU-GAME* points of teachers who

participated in the post-survey, we found out that the average level of participation in activities was comparable for both groups. The average number of *EDU-GAME* points in all countries was 5 214, whereas for Polish teachers it was only slightly higher: 5 553 points (6.5% difference).

In the next step, geographical location in terms of the country's membership in the Arctic Council was considered as an factor, which may influence the initial level of pupils' knowledge. The comparison of the pre-survey results between the countries from the Arctic Council to the countries of non-arctic part of the world (except for Poland) showed no significant difference.

We do not have enough data to determine whether the differences of initial level of knowledge of Polish pupils in comparison with all countries participating in the survey was due to the fact that Polish pupils actually had a lower level of knowledge or whether they were assessed more severely by their teachers. In order to accurately assess the reasons of much lower level of initial knowledge of Polish pupils, analysis of results from other educational studies could be helpful. In turn, the large increase in knowledge among Polish pupils can be explained by the fact that instead of standard version in English, many parts of the EDU-ARCTIC program were conducted in Polish, *e.g.*, online lessons, Polish version of *Polarpedia*, what promoted better understanding of the content conveyed and more engaged participation of pupils in the proposed activities.

Conclusions

Based on the evaluation studies, positive impact of bringing polar research to classrooms was documented by teachers participating in EDU-ARCTIC and EDU-ARCTIC2 educational projects. The impact of these initiatives on Polish participants was significantly higher. Even though we are not able to adequately assess the factors influencing this higher impact, we concluded that polar regions serve as one of the most captivating natural settings capable to engage Polish pupils in discussions on environmental changes.

Taking into account the positive outcomes of educational initiatives, the Institute of Geophysics PAS continued bringing polar research to wider audiences by opening its offer to the general public, families, students of third age and children universities and all citizens willing to explore the fascinating world of the Arctic. Initiating several activities for wider public we have not foreseen the in-depth evaluation of their impact. However, a non-formal and not-structured feedback received from participants of Institute's activities was very positive. Using the Arctic and polar research as a vehicle to inspire interest in science and

to raise societal awareness of the environmental challenges to various groups of non-specialists may be a very effective mean of science communication. It may help to gather numerous audiences. Moreover, polar topics may be easily combined with visual arts, which may bring new beneficiaries, not interested in science per se.

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