ODYSSEY

Good practices in the use of the Oxford debate as an educational tool within STEM

Oxford Debates for Youths in Science Education

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INTRODUCTION

WHY DEBATE IN STEM

BEFORE THE INTERNET, newspapers and magazines mostly made money from subscriptions, and a long-term bond of trust between magazines and readers was formed. Today, the economy of news on the Internet is driven by clicks. For some time now, the quality and accuracy of information has not been crucial; it is important that the link to the news draws your attention. It is very difficult to resist the "bait" in the title; emphatic titles containing no facts at all, that promise us some emotional experience have had the most success. "Seven cats that look like Disney princesses", "Eight amazing nutritional secrets that your personal trainer doesn't want you to know", "Nine unpublished photos of Elvis" or "Ten ways scientists interpret quantitative nonsense" are just some of the colorful examples. The most common phrase in popular headlines on *Facebook* , *Twitter* and other social networks is "will make you", so something you read will make you "lose your breath" or "fall off your chair", and something will "break your heart", while another thing will force you to "look one more time", and phrases like "it will make you cry", "you will get goose bumps" and "you will melt" do very well.

What we talk about becomes more interesting than what is actually happening. All that noise not only dims rational and argumentative communication, but opens the door to misinformation, delusion and conspiracy theories. Knowledge and reliable information can hardly compete on this new market.

Currently, there are three ways we can protect ourselves from false information and misinformation. The first is technology. The second are legislative regulations. Many countries have adopted laws against the production and spread of false news. The third and the most efficient in the long run is education.

Education and critical thinking

Around a century ago, philosopher John Alexander Smith addressed a new class of Oxford students with the following words: "Nothing that you will learn in the course of your studies will be of the slightest possible use to you in after life, save only this, that if you work hard and intelligently you should be able to detect when a man is talking rot, and that, in my view, is the main, if not the sole, purpose of education."

If we were to translate Smith's statement into the language of today, it would read – it is key to think critically, present and analyze arguments, and interpret and evaluate all information we receive. And our educational systems should integrate all of the above in teaching, in all school subjects.

The topicality of Smith's statement is confirmed by extensive research on how much students, and people in general, are subject to fake news, misinformation and pseudo-scientific content on social media. Some countries have taken positive steps to address or at least mitigate this global problem. Critical thinking and media literacy are becoming important parts of national curricula in a number of subjects. So, in art classes, students discover how the meaning of images can be manipulated, in history classes they learn about propaganda techniques, and in language and literature classes they discover the many ways words can confuse, mislead, or deceive.

Research on which the *ODYSSEY* project is based indicates that these problems are particularly obvious in the context of STEM education.

>>> Collaborative environment

Argumentation plays a prominent role in a collaborative learning environment, an approach in which the starting point is that cognition is socially constructed and distributed.

Namely, with all its undeniable successes, STEM education – education in Science, Technology, Engineering and Mathematics – seems to have failed in this field. Teachers do an outstanding job teaching their students biochemistry, astrophysics, computer science, robotics, nanotechnology or neurobiology, providing them with the necessary professional skills and encouraging them to cope with all the challenges of their future STEM careers. However, this focus on professional skills, hard science and technology most often comes at the cost of neglecting critical thinking and basic skills, such as rhetorical skills, building and presenting an argument, proper language use, etc. –equally important both for advancement in future careers, and for building the capacity of students to be active and responsible citizens and participants in democratic processes.

Unlike STEM subjects, subjects in humanities and social sciences (and pertaining skills) face students with the task of juxtaposing opposed ideas and tackling conflicting argu-

ments. In STEM disciplines, students are rarely presented with paradoxes they have to solve, opposed evidence they have to reconcile, or false claims they have to criticize.In addition, they are less likely to orally, rhetorically explain their arguments and debate with other students.

Argumentation in the science classroom

Recent research indicates that speech and other modes of communication are central in the science classroom. When it comes to communication in the classroom, approaches range from interactive and non-interactive, depending on the level of student participation; and dialogic and authoritative, depending on how much attention is paid to different views of students. Argumentation plays a significant role in all approaches, but it takes central stage in those educational environments which support interactivity and dialogue.

In other words, argumentation plays a prominent role in a collaborative learning environment, an approach in which the starting point is that cognition is socially constructed and distributed.

In such a dialogical atmosphere, discussion, asking questions, assessing and critical thinking are the main modus operandi, and not an exception or deviation. This collaborative discourse enables students to reciprocally taught through a discussion of meanings, explanations, and standards for evidence. Argumentative interaction that can take the form of persuasion leads students to further discussion on choices offered and collaborative research of the dialogue space for solutions. Cooperation results in the co-construction of arguments by several participants who thus take on the role of knowledge producers. In such an environment, students face authentic problems, use data, gather evidence and prepare reports, and are encouraged to compare their ideas and positions with alternatives, to evaluate and alter them, and to look for the causes of that change.

From an even broader context, outside the classroom, many science educators believe that one of the main goals of science education is to help students further their understanding of the relationship between society and science. The term "socio-scientific issues" (SSI) was introduced to describe how social controversies can affect scientific fields. Accordingly, and given the importance of socio-scientific issues in biotechnology, engineering, or ecology and similar fields, students should have help with making informed decisions

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about such issues, and the role of the school would be to prepare them to become informed citizens. This means that STEM teaching, at least in part, deals with problems that are complex, open-ended, and debatable. Teaching science (STEM) from the point of view of social issues present in the everyday life of students, would have elements of humanities and social sciences and skills, and therefore would be an alternative to the dominant approaches in contemporary STEM education–mainly focused on acquiring professional skills.

Science debates

At the end of 2018, an international consortium of partners of the project *ODYSSEY* (Oxford Debates for Youths in Science Education – Erasmus+ KA2), launched activities in four countries to encourage students and their teachers to participate in debates and improve their rhetorical skills, advance their understanding and acquisition of STEM knowledge, make informed decisions, and use and understand scientific arguments and the nature of science as such.

Assuming that knowledge can be developed through verbal exchange of arguments according to the propositions of the Oxford debate, *ODYSSEY* aims to distance students from arguments coming from the media, to encourage them to reflect on and analyze available information, and to express their opinions verbally.

On the way to these goals, both students and teachers participating in the *ODYSSEY* project faced a number of challenges. First, the topics debated were controversial and as such provided an opportunity to juxtapose different arguments, which is not common in STEM educational practices. The next important challenge was interdisciplinarity, because preparing for a discussion required students and teachers to get acquainted with facts from several areas. One of the most serious challenges was how to deal with the influence of the media and public debates (often abounding in misinformation and fake news) on students' arguments in the context of Oxford scientific debates. In other words, the challenge was how to help students overcome these difficulties and build their own discourse. Probably the biggest challenge was that students had to develop the ability to build arguments for both the proposition and the opposition sides in the debate, and to look at a particular scientific problem from multiple perspectives, and find equally strong supporting and refuting evidence for both positions from reliable sources.

>>> Exchange of arguments

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ABOUT THE PUBLICATION

BRIEF SUMMARY

MOST EUROPEAN COUNTRIES have identified the need to increase interest and reasoning in STEM subjects with elementary and high school students. Consequently, argumentative and critical thinking, public presentation, and debate have been identified as the main prerequisites for advancement in these fields. One of the starting points is that students who lack these important life and professional skills are more susceptible to fake news, fallacies, and incredible information. International Erasmus+ KA2 project *ODYSSEY* (Oxford Debates for Youths in Science Education) has been devised as an attempted answer to these needs and a possible way to bridge the gap between the need to develop argumentative practices in STEM schools and the systematic absence of these practices.

The main goal of the *ODYSSEY* project is to increase reasoning skills in STEM using Oxford-type debates among 40% of the participating students (13-19 years), from at least 32 schools in Poland, Estonia, Serbia and Greece, including other important goals:

1) to increase interest in and encourage students to undertake a scientific career in STEM among 40% of the students participating in the project during the test phase;

2) to develop communication skills in their mother tongue, argumentation and public speech among 40% of the students participating in the project during the test phase of the project; and

3) to develop the ability to use Oxford-type debates in school practice among 75% of the teachers taking part in dissemination events.

In addition, the project will contribute to the ability to successfully convince, argue, reason and speak correctly, it will improve the ability to compose texts and use rhetoric apparatus in oral statements, speak in accordance with the rules of language culture, interpret texts, it will also improve

>>> Evaluation

The ambitions of the ODYSSEY project transcend the borders of the partner organization countries. In order to disseminate the rich experience gained during the implementation of the project in Poland, Greece, Estonia and Serbia further to education systems in Europe, teachers and educators from Spain, Malta, the Czech Republic, Italy and North Macedonia were asked to evaluate the 19 educational packages developed through the project from the perspective of their educational systems.

>>> Profiles

This report gives a detailed description of partner profiles from the ODYSSEY project consortium, the schools involved in the testing of educational packages, and debate organizations which provided significant contribution by training teachers on how to apply debate in teaching. It also outlines major activities undertaken in Poland, Greece, Estonia and Serbia.

skills such as: public presentation and presentation of texts, discussions and negotiations, and participation in debates.

The project was implemented in four countries (Poland, Estonia, Greece and Serbia), in 41 schools, with students aged between 13 and 19. Initial work began in October 2018, and the project was completed in March 2021.

ODYSSEY ran in five phases: preparatory phase (devising desk report research, project implementation methodology, Oxford debate guidelines, and educational materials); recruitment of schools; testing phase (workshops for teachers followed by the implementation of debate and educational packages in each school participating in the project, finishing with a national debate competition); dissemination (national conference with debate finals and subsequent workshops for new teachers interested in applying this method in their everyday practice); and wrap-up (drafting reports and evaluating project outputs).

With the tremendous efforts of the partner institutions from the consortium, as well as all schools, teachers, students and scientists involved in the project who tested its intellectual outputs, most of the activities were realized despite the adverse circumstances caused by the COVID-19 pandemic.

This report gives a detailed description of partner profiles from the *ODYSSEY* project consortium, the schools involved in the testing of educational packages, and debate organizations which provided significant contribution by training teachers on how to apply debate in teaching. It also outlines major activities undertaken in Poland, Greece, Estonia and Serbia.

A separate chapter is devoted to the analysis of Focus Group Interviews conducted with teachers from four countries who, together with their student teams, tested the intellectual outputs of the project. Conversations with teachers about the project – their expectations, the main challenges they faced, the quality of educational material developed, and the sustainability and usefulness of Oxford-type debates in STEM teaching – clearly show that their expectations from this project were met, and in many cases even exceeded.

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ages developed through the project from the perspective of their educational systems.

The professional analysis of our colleagues has given us a broader view of the results of the two-and-a-half-year long educational adventure we embarked on and enabled us to more credibly assess the potential of the idea and the results of the *ODYSSEY* project as a whole.

>>> Analysis

A separate chapter is devoted to the analysis of Focus Group Interviews conducted with teachers from four countries who, together with their student teams, tested the intellectual outputs of the project.

PARTNER ORGANIZATIONS

ESTONIA

ENERGY DISCOVERY CENTRE

ENERGY DISCOVERY CENTRE is run by SA Tallinna Tehnika- ja Teaduskeskus (the Tallinn Technology and Science Centre Foundation), which was established in 1999 by the City of Tallinn, Tallinn University of Technology, and the national and local power companies Eesti Energia AS and AS Tallinna Soojus.

The Centre's mission as an informal learning environment is to motivate and advance the teaching and learning of STEM subjects. In order to achieve this, the Centre has over a hundred hands-on exhibits, which allow visitors to discover and learn about physical phenomena, and a number of workshops, science shows, and other activities for children starting from kindergarten up to secondary school level (16–17-year-old students). The Centre's educational program is closely connected to the national school curricula.

The Centre, housed in a former power plant first opened in 1913, has mainly focused on the complex topics of energy production and consumption, but also classic natural phenomena – light, optics, and sound. The Centre's Planetarium program introduces the Solar System, and technological advances in space. Workshops and temporary exhibitions also address natural phenomena and climate changes.

The Centre works in cooperation with Tallinn University and Tallinn University of Technology, while also acting as a practice base and example of a non-formal learning environment for teachers-in-training.

As the Centre's mission is to work in close contact with and to support the formal education, the Centre has excellent access to the network of Estonian schools and works in cooperation with them. With its educational program and exhibitions, the Centre is a nationally acknowledged science communicator in Estonia. The Centre is also the only non-formal learning environment focused on natural phenomena.

>>> Mission

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The Centre has previous experience organizing teacher trainings and student competitions with a national appeal, also piloting different educational approaches within the Centre.

>>> Debating

Energy worked together with Siim Ruul, who carried out teacher training and mentoring and helped to develop and adapt debate materials for teachers. Siim Ruul has more than 15 years of experience in debate and argumentation training. He has worked for the Estonian Debating Society and International Debate Education Association, helping to train teachers both in Estonia and abroad.

Debate Support

Energy worked together with Siim Ruul, who carried out teacher training and mentoring and helped to develop and adapt debate materials for teachers. Siim Ruul has more than 15 years of experience in debate and argumentation training. He has worked for the Estonian Debating Society and International Debate Education Association, helping to train teachers both in Estonia and abroad. As a trainer for SpeakSmart, Estonia's leading critical thinking and argumentation training centre, Siim has over 10 years of experience in consulting and mentoring. Siim also works as a history and civics teacher in Pärnu Koidula Gümnaasium and Pärnu Sütevaka Humanitaar gümnaasium.

As a debate teacher he has enjoyed success both on the international level coaching Team Estonia in the Debating World Championships and in the national competitions where Siim has helped his students win the championships on several occasions. In collaboration with the International Debate Education Association, Siim was responsible for editing and compiling teaching materials and guides for the European Network of Debate Teachers.

As an argumentation and debate expert Siim often frequents in nationwide media coverage both in print and online media as an impartial adjudicator in political debates.

Making of Educational Packages

Energy's materials have largely been developed by the specialists working in the Center. The center employs specialists holding master's degrees in their respective fields: physicist Jana Paju (energy-related material), forestry specialist Krista Keedus (material on biodiversity), educational specialist Kerttu Voor (climate change material), and master in journalism Teele Tammeorg (materials on circular economy). In addition, three researchers collaborated on the videos: ecologist Liisa Puusepp from Tallinn University (video on biodiversity), meteorology professor Aarne Männik from Tallinn University of Technology (video on climate change), and optoelectronic materials professor Maarja Grossberg from Tallinn University of Technology (video on solar energy). When compiling the study packages and videos, it was considered

that both materials complemented each other. The teaching materials were read and supplemented repeatedly, edited and then sent to the teachers involved in the project for use. Feedback on the materials was also collected from the teachers and the materials were adapted according to the feedback received. The materials and videos were distributed to the teachers so that they could start working on them together with students.

Unfortunately, due to the COVID-19 pandemic, teachers were not able to work through the materials with the students in depth as initially planned, nor were they able to discuss the materials with the researchers. During the homeschooling period many teachers used this material as an extra reading for their nature science classes rather than for practicing debate. The materials are intended for students from the age of 13. After the feedback from the teachers, the materials were forwarded for review and feedback to two members of the pedagogical council, Ingrid Rõigas (Physics teacher at Viimsi Gymnasium) and Anton Leppik (Physics and Chemistry teacher at Laagri School and Tallinn Free Waldorf School). The feedback received was added to the supplementary material chapter.

>>> Materials

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Hellenic Institute of Rhetorical & Communication Studies

GREECE

HELLENIC INSTITUTE OF RHETORICAL AND COMMUNICATION STUDIES

>>> Workshops

HIRCS collaborates with various academic, educational (formal and informal), cultural, scientific and municipal institutions in Greece and abroad. More specifically, HIRCS has developed an intense action of training workshops and webinars on the teaching of rhetoric, argumentation, training of debate contest judges and communication for teachers of primary and secondary education all over Greece, closely related to the national school curricula.

THE HELLENIC INSTITUTE of Rhetorical and Communication Studies (HIRCS) is a non-profit scientific institute. It was founded in the end of 2016 in Athens by a group of educators, students and academic professors. Its mission is to promote and extend the research, studies and implementation of rhetoric and communication through the cultivation of oral, written and visual argumentation within all education levels (formal, non-formal, long-life learning) concerning various scientific fields (pedagogy, law, literature, philosophy, history, linguistics, psychology, political sciences, STEM, health sciences, media, communication, political sciences, management, theatre, fine arts, economy, etc.). In this way, the power of human Logos and argumentation in various forms of communication (persuasion, negotiation, information, etc.) is highlighted, while teaching and learning practices at all educational levels are enhanced cultivating free, active and democratic citizens.

For achieving these goals HIRCS collaborates with various academic, educational (formal and informal), cultural, scientific and municipal institutions in Greece and abroad. More specifically, HIRCS has developed an intense action of training workshops and webinars on the teaching of rhetoric, argumentation, training of debate contest judges and communication for teachers of primary and secondary education all over Greece, closely related to the national school curricula.

Its educational program "*Games of rhetorical art in school: I think… I express myself… I communicate…*" for students of elementary schools is approved by the Greek Institute of Educational Policy and the Ministry of Greek Education. Since 2018, this program has been implemented in numerous Greek schools, leading to the organization of the "*Festival of*

Rhetorical Art for Primary Education" in collaboration with educational directorates.

In 2019, HIRCS organized the 1st Panhellenic Conference of Rhetoric in collaboration with the francophone school "Saint Paul-Delasalle". The e-proceedings of the conference entitled "*The Art of Speech in Educational Praxis. Searching for new forms of rhetorical paideia*" are uploaded to its web-page (www.rhetoricinstitute.edu.gr), as well as additional educational material.

Because of HIRCS' special scientific interest in argumentation and debates, various debates, rhetorical contests and exhibitions are organized (e.g. contests of spontaneous speech, aloud reading etc.). Indicatively, we mention the "Thukididеioi Rhetorical Contests" and the "Thukididеioi Theater Contests" in collaboration with the Municipality of Alimos. Also, HIRCS founded and supported the rhetorical-theater group of educators "Rithinai" (in ancient Greek means "to talk"). Also, collaborating with the Laboratory of Ancient Rhetoric and Drama of the Department of Philology at the University of Peloponnese, HIRCS participates both in the implementation of the regional "Rhetorical Students Contests of Peloponnese" for students of secondary and primary education. In addition, HIRCS is a member of the "Rhetoric and Anthropology Research Net" which is founded by the faculty of Communication at the Pontifical University of Santa Croce in Rome (Italy), while it collaborates with the *National Society of Debate Italia*.

Besides the coordination of the European Erasmus+ KA2 project *ODYSSEY*: Oxford Debates for Youths in Science Education in Greece, HIRCS also participates in the educational project "Historical Controversies" for students of primary and secondary education by providing two formats for the implementation of debates in History classes. The project is coordinated by the Greek Foundation Lambraki and the Association for History Education.

Finally, the participation of HIRCS in scientific programs and forums with discussions, round tables, seminars, symposia, congresses, conferences, Teachers4Europe activities is also accompanied by an intense voluntary action (e.g. program of rhetoric implemented in the Detention Center for Minors in Avlona, implementation of the educational program of Toastmasters "Youth Leadership" in Greek public Junior High Schools etc.), while it supports its members to begin their professional and scientific careers.

>>> Contests

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Debate Support

In Greece, debates are mainly interwoven with the Language Arts lesson. So, the introduction of debates in STEM education was innovative. For this reason, in some of the participant Greek schools the STEM educators collaborated with Philology educators who had previous experience in debates. HIRCS carried out teacher training and mentoring, helping the participant teachers to apply the *ODYSSEY* debate materials and become acquainted with the judging rules by organizing workshops and live educators' and students' friendly debates during the pilot implementation of the project.

In particular, Foteini Englezou, founder of HIRCS and coordinator of the *ODYSSEY* project in Greece wrote the intellectual output O4 "Methodological Guide for teachers" and seven lesson plans within the methodological output O3 "National frameworks for implementation of Oxford debates in STEM in school practice". She has more than 15 years of experience in debate and argumentation training, since her doctoral dissertation is related to this topic. She is a member of judging and organizing committees of debate contests in Greece and abroad, she trains students and educators in argumentation and debates and prepares them as debate judges. She has been the coordinator of two Junior High School rhetorical clubs, while she was a trainer of student debating team (e.g. Laboratory of Strategic Communication at the University of Peiraieus, chemical engineering students at the University of Patras), while she was teaching rhetoric and debate in a related master program at the National and Kapodistrian University of Athens. She is a certified trainer by the International Debate Education Association and she participates as judge in the Italian Debate Champion of Youths (organized by SNDI).

Due to COVID-19, she organized the on-line semi-final and final debates (June 2020 & January 2021). These events were presented at the International round table "Delivering Rhetoric online" which was organized by the Global Society of online Literacy Educators and the International Rhetoric Workshop.

Making of Educational Packages

HIRCS's materials have been developed by specialist educators. The Institute assigned the writing of the five Greek educational packages to the following members:

a) **The Energy Issue** and b) **Biotechnology: Health and Environment** were written by **Panagiota Argyri**, Mathematician, M.Sc., M.Ed, Ph.D. Candidate at the National and Kapodistrian University of Athens. The first package introduces students to the energy issue and the need for its solution. The advantages and disadvantages of nuclear energy and renewable forms of energy are presented, cultivating the role of a responsible citizen who cares about the sustainability of Earth. The second one explores the concept of biotechnology both in the fields of health and environment revealing its connection in the diagnosis, prevention and treatment of diseases, the production of transgenic plants and animals, and the recycling and treatment of sewage, solid waste and oil spills.

c) The **Space Exploration** package was written by **Nikolaos Nerantzis**, Physicist, and **Zois Asimakopoulos**, Physicist-Geologist, M.Ed., Ph.D. Candidate at the National and Kapodistrian University of Athens. This package aims to familiarize students with the main advances related to space exploration and its connections to problems of planet Earth, such as rapid population growth, research of new hospitable universes and the need for more energy and natural resources.

The packages of d) **Nanotechnology: Health and Environment** and e) **Internet Access and Development** were written by **Dimitrios J. Sotiropoulos**, Dr, Physicist, Post-Doctoral Student in Informatics, Adjunct at the Department of Informatics at the University of Thessalia. The first package aims to introduce students to basic concepts of Nanotechnology (e.g. nanoscale, nanomaterials), its applications in medicine, pharmacology, industry, cosmetics and related issues (e.g. economic) that arise or are likely to arise in the future as well as possible ways to address these problems. The second one familiarizes students with the types of Internet access and the general networking of devices that is done by wireless and wired means and problematizes them on the connection of Internet access to the world development.

Additionally, the creation of the relevant complementary scientific videos was assigned to the following three members: a) **George Stefanidis**, M.Sc. in New Technologies in Education and Ph.D. Student at the National and Kapodistrian University of Athens created the videos of i) Nanotechnology and ii) Biotechnology, b) **Michael Georgoulakis Misegiannis,** Electrical Engineer and Computer Engineer Student at the Metsovio Polytechnic University of Athens created the videos for: iii) Energy Issue and iv) Internet Ac-

>>> Materials

HIRCS's materials have been developed by specialist educators. The Institute assigned the writing of the five Greek educational packages to the following members.

cess and Development and c) **Makis Valsamis**, Physicist, M.Ed. was the creator of the Space Exploration video.

All teaching materials were distributed to the participant teachers and were reviewed by them. Due to COVID-19, three of them were implemented during the pilot stage, while the fourth package (Nanotechnology) was implemented by the two schools that participated in the final online debate.

After the implementation of each package, the feedback of the participant educators led the authors to their improvement. Then, the material was reviewed by the three members of the Greek Pedagogical Advisory Board: a) **Panagiotis Pefanis**, Physicist, Ph.D., Head Coordinator of the 6th Peripherical Center of Educational Design, b) **Aristeidis Paliouras**, Professor of Informatics, M.Sc. at the 3rd Professional Lyceum of East Attica (specialized in educational Robotics) and c) **Kostas Karpouzis**, Research Director at the Institute of Communication and Computer Systems (ICCS) at the National Technical University of Athens (NTUA).

Finally, the educational packages were translated in English by three members: a) **Maria Teresa De Rosa Palmini**, Student of English Literature at the National and Kapodistrian University of Athens (Space Exploration), b) **Eftychia Karavangeli**, Student of Informatics at the National and Kapodistrian University of Athens (Internet Access and Development) and c) **Marily Vardaki**, Teacher, Ph.D. (Nanotechnology, Biotechnology and Energy Issue).

The final corrections and additions to the packages were made after the review of the *Scientix* evaluators. The above materials are mainly addressed to high school students (16-18 years old), although they were also implemented in a simplified form by students of the second class of two Junior High Schools (14 years old).

POLAND

INSTITUTE OF GEOPHYSICS POLISH ACADEMY OF SCIENCES

Institute of Geophysics
Polish Academy of Sciences

THE INSTITUTE OF GEOPHYSICS POLISH Academy of Sciences is a scientific institution representing the mainstream of Polish basic research in Earth sciences. It is the only institution in Poland that performs monitoring of geophysical fields in seismology, geomagnetism, and selected areas of atmospheric physics. The main statutory tasks of the Institute include scientific research, development, monitoring and educational activities, as well as dissemination of research results and their implementation in the economy. An important objective of the Institute's activity is supporting people beginning their scientific careers and education and promoting specialists with particular skills in the field of geophysical sciences.

The Institute has been involved in numerous educational activities and is active in science communication and dissemination. The most important achievements in this field include:

- coordination of the national project EDUSCIENCE (2011-2015), in which 3500+ schools participated. The final EDUSCIENCE products were: an e-learning platform with 15000+ educational resources, popular science portal, methodological support for teachers, and nationwide nature monitoring program.
- coordination of the European project EDU-ARCTIC (H2020, 2016-2019), which was implemented by 1300+ teachers from 60 countries around the world, taking part in online lessons and arctic competitions and reporting meteorological and phenological observations in specially created monitoring systems.
- Coordination of EDU-ARCTIC 2 (EEA grants, 2020-2022) and EDU-ARCTIC.PL (Ministry of Science and Higher Education in Poland, 2019-2021) – follow-ups of EDU-ARCTIC.

>>> Institute

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- coordination of 3 ERASMUS+ projects: ERIS (2015-2018), in which 30 educational packages based on real research results were prepared and disseminated in English and national languages (Polish, French, Romanian); BRITEC (2018-2021), which is dedicated to bringing research into the classroom via series of pilots of Citizen Science activities in 4 countries (Poland, Belgium, Greece and Spain) and ODYSSEY.
- cooperation with European Schoolnet as the National Contact Point *Scientix* 2 (FP7), *Scientix* 3 and *Scientix* 4 (H2020) since 2015.

>>> Polska Debatuje

The most active organization supporting implementation of debates in schools in Poland is the Polska Debatuje Foundation (more on: www.polskadebatuje.org). The foundation develops sport debates and teaches public speaking skills, organizes workshops, tournaments and moderates public debates. In the recognition of their experience, the Institute had three tasks for them.

Debate support

Debating is not a part of the educational curriculum in Poland. However, it is suggested as a valuable teaching method in secondary schools curriculum for Geography. As this curriculum is new (introduced for the school year 2019/2020), not many teachers are able to use this method during regular classes. Although there are some initiatives dedicated to debating, mainly extracurricular activities, the main topics covered in such debates are: politics, economy, governance, social inclusion.

Therefore, in order to implement debating as a STEM teaching method, the Institute of Geophysics PAS organized teacher trainings in the form of workshops and a webinar. During the full-day workshop held in October 2019, after the schools registered for the *ODYSSEY* project, teachers got familiar with the *ODYSSEY* debate format and received printed parts of the methodological guides in Polish. Additionally, they participated in hands-on activities dedicated to argument formulation and a testing debate during the final session. The workshop was held once more in November 2019 for new schools.

Although experienced in STEM subjects and educational initiatives, the Institute had little experience in debating and decided to collaborate with experts in the field. The most active organization supporting implementation of debates in schools in Poland is the Polska Debatuje Foundation (more on: www.polskadebatuje.org). The foundation develops sport debates and teaches public speaking skills, organizes workshops, tournaments and moderates public debates.

In the recognition of their experience, the Institute had three tasks for them: Polska Debatuje translated the O4 Methodological Guide for teachers into Polish. Additionally, in March 2020 one of the experts conducted a webinar on

the proper construction of arguments. The webinar was recorded and is available on our *YouTube* channel. Judging debates during the school contest was the last task implemented by the Foundation.

Making of Educational Packages

Institute's materials were developed by experts working at the Institute. Researchers from various departments and units were involved in their preparations. Dr. Jerzy Giżejewski (geologist, polar researcher) developed two packages: Flood protection in the mountain catchments and Sea transport in the Arctic. Assoc. Prof. Grzegorz Lizurek (seismologist from the Department of the Seismology) prepared material on anthropogenic seismicity. Dr. Artur Szkop (researcher in the Department of Atmospheric Physics) developed the toolkit on wind energy. Anna Wielgopolan (environmental specialist) developed material on geoengineering. Additionally, all toolkits were consulted with the methodological adviser – Piotr Stankiewicz, geography and science teacher and author of textbooks for geography.

What was the motivation to choose the debate topics? First, the potential to create a balanced resolution, to get students' interest and to provide them with valuable arguments and scientific facts, which help them formulate their own opinions. The second motivation came from the authors of the packages:

1. **Wind energy**: as there are limitations regarding wind mill constructions in Poland, the potential of wind energy production is not fully used. By providing students with important information (facts, stories), we gave them a chance to better understand advantages and limitations of wind energy production and formulate their own knowledge-based opinion regardless of the political conditions.

2. **Flood protection in the mountain catchments**: knowledge of the area of investigation, contacts with people working in mountain forests, experience resulting from working on rivers and awareness of the importance of the matter were the author's motivation.

3. Is **geoengineering an answer to climate change**, one of the biggest challenges we face as mankind, or one of the biggest threats? Even though such interventions in the Earth's natural systems have not been used on a large scale, they cause serious controversy. The main idea of this package was to explain geoengineering, its main methods, either used or discussed. Some ludicrous ideas were omitted deliberately (e.g. placing mirrors in the orbit). They have

>>> Educational activities

The Institute has been involved in numerous educational activities and is active in science communication and dissemination.

>>> Materials

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been categorized, described, their advantages and disadvantages were listed, accompanied by case studies. It was important not to focus on one aspect of the potential use of geoengineering techniques (like environmental issues, global safety, etc.), but to cover all important aspects, taking into consideration technical and political conditions, as well as environmental, economic and social outcomes. Some of the stories may appear to be loosely related to geoengineering when in fact they give clues to particular techniques, their possibilities and hazards.

4. **Sea transport**: The sea routes in the Arctic are of global interest due to their economic and political potential. There are also environmental issues, which are hardly taken into account by the global economy. The author has been fascinated by the Arctic for many years now and loves searching scientific sources connected with the Arctic.

5. **Anthropogenic Seismicity**: Motivation to create this package was the number of earthquakes related to fracking, which started the social debates about how dangerous it is to citizens. There were many wrong interpretations of the hazard related with small and almost unnoticed seismic events in the vicinity of the fracking activities. On the other hand, there are many more dangerous industrial activities posing higher seismic hazard being ignored or not recognized by the common people. It seemed to us that it would be beneficial for the pupils and teachers to tackle this topic backed up with the current scientific knowledge. Therefore we provided the data and facts related with the anthropogenic seismicity hazards and its impact on society to allow the students to discuss.

The packages were intended for students of secondary schools (aged 14-19). In order to use packages in primary schools (7th, 8th grade, students aged 12-14), much more effort from teachers was necessary to guide students properly and provide them with additional explanations for topics. Each package was presented during the first workshop for teachers. Subsequently, we shared one package every 4-6 weeks in order to let teachers and students focus on one particular topic at a time. During this period at least two webinars were organized, during which authors could present the topic in detail and answer questions. For some packages we organized additional online sessions ("Meet the expert"). All webinars were recorded and they were later used in classes, if students couldn't attend in real time. Teachers were asked to fill in a survey about the packages, however, no significant changes were needed based on teachers feedback.

SERBIA

CENTER FOR THE PROMOTION OF SCIENCE

THE CENTER FOR THE PROMOTION OF SCIENCE (CPN) is a public institution, established in 2010 by the Serbian Ministry of Science to promote science and technology. In accordance with its mandate, the Center implements programs and activities by working with research and educational institutions in Serbia and around the world. It also works closely with the ministries in the Serbian Government, the media and the private sector.

CPN's mission is to bridge the gap between science and society by bringing together all relevant actors and the general public in the research and innovation process. The ultimate goal is to integrate society into research processes in order to gain a better understanding of citizens' needs and to deal with societal challenges more adequately. The Center organizes a large number of exhibitions, lectures, panel discussions and other events covering various topics. The common feature for all these formats is that they are often interactive, so the visitors can take on an active role, if they wish.

CPN puts a strong emphasis on communication, media relations and the production of multimedia materials. Its publishing department, with four to five new titles each year, has received several awards; four times a year, the Center also publishes its popular science magazine, *Elementi*. CPN is also known for its international cooperation and is considered to be a regional leader in Southeast Europe. The Center is currently a partner in eight H2020 projects, two Erasmus+, one Creative Europe and one Visegrad+ fund projects, and one COST action; overall, the CPN has participated in 40 EU-funded projects so far.

>>> Mission

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Debate Support

CPN conducted teacher trainings with the help of debate trainers Miloš Marjanović and Ilija Ivanišević from the debate organization Open Communication, organizer of the largest annual student tournament in Serbia. Miloš and Ilija have participated – both as competitors and judges – in the largest international debate competitions; among others, Miloš won one of the most prestigious tournaments Oxford IV in the category English as a Second Language. Open Communication was awarded the organization of World Universities Debating Championship – WUDC, scheduled for July 19-27, 2022. Together with Maja Keskinov, philosophy professor from XIV Belgrade Grammar School with vast experience in training debate teams, the two debaters designed the teacher training program for implementing Oxford-type debates in the teaching curriculum. Open Communication also significantly contributed to the organization of the national tournament, with their internationally acclaimed debaters Marta Vasić and Teodora Rešetar serving as jury members, along with Miloš and Ilija. Miloš Marjanović also made two 20-minute long video tutorials about the rules of the *ODYSSEY* scientific debate and argumentation.

Video tutorials made with Miloš were aired several times on the Serbian National Television, which contributed to the dissemination of the project significantly.

https://www.youtube.com/watch?v=VAYbjH5RRTY

https://www.youtube.com/watch?v=lfk_w9SY1_U&t=34s

Making of Educational Packages

CPN's educational packages are a product of the collaboration between several external scientists, experts in their respective fields, and CPN's in-house science communicators. Representatives of the Center include Ivan Umeljić, with a degree in philosophy, and Bojan Kenig, expert in the field of evolutionary and population genetics. Science journalists from the Center Đorđe Petrović, Ivana Nikolić, Bogdan Đorđević, and linguist and proofreader Ivana Smolović contributed to the narrative structure of the texts. The Center also hired external experts in different areas: Marija Meršnik, university lecturer and translator, PhD candidate at the Faculty of Philology in Belgrade, Igor Živanović, PhD, expert in bioethics and philosophy of biology, research associate at the Institute for Philosophy of the Faculty of Philosophy in Belgrade, Mašan Bogdanovski, PhD, expert in the field epistemology and AI, professor at the Faculty of Philosophy, Uni-

versity of Belgrade, and Jelena Ćirić, PhD from the Faculty of Veterinary Medicine, University of Belgrade.

All educational packages tackle the so-called "socio-scientific issues". This interactive teaching approach gave teachers and students a chance to look for answers to social controversies in various fields of science..

1. **Rewilding.** The educational package "The best way to preserve an ecosystem is by rewilding" includes an overview of theoretical underpinnings of this novel and increasingly present ecological concept. It also allows students to formulate arguments for and against rewilding – from the point of view of several scientific disciplines: evolutionary biology, conservation biology, agriculture and economics.

2. Social networks & the Internet. This educational package includes an overview of online teaching, reliability of information found online, and the spread of pseudoscience. It also allows students to formulate arguments for and against the use of the Internet in education.

3. Conservation of bees. The educational package "The future of humanity depends on the conservation of honeybees" includes an overview of several important aspects of conservation biology through a popular topic, often written and spoken about in the public in a superficial manner, presenting invalid data. Through formulating pro and con arguments, students will be able to further their knowledge of the biology of bees, as well as plant reproduction of both wild and cultivated species. Finally they will view our relationship with plants and animals from different angles.

4. Artificial intelligence. AI is certainly not a novel concept for high school students. Although forms of artificial intelligence are very much present in our everyday lives, students may not be familiar with all the benefits, and dangers of enthusiastically embracing it. So, a critical view is necessary – in the form of pro and con arguments – to give students a more in-depth insight into all the ways technology, and AI in particular, could be used or misused.

5. The use of animals in experiments. Educational package "Scientific community has a moral obligation to ban the use of animals in experiments" includes an overview of the use of animals in scientific experiments. It also allows students to formulate arguments for and against the use of animals in these experiments – in view of the results of different medical research, ethical aspects of their use and possible substitutes for animals in biomedical research.

>>> Open communication

CPN conducted teacher trainings with the help of debate trainers Miloš Marjanović and Ilija Ivanišević from the debate organization Open Communication, organizer of the largest annual student tournament in Serbia. Miloš and Ilija have participated – both as competitors and judges – in the largest international debate competitions; among others, Miloš won one of the most prestigious tournaments Oxford IV in the category English as a Second Language. Open Communication was awarded the organization of World Universities Debating Championship – WUDC, scheduled for July 19-27, 2022. CPN conducted teacher trainings with the help of debate.

IMPLEMENTATION OF ODYSSEY: CONCEPTION, TESTING AND DISSEMINATION IN ESTONIA, GREECE, POLAND AND SERBIA

ACTIVITIES

ESTONIA

COVID-19 AFFECTED all activities that were planned since March 2020. However, none of the planned events were cancelled. All events and activities took place, only the physical place was changed – face-to-face events were replaced with online meetings. Most probably COVID-19 affected the number of students who could have been involved in debate as the workload of teachers got higher. On the other hand, thematic packages were shared more often than planned, as packages were used as extra learning materials during distance learning.

- The **first teacher training was held on October 21, 2019** at the Energy Discovery Centre. A total of 16 teachers from 10 different schools participated. The debate method and rules, thematic packages, etc. were introduced during the full-day training. Teachers participated

>>> Events

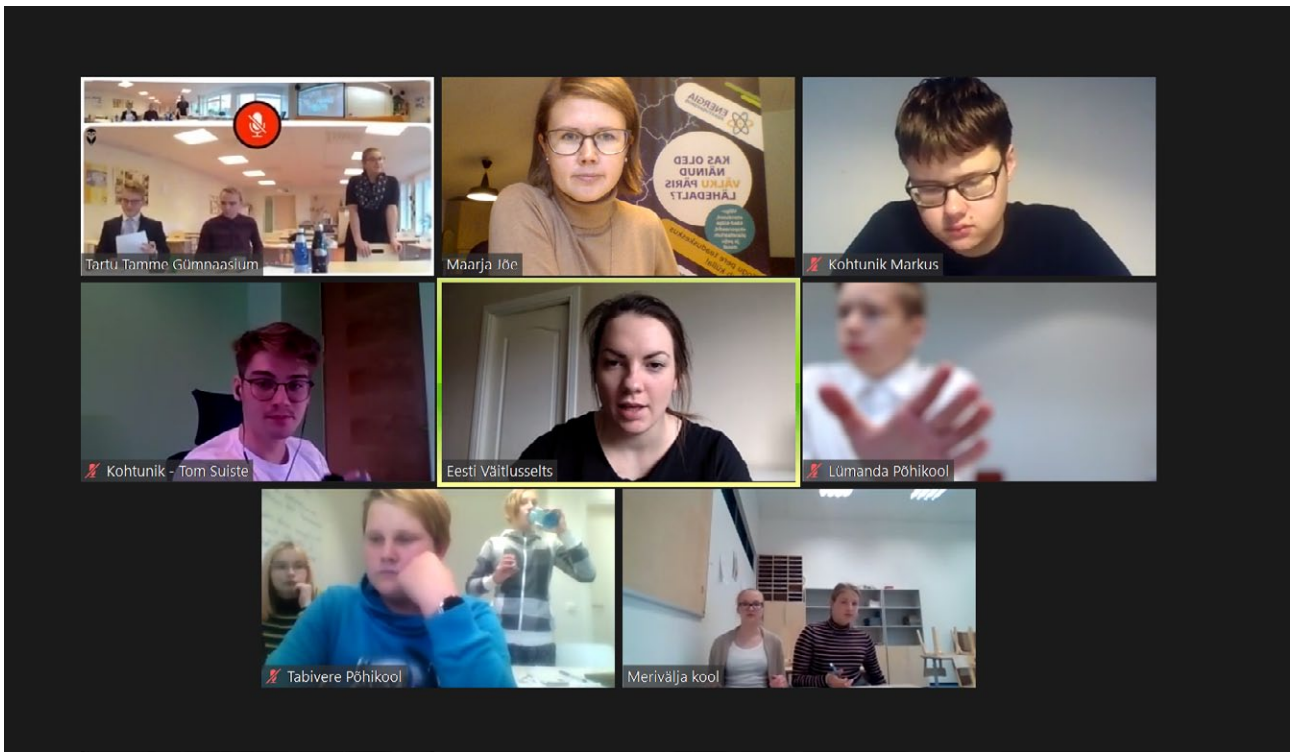
All events and activities took place, only the physical place was changed – face-to-face events were replaced with online meetings. Most probably COVID-19 affected the number of students who could have been involved in debate as the workload of teachers got higher.

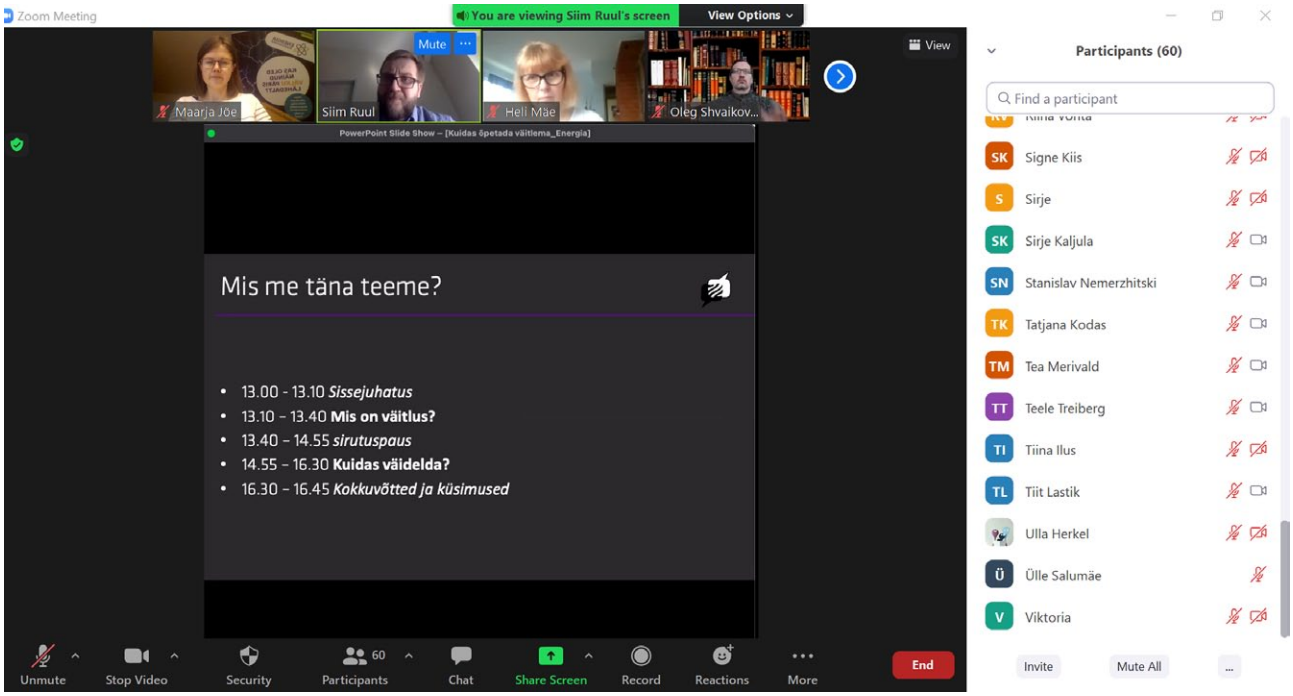
>>> Support

Estonian Debating Society moderated the conference. There were several presentations about debate and how to use this as a method in school, how to use the developed ODYSSEY materials, and pilot school teachers shared their experiences.

in the testing debate as well. The selected pilot schools (8 schools) and teachers started practicing debate during the school year 2019/2020. **To mentor** debate teachers a *Facebook* group was launched where teachers could ask questions, share problems, success stories, etc. Also, two online **mentoring meetings** were organized giving pilot school teachers the possibility to ask questions or go through some important aspects of debate. Professional debate trainer and teacher Siim Ruul mentored both the *Facebook* group and the two meetings.

- **Debate competition between participating schools was held on October 16, 2020**. In the end, four schools took part in the competition. The debate competition was held online, using *Zoom* platform. Before COVID-19, the competition was planned for April 2020 and eight schools were planning to participate. The reason why there were four schools participating in the debate in October 2020 was as the school year 2020/2021 changed, it changed the situation in schools, students changed schools or did not have classes with the debate teacher, etc. All in all, students who participated in the competition were well prepared and got an exciting experience from their first debate. Debate was organized together with Estonian Debating Society who provided all the judges for the competition and moderated the debate day as well. All together 12 students (6th to 10th graders)





from four schools all over Estonia (Tabivere Põhikool, Merivälja Kool, Lümanda Põhikool, Tartu Tamme Gümnaasium) and five teachers participated. Two teams who got the highest score were invited to participate in the final debate at the conference.

- First multiplier event – **conference "How to support the student's argumentation skills?", was held on February 19, 2021**, as a hybrid conference. There were 30 par-

ticipants on site at the Energy Discovery Centre and 32 registered participants online, however the broadcasted video reached 550 unique visitors via *Facebook* Live (link to the conference: https://fb.watch/49NDFMIp3U/). Estonian Debating Society moderated the conference. There were several presentations about debate and how to use this as a method in school, how to use the developed *ODYSSEY* materials, and pilot school teachers shared their experiences. The final debate on the topic "In Estonia, it is possible to quit using oil shale only if we introduce nuclear energy" took place between the students of Tabivere Põhikool and Merivälja Kool. The agenda of the conference can be found here: https://www.energiakeskus.ee/konverents/

- Second multiplier event – **online workshop "How to use debate as a method?" for teachers will took place on March 18, 2021**. During a 6-hour long online training, the debate trainer and teacher Siim Ruul gave an overview of debate, how to form an argument, etc. and also shared valuable debate exercises to practice with students. Apart from the overview of thematic packages, teacher materials were presented. All together there were 60 teachers participating from all over Estonia.

GREECE

THE ODYSSEY TRIP **started with a series of training meetings of the educators involved in the project.** The first meeting was held in Alimos (June 24, 2019) where interested educators from 14 schools were given basic information on the project. The first official training of the participant STEM teachers was realized on October 12, 2019, within Erasmus Days. Several workshops have been conducted related to the intellectual outputs of the program, scientific material, role of argument in science, communication of science etc. The event lasted all day long.

On November 12, 2019 the 53rd GEL of Athens hosted a three-hour experiential training workshop regarding the implementation of *ODYSSEY* debates in classroom. During the workshop, the teachers were introduced to debates rules and evaluation criteria, while they participated in a debate as speakers.

The GEL of Filothei hosted another training meeting on December 9, 2019. The teachers watched a demo of the friendly debate on Energy Issue realized by students of two participant schools. This way, teachers had a chance to practice and discuss the application of debate evaluation criteria as judges.

On February 5, 2020, our training meeting was held at the 2nd GEL of Kallithea regarding the rules of *ODYSSEY* Debates as the semifinal contest was designed to be implemented in the beginning of April, before the outbreak of COVID-19.

During the pilot phase many *ODYSSEY* debates have been conducted. More than 150 students participated as audience at the friendly debate between Politropi Armonia – GEL of Philothei in January 2020. On the other hand, the friendly debate between Politropi Armonia and Saint Paul Delasalle (March, 2020) was realized with the participant students and professors respecting the measures of protection against COVID-19. Also, many internal *ODYSSEY* school debates were held in all participating schools.

>>> Training

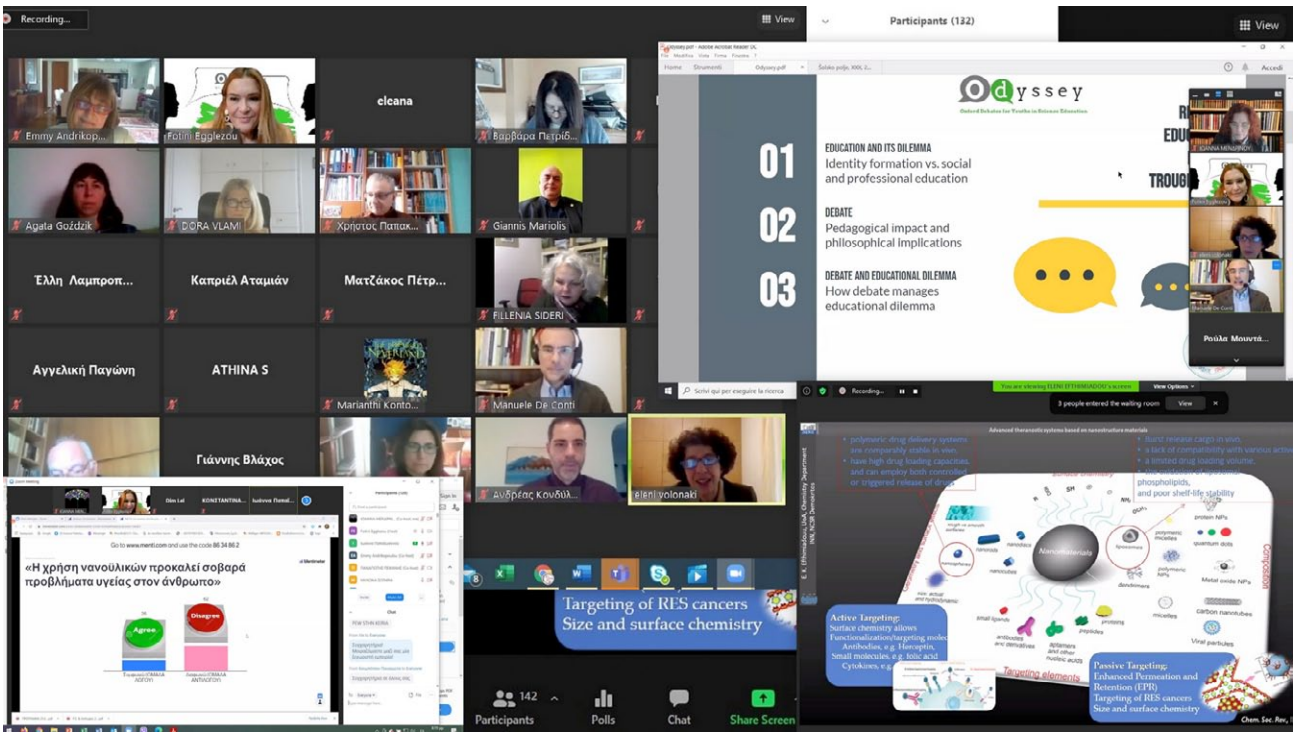
The first official training of the participant STEM teachers was realized on October 12, 2019, within Erasmus Days. Several workshops have been conducted related to the intellectual outputs of the program, scientific material, role of argument in science, communication of science etc.

>>> Semifinal

The semifinal debates took place in June 2020, due to COVID-19 that rendered impossible a live debate event, as meetings of more than 20 people were forbidden by law.

In addition, five webinars concerning the presentation of the five Greek educational packages were realized through the CISCO platform. During the webinars, we hosted two scientists-researchers as speakers: Olga Malandraki, Principal Investigator of the Athens Observatory, and the famous scientist of Molecular Biology, Panagioti Lempesi, who talked to the students from the Laboratory of Physiology at the University of Athens.

The semifinal debates took place in June 2020, due to COVID-19 that rendered impossible a live debate event, as meetings of more than 20 people were forbidden by law. Two semi-final on-line debates took place. The first one between the two participant Junior High Schools. The semi-finals of High Schools took place in two successive rounds among 10 participant teams. One of them wasa "mixed" team created by students of 3 participant Lyceums. The 'mixed' team concentrated the second higher score proving that collaboration is important not only in a debate contest but also to the scientific field. Many team and individuals awards and distinctions such as the 1st & 2nd Ascendant Scientific Debate Team award, Distinguished Scientists-Debaters for Communication Skills, the award for the most reliable evidence, the award for scientists collaborators, the award for the best female scientific participation etc. were given to the participants as a souvenir during a friendly meeting organized after the semifinals (June 27, 2020). The official presentation of



the awards took place in each school separately when the schools were open.

Because of COVID-19, the final debate also took place online between the 6th GEL of Kallithea and Saint-Paul Delasalle High School. The *ODYSSEY* Conference was held on *Zoom* platform on January, 23, 2021, as meetings of more than 9 persons were strictly forbidden by law due to the pandemic. Saint-Paul Delasalle won the first position according to the judgment of the 5 members scientific committee and the audience. The participant students of both schools were: Panagiotis Vatsakis, Anna Santorinaiou, Dimitris Boltsis (6th GEL of Kallithea) and Ioanna Chalvantzoglou, Georgios Stoumbis, Eirini Poligerou (Saint-Paul Delasalle). Numerous guests, scientists, debate-experts as key-note speakers, educators, representatives of the Environmental Education in Greece and students participated. The materials and the presentations of the participant speakers are uploaded to the *ODYSSEY* platform. The conference was registered and the related videos are uploaded to the *ODYSSEY* and HIRCS *YouTube* channel as supporting material.

During the dissemination phase HIRCS implemented the following online workshops:

- "*ODYSSEY* Debates in STEM Education." Energy Issue: Nuclear Energy and Renewable Energy" was organized by the Directorate of Secondary Education of C' area of Ath-

>>> Conference

The ODYSSEY Conference was held on Zoom platform on January, 23, 2021, as meetings of more than 9 persons were strictly forbidden by law due to the pandemic. Saint-Paul Delasalle won the first position according to the judgment of the 5 members scientific committee and the audience.

ens, through the Heads of Environmental Education and Cultural Affairs (October 19, 2020).

- Two-day workshop (November 16 & November 23, 2020). It was organized by the Directorate of Secondary Education of B' area of Athens, Imathia (North Greece), Achaia of Cyclades islands and Rethimno (Crete), through the Heads of Environmental Education.
- "Implementation of debates in STEM Education" (March 22, 2021) was organized by the Peripherical Center of Educational Design of Peloponnese through a pleiad of co-ordinators of primary and secondary education.

POLAND

IN POLAND THE TESTING PHASE started with the recruitment of schools. A total of 11 schools applied for participation in the project and the debate tournament. Teachers from participating schools took part in a full-day training organized on our premises on October 4, 2019 and repeated on November 28, 2019. During the training, teachers got familiar with the *ODYSSEY* debate format, debating rules and proposed educational topics. They also took part in the testing debate and in various engaging activities dedicated to formulation of proper arguments, recognition of fallacies and improving the style of public presentation.

A selected group of students, who formed the competition teams, took part in the training to prepare for the debate tournament during the school year 2019/2020. The training was organized at schools by the coordinating teachers. Students were familiarized with the principles of debate, practiced different roles in the debate and explored further topics based on prepared packages, through regular mentoring. Teachers confirmed that they observed the teams

>>> Mentoring

The mentoring process was offered to all schools in a timeline discussed during the workshop. It had two main forms: online lessons with experts and Q&A open sessions.

developing their skills, naturally learning to work as a team, and how shy students developed self-confidence.

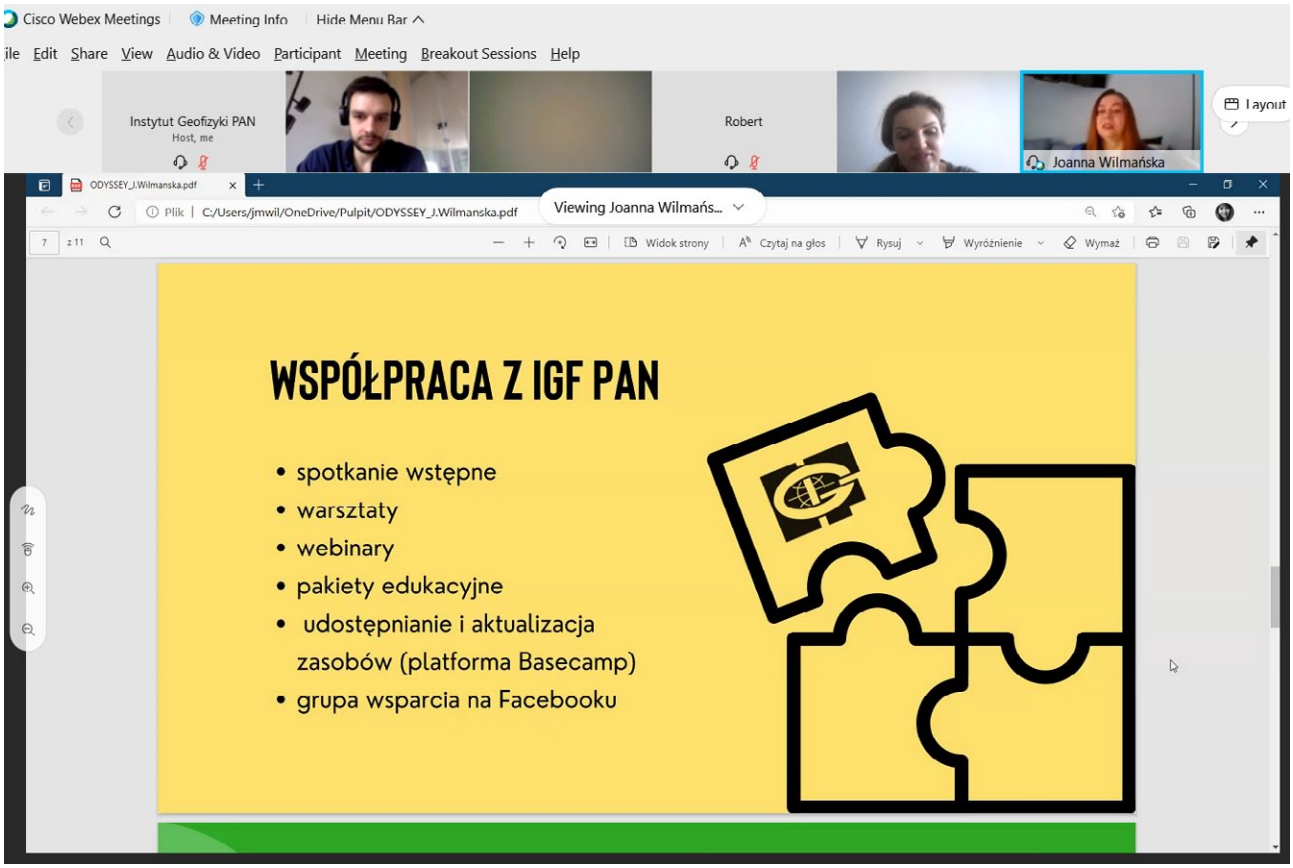
The mentoring process was offered to all schools in a timeline discussed during the workshop. It had two main forms: online lessons with experts and Q&A open sessions. Schools took part in online lessons hosted by scientists responsible for particular topics (online lectures) and in Q&A sessions with authors of toolkits. Each topic was introduced separately, every 4-6 weeks, to give students enough time to familiarize with the subject. Additionally, a webinar with an expert on debating was organized in March 2020, dedicated to efficient formulation of arguments.

The tournament was planned for May 2020, however due to the COVID-19 pandemic it was shifted to November 2020. Schools were working remotely from mid-March till the end of the school year 2019/2020, and then again from mid-October. Therefore, the final preparation for the tournament was held online. This mode of work was very difficult – both for students and teachers. Therefore, only six teams decided to participate in the online version of the tournament.

The tournament took place on November 6, 2020. Teams were randomly chosen for debates in the eliminations in

>>> The tournament

The tournament took place on November 6, 2020. Teams were randomly chosen for debates in the eliminations in two categories: four teams in the category for secondary schools and two teams in the category for primary schools.



two categories: four teams in the category for secondary schools and two teams in the category for primary schools. Teams randomly drew topics and their roles (proposition and opposition). Debates were judged by the Judging Scientific Committee consisting of three persons: representative of the organizer, expert on the chosen topic and external debate expert from the Debating Poland Foundation. In the category for secondary schools two winning teams were invited to the final debate organized on the same day.

The winners were "Taczaki", team from the Primary School no. 62 in Poznań, and "Team GAJA" from Secondary School no. 1 in Tychy.

Two multiplier events were organized online: teachers' workshop on March, 4 2021 with 28 participants and *ODYSSEY* conference on March 20, 2021 with 45 participants. During both events we presented the method of using debates in science lessons and we discussed the proposed topics for debates. Detailed instructions were also formed by the methodological adviser on how to work with educational packages for debates. In addition, during the conference we organized a demonstration debate in which students from the teams that won the debate tournament took part.

SERBIA

>>> The final debate

As part of the final conference of the ODYSSEY project, the final debate was held on September 29, 2020 in the big cinema hall of the Faculty of Dramatic Arts, University of Arts in Belgrade.

THE FIRST MAJOR STEP in implementing the international project *ODYSSEY* was a training for high school teachers on how to apply the Oxford-type debate in STEM teaching. The training was held on November 4, 2020 in the Science Club of the Center for the Promotion of Science, and was attended by 17 teachers from eight high schools. The project coordinators for Serbia first presented the project, its goals, topics to be debated, educational packages, how to form scientific debate teams, and the agenda of project activities. Then, debate trainers from Open Communication, a project partner organization with rich international experience in organizing debate competitions, introduced teachers to a short history of debate, its basic concepts, and explained the Oxford-type debate format. Debate trainers then addressed

the problem of argumentation, giving examples of well-developed arguments. In the final part of the training, trainers moderated a school-hour debate simulation, and teachers assumed the roles of debaters, judges and time-keepers.

By the end of 2019, teachers formed the school debate teams, and then trained them for competitions in scientific debate, planned for the end of April (school competition) and at the end of May (national competition) of 2020. However, this plan was obstructed by the outbreak of the COVID-19 pandemic, which significantly delayed some project activities and hindered project implementation.

Thanks to a favorable epidemiological situation, but with strict adherence to the recommended measures, the national debate competition was organized on September 19, 2020 at the Faculty of Biology, University of Belgrade. In the authentic environment of this higher education institution, students from eight high schools participated in debate. The role of judges and moderators, along with the scientists who prepared the educational packages, was assumed by some of the world's best debaters, members of the organization Open Communication, including the teachers who trained the debate teams. After the draw, extremely interesting quarterfinal and semi-final debates took place.

>>> The national competition

Thanks to a favorable epidemiological situation, but with strict adherence to the recommended measures, the national debate competition was organized on September 19, 2020 at the Faculty of Biology, University of Belgrade. The role of judges and moderators, along with the scientists who prepared the educational packages, was assumed by some of the world's best debaters, members of the organization Open Communication.

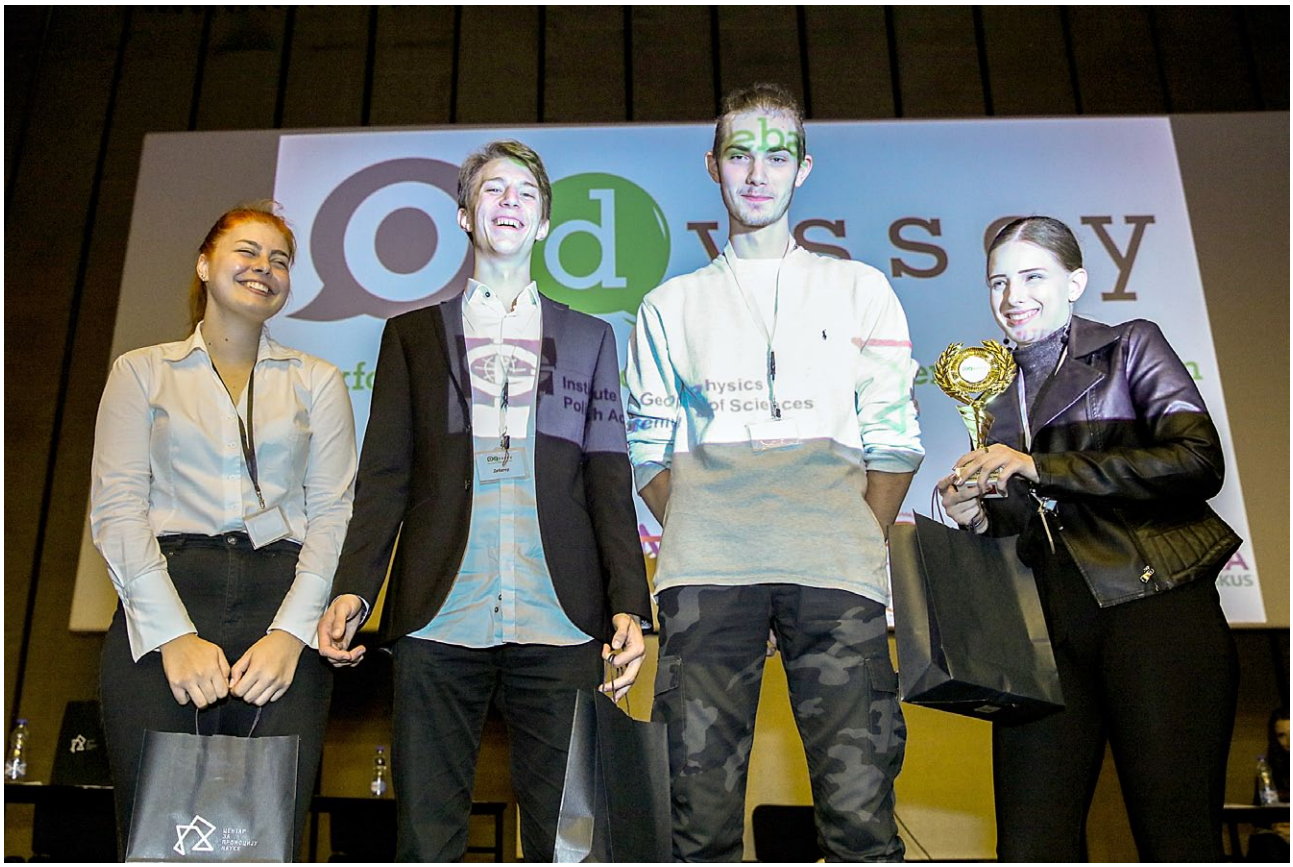
>>> Training session

During February 2021, the results of the project were disseminated through teacher trainings in three cities in Serbia. The first training session for 11 teachers was held on February 17 in Niš, followed by a session for 12 teachers on February 19 in Kruševac, finishing with a session for 8 teachers in Šabac on February 25.

As part of the final conference of the *ODYSSEY* project, the final debate was held on September 29, 2020 in the big cinema hall of the Faculty of Dramatic Arts, University of Arts in Belgrade. Along with debate participants, judges and moderators, the final conference was attended by more than 60 teachers from primary and secondary schools and other educational institutions from different parts of Serbia. The conference began with a panel discussion on the application of Oxford-type debates in education, including a psychologist focusing on argumentation in education, an internationally-recognized debate coach, and two teachers who participated in the project and trained the debate tournament finalists. At the end of the conference, the finalists competed in a very vivid debate, demonstrating excellent presentation skills. The final debate competition was recorded and uploaded on the YouTube channel of the Center for the Promotion of Science so that it could serve as teaching material to all interested teachers.

During February 2021, the results of the project were disseminated through teacher trainings in three cities in Serbia. The first training session for 11 teachers was held on February 17 in Niš, followed by a session for 12 teachers on February 19 in Kruševac, finishing with a session for 8 teachers in Šabac on February 25. During the workshops, held in scientific clubs of these three cities, the participants also received the teaching materials to use in their teaching. The educational packages developed within the *ODYSSEY* project were presented to the participants, and the trainers explained in detail how the Oxford-type debate can be effectively applied in working with students. At the end of the training sessions, teachers went through hands-on exercises in applying debate in STEM teaching. They had great success in this new role, showing keen interest in implementing this innovative approach in their teaching practice.


Odyssey


Odyssey

LESSONS LEARNED

ODYSSEY AS SEEN BY PARTICIPATING TEACHERS

FOCUS GROUP INTERVIEWS (FGIs) were conducted with teachers from all four partner countries in order to evaluate project efficacy, utility of materials, and sustainability and utility of the method developed within the *ODYSSEY* project. This was a structured interview with a set of questions designed to be asked in the specified order:

0. Opening (0.1 Greeting and welcoming of guests; 0.2 Information on the purpose of the interview, i.e. obtaining information on teachers' opinions about working with packages, utility of materials, sustainability and utility of the method developed within the *ODYSSEY* project)

1. Expectations (efficacy) (1.1 Have your expectations for the teachers' professional development been met in the project?; 1.2 Have your expectations for student learning outcomes been met in the project?)

2. Experience about debating (2.1 What were the main challenges in running the debating project in your school?; 2.2 Were these challenges overcome? Could they be prevented?; 2.3 What is your opinion about actual workload in relation to the results?)

3. **Usefulness of educational materials** (3.1 To what extent were the materials useful and sufficient to conduct debates?; 3.2 Which materials did you like most?; 3.3 Which were less useful? What could we change to make them more suitable for your needs?)

4. Sustainability and utility of the method (4.1. What are the main barriers/limitations of using the proposed method in school practice?; 4.2 To what extent is it anticipated to use the project results after its termination? With other pupils?;

> Despite the fact that I had prior experience with debates, I had no prior experience with debates on scientific issues. The communication of science was guaranteed by this project and this is very positive. We have to examine if students acquired a deep comprehension of the scientific notions examined.
>
> (Teacher from IONIOS High School, Greece).

This project is the best we've had for the past several years. We got the opportunity to implement in our teaching exactly what we usually completely miss – public speech, confrontation of different positions, argumentation. I would like it to be implemented much more broadly.

(Math teacher from Serbia)

4.3 What tools/support would be useful for you and other teachers to implement the method for other topics in the future?)

5. Ending (5.1 Considering all the items we discussed today, is there anything else you would like to talk about?)

FGIs Summary

The COVID-19 pandemic changed the plans for the FGIs, initially planned to be held face-to-face, so they were held in all four partner countries between June and October 2020 through different online platforms (*Zoom*, CISCO). This section gives a brief summary of the most important insights gained from the teachers, along with their statements about the project.

Teachers' **expectations** in all four countries have been met undoubtedly; the majority even stated that their expectations were exceeded. The project gave them an opportunity to introduce a new tool in the form of debates into their teaching practice, but also to develop collaboration within their school communities and meet other teachers and scientists. Students learned how to build an argument and understood the importance of debate for analyzing a problem from different angles.

Despite the fact that I had prior experience with debates, I had no prior experience with debates on scientific issues. The communication of science was guaranteed by this project and this is very positive. We have to examine if students acquired a deep comprehension of the scientific notions examined. (Teacher from IONIOS High School, Greece)

Students improved their knowledge, developed their communication skills and teamwork, understood the meaning of debate and the impact of science on society. (Teacher from 4th High School of Lamia, Greece)

The use of debates in STEM makes it a pioneering project. (Geography teacher from Poland)

My students were debate-debutants. They were shy, we would not expect that they would participate in public speaking. Especially for those shy, reluctant to speak up, it was a huge personal development. (Geography teacher from Poland)

This project is the best we've had for the past several years. We got the opportunity to implement in our teaching exactly what we usually completely miss – public speech, confrontation of different positions, argumentation. I would like it to be implemented much more broadly. (Math teacher from Serbia)

I am glad I participated in this project as it gave me tools to use debate in lessons and achieve learning outcomes differently. Pupils feel more confidence in presenting their ideas and they have more guts to try new things. It's always heartwarming to see if the subject has enlightened students to discuss the debate topics outside the classroom as well (such as electric cars vs. petrol cars, wind generators). (Estonian language teacher from Estonia)

"This project gave students possibility to argue safely so that nobody feels offended. It taught us how to listen and how to notice and communicate politely. (STEM teacher from Estonia)

Students who participated in the competition surely got a good performance experience, developed their information finding skills and they got acquainted with the topic they otherwise wouldn't know that thoroughly. (Social studies teacher from Estonia)

My plans – I will repeat these debates with subsequent years of students. The topics fit into the core curriculum!

(Geography teacher from Poland)

One of the main **challenges** to the successful implementation of project activities was the situation caused by the COVID-19 pandemic which forced teaching to migrate to online or distance learning. Remote learning reduced direct contact, so this offered little opportunity to train as a group and concentrate on team work. The second most important obstacle that the teachers from all four partner countries listed was the lack of time to incorporate debate lessons into the standard curriculum, so some of them turned to organizing these lessons as part of extracurricular activities or different clubs.

Teachers indicated that those of them with no previous debating experience often felt the need for a mentor. Both as debate teachers and debate judges, they felt it would have been better if more time had been devoted to mini-debate simulations during initial teacher training.

There were three types of pupils: those who enjoyed a lot, those who did it well and those to whom debate was a big challenge. (Estonian language teacher from Estonia)

Pupils enjoyed participating in debate during classes. However, it was difficult to get together the debate team as they were not willing to spend time for debate after school. (Social science teacher from Estonia)

First, the students had to overcome their fears in order to be exposed to the public. Second, it was something very new for me and I needed time to adjust. (Teacher from Saint-Paul Delasalle, Greece)

Students who participated in the competition surely got a good performance experience, developed their information finding skills and they got acquainted with the topic they otherwise wouldn't know that thoroughly.

(Social studies teacher from Estonia)

Materials were great because they offered us borders to better understand the space we are moving through.

(Biology and Math teachers from Serbia)

The main challenges that we faced were, first, the lack of previous experience of teachers with debating. Second, the sudden closure of schools due the COVID-19 pandemic caused a very big problem in the preparation of the children. (Teacher from 2nd High School of Kallithea, Greece)

It was extremely difficult to coordinate the project during remote learning. (Geography teacher from Poland)

As an English language teacher I was not a specialist in STEM, so I let students work on their own. (English language teacher from Poland)

The system does not recognize this kind of activity and that is why it is very difficult to find time for them. We really need to make mental gymnastics in order to organize it in a way to fit with all students' other obligations. (Math teacher from Serbia)

Teachers either stated that there is a balance between **workload** and results, or that they gained much more than they had invested. On the other hand, getting the team/students together and teaching basic skills took more resources and time in the beginning of the project.

We got much more than we invested. One year is not much compared to the fact that we are going to use these tools for many, many years. (Biology teacher from Serbia)

Most of the teachers evaluated project **materials and educational packages** as professional, multi-faceted and exhaustive (Poland), useful, well designed, with carefully thought-out and sufficiently detailed content, examples and explanations (Serbia), clear and easy for students to understand (Estonia), reliable, organized and interesting (Greece). Videos and webinars were particularly singled out as useful.

Students taking part in the project belonged to two age groups, primary school and secondary school students. Taking their age into account, some materials were identified as potentially too complex for the younger students. For example, in Poland, the educational package *Wind energy* was the most favorite package, especially since it relates to current affairs, such as climate change. Other educational packages were seen as rather complicated in terms of e.g. vocabulary (*Geoengineering, Flood management of mountainous catchments*), especially for primary school students. In Greece, students showed greater interest for certain packages (e.g. *Space Exploration*), while other packages (e.g. *Biotechnology*) were considered more challenging from a scientific point of view. None of the materials were identified as less useful.

Materials were great because they offered us borders to better understand the space we are moving through. (Biology and Math teachers from Serbia)

The materials were really useful. Especially the information and story cards. They were easy to read and clear for students to understand. (Geography teacher from Estonia)

I found interesting the fact that the data of the material covered many aspects of the topics under consideration. Also, it is always interesting to link scientific research and its various applications to real life through Story Cards and Fact Cards. (Teacher from the 2nd High School of Athens, Greece)

The variety of materials is very valuable. (Geography teacher from Poland)

Very good materials base; Professional worksheets. (Geography teacher from Poland)

The method proposed by the *ODYSSEY* project has proven to be **sustainable,** since educators confirmed that they

Very good materials base; Professional worksheets.

(Geography teacher from Poland)

There were three types of pupils: those who enjoyed a lot, those who did it well and those to whom debate was a big challenge.

(Estonian language teacher from Estonia)

I found interesting the fact that the data of the material covered many aspects of the topics under consideration. Also, it is always interesting to link scientific research and its various applications to real life through Story Cards and Fact Cards.

(Teacher from the 2nd High School of Athens, Greece)

were willing to continue using it after the project was completed.

Indisputably, one of the main **obstacles/barriers** was the lack of time for debate classes provided by the standard curriculum. Teachers from Serbia agreed that the educational system gives little support for the various skills necessary for debate and that they expect challenges since their students lack skills such as finding and checking the reliability of information, developing argumentation; communication and public speech; self-confidence during presentation of personal opinion in front of classmates, etc. Greek teachers identified the problem of finding scientific topics/material analyzed in their national language, such as the educational guides that were given to them during the testing phase. Polish teachers suggested that further webinars would be helpful; English versions of materials could be used as well, in order to combine the development of STEM knowledge and debate with using English language in practice. Teachers from Estonia confirmed that future teachers would benefit from training and support materials, especially in the form of instructional videos.

They (students) are not skilled enough in research and argumentation. They are not careful enough about the reliability of

information they find although we ask them to check everything. (Chemistry teacher from Serbia)

Repetitions of the webinars would be valuable, with the ability to ask questions directly. (Geography teacher from Poland)

Teachers see room for use of the project results after it is completed, either as part of regular classes to some extent, or as part of elective courses.

I simply cannot imagine ending the use of materials after the project ends. (Chemistry teacher from Poland)

My plans – I will repeat these debates with subsequent years of students. The topics fit into the core curriculum! (Geography teacher from Poland)

In sum, overall **project reception** was very positive, and the benefits exceeded teachers' expectations. Teachers observed the positive influence of the project on students' personal development, their skills and self-esteem, and appreciated the mentoring processes. All teachers suggested that a list of topics and educational guides translated in their national language for future work with students would be highly beneficial.

ENRICHING STEM WITH SCIENTIFIC DEBATE

ODYSSEY AS SEEN BY INTERNATIONAL PEDAGOGICAL ADVISORY BOARD

ONE OF THE KEY CHARACTERISTICS of the projects, having the ambition to really make a difference in the field, is the care to ensure the sustainability of its main products and values. Guided by that, our goal was to complement the rich experience gained through project implementation in four European countries by asking teachers from other countries (Spain, Malta, the Czech Republic, Italy, and North Macedonia) to look at the project through their own lenses and with their own educational systems and professional experience in view. We believe this is the best way to understand how project outputs could be used more broadly and to increase its potential to enrich education with a new flavor.

Talking about the place of argumentative debate in the educational system, we actually talk about an important aspect of learning which has been in the focus of science for decades. However, its implementation in the educational practice appeared to be complex, mostly due to the lack of thoughtful design and implementation. Thus, if we try to sum up the contribution of this project in one sentence, that would be this one: It seems it succeeded in applying one of the extremely important aspects of learning in the work with students–argumentative thinking and debate; and not only in its outline, but to its full extent. It offered a shape for one of the basic principles of learning – let your students be proactive and involved, to take the responsibility for their own learning, to investigate, to be thrilled, to dig for new knowledge and grab it.

Partner countries which implemented the project (Poland, Serbia, Estonia and Greece) have already taste tested it, but in line with our project aims, we wanted to open the space for debate by crossing the borders of project teams and

>>> Other voices

Partner countries which implemented the project (Poland, Serbia, Estonia and Greece) have already taste tested it, but in line with our project aims, we wanted to open the space for debate by crossing the borders of project teams and educational systems, offering the floor for other voices so we would learn more.

>>> Materials

International Pedagogical Advisory Board members claim that the educational materials offer them detailed step-by-step instructions, both in course content and teaching methodology. Talking about the materials developed within the project, teachers described them as understandable, well prepared and adequately detailed.

educational systems, offering the floor for other voices so we would learn more. And what we learned was that the implementation of debate in the educational practice requires continuous and careful planning from teachers and guidance for students, but still – its implementation is possible and highly recommended. Let's see what they taught us about the sustainability of the project in the context of their professional experience and educational practice in their countries.

To begin with, teachers' general positive impression of the packages seems to be very promising from the perspective of project sustainability. Before going into a more detailed analysis, it is important to emphasize that in addition to describing materials as very interesting, which is very relevant from the perspective of long-term motivation for learning, teachers highlight the usefulness of project materials and scenarios from the perspective of diverse educational goals. Put shortly – they point to the opportunities for knowledge development, but also, and even more importantly, to the development of different skills relevant for the growth of further knowledge. Isn't it the brightest role of education – to manage to teach others to learn, to value knowledge, and to reflect on it? And isn't this exactly what we want to ensure in education?

Going further, one can think about the project asking a simple, but the most relevant question – what does it bring to the students involved? Teachers who analyzed its outputs are unanimous and clear stating that the project:

- gives the students an active role (some teachers highlighted that it involves even the students who are not taking an active part in the debate), which is a key factor in learning with understanding;
- develops argumentative thinking and creativity;
- opens the floor for questioning knowledge, searching for proof and evaluating it;
- directs students towards some very important issues, such as ethics in scientific research or the role of science in our everyday lives;
- opens new questions about topics that students find relevant;
- increases motivation for learning;
- develops problem-solving skills;
- asks students to use different sources of information and to learn how to appropriately use this information, as well as to evaluate its reliability;

>>> Sustainability

The project illustrates and teaches us how to actively create, share and evaluate knowledge, putting all these learning tools in the hands of our students, letting them be the agents of their own learning and growth. It shows that education needs are very similar everywhere.

- develops feelings, teamwork, verbal skills, the ability to communicate and engage the audience;
- empowers students to create their own learning process, etc.

Reflecting on this list of project outcomes, we can say that it brings into practice several aspects very important for reaching the most complex educational goals and the highest student achievements. What we learned from several large-scale international assessment studies (such as PISA) is that the students from the countries behind the OECD average are those missing exactly some of the mentioned skills (argumentative thinking, analytical abilities, rich verbal skills, etc.). In addition, teachers who participated in the project also commented on the potential of debate to deeply involve every student and give him/her the opportunity to practice public speech, collaboration and communication in the learning context. Thus, we can say that it perfectly matches the goal of developing 21st century skills through education.

In order to reach all set goals, we need teachers ready and capable to support students in an optimal way. From this perspective, one of the most relevant questions was – what the project brings to teachers and what additional support we can provide for teachers in order to maximize the effects of their efforts. International Pedagogical Advisory Board members claim that the educational materials offer them detailed step-by-step instructions, both in course content and teaching methodology. Talking about the materials developed within the project, teachers described them as understandable, well prepared and adequately detailed. At the same time, they say that it leaves room for teachers to implement them having in mind the characteristics of his/her own students, adjusting them in a way he/she finds relevant (e.g. simplifying them for younger students or students with poorer achievement; adjusting the content in relation to the country-specific context). Having both aspects in mind, we can conclude that the project managed to provide adequate and complete support, making teachers confident about the implementation of debate in their practice, even for those who had no similar experience thus far.

Teachers from different countries also commented on specific subjects and curriculum content in their own countries for which every project package would be useful. As expected, teachers have drawn connections between different subjects and the packages they were evaluating. But what is more interesting and more relevant is that the teachers

have also managed to connect a number of diverse subjects to each individual package. This nicely shows the interdisciplinary nature of the selected topics and the way they are approached within each package. It goes without saying that it is one of the key factors in the development of transferable skills, extremely relevant and not prominent enough in schools across different countries.

To conclude, the project illustrates and teaches us how to actively create, share and evaluate knowledge, putting all these learning tools in the hands of our students, letting them be the agents of their own learning and growth. It shows that education needs are very similar everywhere, and what is even more relevant from the perspective of the project – that argumentative debate helps us attain some of the greatest aims of educational endeavors all over Europe.

Finally, to put a name on the advice and suggestions given, gratitude for project improvement goes to project Advisors: Helena Lazarová (Czech Republic), Chiara Schettini (Italy), Karolina Damjanoska (Republic of North Macedonia), Alexia Micallef Gatt (Malta), and Ismail Ali Gago (Spain).

Also, publishing the *ODYSSEY* educational resources in the *Scientix* repository is crucial for their exploitation after the project closure. This helps further dissemination as *Scientix* regularly promotes new resources via its portal and via ***Scientix* Digest**, which is being sent out to more than **2,500** online subscribers worldwide.

>>> Scientix

Publishing the ODYSSEY educational resources in the Scientix repository is crucial for their exploitation after the project closure.

PERSPECTIVE

TOWARDS A DEEPER STEM LEARNING

CHARLES DARWIN ONCE DESCRIBED *On the Origin of Species* as "one long argument". Lending such a description to a masterpiece such as this book unifies some of the key aspects of argumentation. The first aspect relates to the justification of scientific claims, integrating theoretical ideas and empirical evidence. The second aspect is connected to argumentation as persuasion, which in Darwin's case implies an attempt to persuade the audience made up of scientists and the public into believing that animals and plants change, that living species on Earth originate from other species – and that they were not all created at once, in one particular moment. The publication of Darwin's book fueled great controversy, which corresponds to another aspect of argumentation – a debate between two sides having opposing arguments on a topic.

With a conviction that argumentation is integral to building and acquiring scientific knowledge, the international project *ODYSSEY* (Erasmus+ KA2) was initiated and implemented with an idea to integrate argumentation deeper into STEM education. Focusing on Oxford-type debates as a methodological and pedagogical framework, *ODYSSEY* placed the socio-cultural perspective to the forefront, furthering the understanding of the role of social interaction, socially-mediated activities and development of language skills in the learning process of STEM education.

Despite the adverse environment for project activities and education systems in 2020 and 2021 caused by the COVID-19 pandemic, the consortium partners succeeded in developing and testing a plethora of educational materials. Following internal and external evaluation of ideas and intellectual outputs, and with great impressions from the cooperation with teachers, students, scientists, and debate trainers from four countries, it is with great pleasure that we can recommend the results of the two-and-a-half year work to colleagues from Europe, with the hope that our experience would help them innovate and improve their own teaching practice.

>>> Framework

Focusing on Oxford-type debates as a methodological and pedagogical framework, ODYSSEY placed the socio-cultural perspective to the forefront, furthering the understanding of the role of social interaction, socially-mediated activities and development of language skills in the learning process of STEM education.

APPENDIX

SCHOOLS PARTICIPATING IN ODYSSEY

ESTONIA

Merivälja School

Hekitee 16, Tallinn, Harju County, Estonia

In Merivälja School there are nearly 600 students. Our school has integrated project base studying into our curriculum. Our students are very versatile and very motivated to learn new facts about different subjects.

Professor's statement about the project: The project has been very interesting and with a great learning curve from a teacher's standpoint. Students, especially 9th graders have been very interested in debating and what it can give them in the sense of social skills.

https://meripohi.edu.ee/et

Tallinn Mustamäe Humanitaar Gymnasium

A. H. Tammsaare tee 145, Tallinn, Estonia

Tallinn Mustamäe Humanitaar Gymnasium is a language immersion school, with nearly 900 students whose native language is Russian. One year ago, on September 1, the school celebrated its 50-year anniversary. The School motto is "The future is in my hands". The main values of the school are responsibility, openness, cooperation and a sense of success.

>>> Logical skils

The project is interesting as it develops students' skills in logical thinking, analysis and drawing conclusions.

Professor's statement about the project: The project is interesting as it develops students' skills in logical thinking, analysis and drawing conclu-

>>> Different points of view

The project materials allow students to work independently, get acquainted with different points of view and form their own point of view.

>>> Educational packages

Project materials are very thorough and younger students have interest in participating.

sions. Students gain debate skills on important topics in society.

https://www.tallinn.ee/mhum/

Põltsamaa Co-Educational Gymnasium

Veski 5, Põltsamaa, Estonia

Põltsamaa Co-Educational Gymnasium is 102 years old and has approximately 685 students. The school motto is to be "Champions of creating competence". We are proactive, enterprising and open to innovations. School has been awarded with a silver award as enterprising school. Since 2015, students can choose cyber defense as a field of study in high school.

Professor's statement about the project: During the project, the students get acquainted with the format of the argumentative debate, learned to compose an argument and use it in the debate. The project materials allow students to work independently, get acquainted with different points of view and form their own point of view. Debating is an opportunity to get students interested in STEM subjects.

https://poltsamaa.edu.ee/et

Tabivere Middle School

Hariduse 1, Tabivere, 49127 Tartu county, Estonia

In Tabivere Middle School there are 140 students. School's motto is: "Unistuste täitumine algab kodukoolist" – the fulfillment of dreams begins at home school. Tabivere School started in 1973 with 8 grades. This school year we are proud to say we have a brand-new school building.

Professor's statement about the project: Project materials are very thorough and younger stu-

dents have interest in participating. Hopefully we will have enough time to prepare ourselves.

tabivere.edu.ee

Tartu Tamme Gymnasium

Nooruse 9, Tartu, Estonia

Tamme Gymnasium celebrated its 100th anniversary last year. It has approximately 500 students aged 16-19. TammeGymnasium is famous in Tartu for its specialization in natural sciences (biology and medicine in particular). Our school's motto is by Estonian poetess Anna Haava, which roughly translates as "We do not want to become a quiet forgotten page in the history books".

Professor's statement about the project: We started with a group of 12 students for our elective course "Speech and debate". We used the European project materials for our debate part of our course. The students showed an interest in the debate themes and several times the debate became a heated argument. We selected three most promising students into our debate team.

https://tammegymnaasium.ee/

>>> Debate themes

The students showed an interest in the debate themes and several times the debate became a heated argument.

Lümanda Basic school

Lümandaküla, Saaremaa vald 93301, Estonia

Our school is 125 years old; it is not big, but it is still big enough for us to study and learn. The school has around 70 students. Our school's motto is – "Mõistuse ja südametunnistusega" translated into English – "With reason and conscience".

Professor's statement about the project: Students who take part in the debate are better able to write a discussion and are able to add factual examples and relate to what they have learned. Apart from debate I have used teaching materials to make the lessons more interesting.

https://lymanda.edu.ee/

>>> Lessons

Apart from debate I have used teaching materials to make the lessons more interesting.

GREECE

2nd General Lyceum (High School) of Kallithea, Athens

21 Megaloupoleos & Kremoustr.,
17675 Kallithea, Greece

Since 1979-1980, the 2nd General Lyceum of Kallithea has been working as a mixed-population school. Before this date, from 1964 until 1979 the students were only males. Even before this period, it was a Commercial School and then an Economic Junior High-School.

Professor's statement about the project: It was an unprecedented experience. Until now the subject of Science was limited to exercises and experiments. This year it became a debating topic. Children showed great interest.

http://2lyk-kallith.att.sch.gr/

6th General Lyceum (High School) of Kallithea, Athens

Socratous 222 and Lysikratous str.,
17673 Kallithea, Greece

Our school was founded in 1989 and since then it has been a center of knowledge, culture and athletics with numerous distinctions deriving from everybody's efforts, teachers', parents' and students'. It counts about 250 students and 25 teachers and it is housed in a beautiful building with a garden. Our school motto is a verse of the

Greek national poet, Dionysios Solomos: "The eyes of my soul, always open, always sleepless!"

Professor's statement about the project: This program has taught us a lot about science in a simplified way adjusted to students' prior knowledge, giving them the chance to practice debating on highly interesting topics. We strongly believe that this program has offered them a motive to develop as active citizens and to pursue further research on scientific issues. Through interschool competitions organized for 3rd grade senior High school students, competitors were familiarized with public speaking and received well-intentioned reviews by older students. Another practice involved displaying part of the printed material on the school notice board, which enabled all students to become aware of the program.

http://6lyk-kallith.att.sch.gr/autosch/joomla15/
https://lykeio6o.blogspot.com/

>>> Adjusting students' knowledge

This program has taught us a lot about science in a simplified way adjusted to students' prior knowledge.

52nd General Lyceum (High School) of Athens

Tripoleos 1-5 str., Athens, Greece

The 52nd General Lyceum (High School) of Athens is located on the hill of Ippias Kolonos, within a historical area in the oldest neighborhood of Athens. The school was initially founded (with six classes) as the *Mixed Gymnasium (Junior High School) of Kolonos* (when the majority of the Greek schools in big cities were either male schools or female schools). In 1979, its name changed to *52nd Lyceum of Athens* and the correspondent Junior High School was created. In 2004, after the Olympic Games in Athens, the construction of the new school building started and was inaugurated in 2006. The school is characterized by the excellent sport performances and personal distinctions of students.

STEM Professor's statement about the project: Pinelopi Karala: It studies many issues that represent modern trends of scientific research. This is a

>>> Character of the project

The particular character of the project and the inspired management of the debates impressed the students.

reason why students' interest is motivated. I had the impression that the initial schedule was too 'heavy' especially for Lyceum's students as, first, they don't easily commit themselves to projects and, second, they don't have time to dedicate to extra-curricular activities.

Andrikopoulou, Efthymia: This school year was extremely difficult because of COVID-19 and it didn't allow us to complete the project in a way analogous to its merit. Indeed, the multiple responsibilities of Lyceum's students don't give them the chance to participate in extracurricular activities in order to implement the project in a more organized way. Despite it, the particular character of the project and the inspired management of the debates impressed the students. So, they easily understood the rules and participated in the on-line contest debate despite the difficulties.

http://52lyk-athin.att.sch.gr

Filothei General Lyceum (High school)

Papaflessa 15 str., Filothei / Attiki, Greece

Geniko Lyceum of Filothei is a Greek Public high school serving the suburban community of Filothei. Our school not only offers the detailed Greek national curriculum, but also goes above and beyond to offer the students a nurturing and creative environment. Geniko Lyceum of Filothei currently has 20 teachers covering all three years of high school, Grades 10–12, and a graduating class of 82 students. In addition to providing common core preparation courses, our high school students must choose one of four "orientations" pertaining to their future plans for university enrollment. It is in this area of specialization that they are able to delve into an "advanced placement" program that prepares them at a high level in a specified area of study. Between 2013 and 2018, the school won over 200 awards in literature, debate, STEM, arts, sports, music and other local and global high school competitions.

A full list of the awards can be found on our website *(www.lykfilot.gr).*

Professor's statement about the project: Matzakos Petros: Very well structured program. Really different from what we have done so far. The students liked it.

Betihava Athanasia: Contemporary topics that piqued the students' interest. They worked together perfectly, devoting personal time as well.

Meintanis Eustathios The students had the opportunity to study in depth the logic of scientific debates through representative topics of our times. The participation of the students was definitely impressive.

lykfilot@sch.gr

>>> Logic

The students had the opportunity to study in depth the logic of scientific debates through representative topics of our times.

Ionios School

14 Louki Akrita str., Filothei 15234, Greece

Ionios School is a private school founded in 1908 in Athens by Konstantinos Kavalieratos, a teacher from Kefalonia, as a model "School for young Greeks". In 1961 the School moved to Filothei and in 1981 created a second school unit at Maroussi. It operates without break under the management of the founder's descendants. Today it comprises a Nursery, a Primary School and a Middle School at Maroussi and of a Primary School, a Middle School, a High School and an International Baccalaureate Diploma Program at Filothei.

Professor's statement about the project: Kapriel Atamian: I think that all participants (teachers and students) really enjoyed their participation in this Project. Positive impressions for all of us! The Project must be repeated next year, too.

Manolis Polychronides: The project was innovative, well organized, with excellent material and worthy scientific partners. The students found the topics interesting, current and important and got involved with them with eagerness. We hope this program continues with more schools next year.

www.ionios.gr

>>> Excellent material

The project was innovative, well organized, with excellent material and worthy scientific partners.

Politropi Harmonia Private High School

Socratous 65 str., Dasos Haidariou, Athens, Greece

Polytropi Armonia, our school, was founded in the school year 2005/2006, in Dasos Haidariou (forest of the area Haidari), in Athens. Its distinguishing feature is the passion and drive of both the educators and the pupils for knowledge. The knowledge as power and as a source of moral values. Our pupils have had significant success in various competitions and University entry exams. Our school's motto is a verse written by the poet Odysseas Elytis: *If you don't have one foot away from earth, you will never be able to stand on it.*

>>> Competitivness

We have noticed that the element they most enjoy is the competitive part during which they "cross their swords".

Professor's statement about the project: The children have loved our program as demonstrated by their enthusiasm in our regular after lesson meetings every Thursday. The pupils collaborate, study with interest the relevant material, and do their personal internet research to build their debating and argument strategy. We have noticed that the element they most enjoy is the competitive part during which they "*cross their swords*" and they form evidence-based arguments to convince the judges panel. We have participated in two friendly competitions with other schools, which they really enjoyed. Unfortunately, the current pandemic has shut our doors and although we are keeping in touch online, the enthusiasm has been somewhat lowered. However, when we meet again we will take it exactly from where we left it.

http://politropiarmonia.gr

École Franco-Hellénique du Pirée Saint-Paul Delasalle

Xarilaou Trikoupi 36 str., Pireaus, Attiki, Greece

Our school, which was founded in 1893, operates as a school of Secondary Education. It counts about 420 students and it belongs to the big family of Lasallian Institutes. The founder of the Institute of the Brothers of the Christian Schools,

John Baptist de La Salle, laid the foundations of the educational work that continues to this day, which prioritizes students and multi-level development of their personality. Our school's distinctions and innovative programs are various, both on an intellectual and athletic level. Our love for our students and fellow human beings is the fundamental feature that distinguishes the entire educational community of Lasallian Institutes.

Professor's statement about the project: It is a remarkably interesting program that is related to various and up-to-date issues. Our students showed great enthusiasm and engaged deeply.

www.saintpaul-delasalle.gr

>>> Up-to-date issues

It is a remarkably interesting program that is related to various and up-to-date issues.

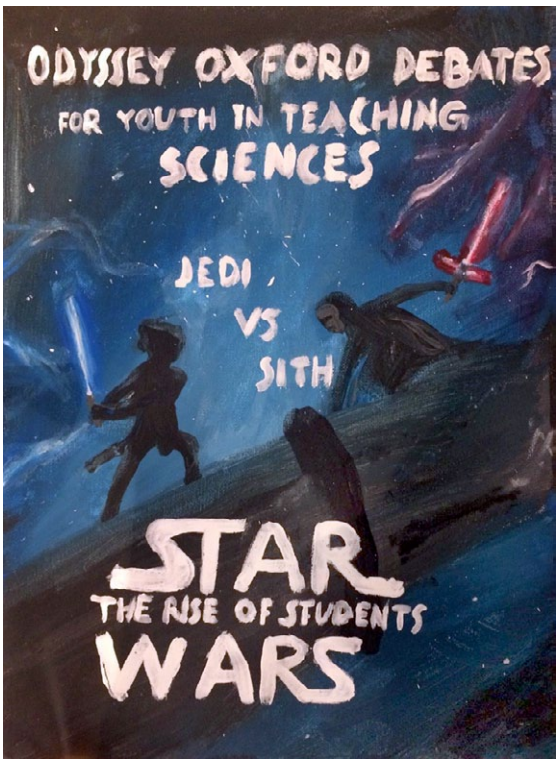
13th Junior High School (Gymnasium) of Athens

Voutsina 10 and Damagitou str., Athens, Greece

Our school was established in 1933 and has about 300 pupils. Although it belongs to the central educational sector of Athens, it is located very close to Ymittos municipality, an area with lots of free spaces. Many educational programs are held in our school in sectors such as science, history and fine arts.

Professor's statement about the project: In the *ODYSSEY* program children partake in modern sectors of science, that are applied in everyday life. Children are introduced to important subjects that preoccupy people locally and globally. We could say that this program adds to the training of responsible citizens.

http://13gym-athin.att.sch.gr/autosch/joomla15/



>>> Applied science

In the *ODYSSEY* program children partake in modern sectors of science, that are applied in everyday life.

53rd General Lyceum (High School) of Athens

Grammou 23 str., 10443, Athens, Greece

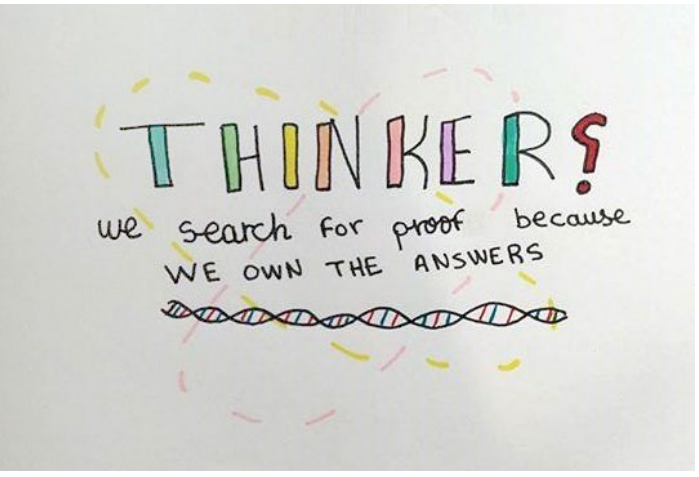
The 53rd Lyceum of Athens has emerged from the school merger of two public general schools (53rd and 54th) which were both founded in the '80s. Nowadays there are approximately 300 students and 30 teachers. During the last years we have developed many extracurricular activities on a national level (i.e. environmental, cultural, health programs) as well on a European level (Erasmus+) providing the opportunity to both students and teachers to enhance their knowledge and skills, creating at the same time a more attractive learning environment.

Professor's statement about the project: The overall impression is positive and the students' involvement is satisfying. The topics are interesting and the change of the topic every month provides the opportunity to more students to enrich their knowledge in accordance with their interests.

http://53lyk-athin.att.sch.gr/

>>> Topics

The topics are interesting and the change of the topic every month provides the opportunity to more students to enrich their knowledge.



7th Junior High School of Ilioupoli

Pousoulidou 18 str., Ilioupoli, Greece

The 7th Junior High School of Ilioupolis is located in the most central part of the city, near Mountain Ymittos. School facilities are modern, with smartboard in the Math classroom, Science laboratory and a large courtyard. The aim of the teaching approach and programs is focused on participation with respect among teachers and students. Giving priority to critical thinking, we cultivate a modern knowledge environment.

Professor's statement about the project: The *ODYSSEY* program is characterized by a modern way of approaching knowledge as well as teaching. It enables the students to engage in scientific mat-

ters that concern society. Public speech, structure of an argument in combination with a scientific approach towards all matters has led both students and teachers to evolve as a whole. Our team managed to overcome any difficulties, concerning the lack of scientific knowledge, while maintaining its enthusiasm.

http://7gym-ilioup.att.sch.gr/

>>> Science engagement

The *ODYSSEY* program enables the students to engage in scientific matters that concern society.

4th General Lyceum (High School) of Lamia

Pardali 4 str., Lamia, Greece

The 4th High School of Lamia is located in a quiet area of the northern part of Lamia. The current building is a modern school complex which includes 18 spacious classrooms, two fully-equipped computer labs, three modern laboratories for Physical Sciences, a library with updated resources, an indoor gym and outdoor sports facilities (football pitch, volleyball and basketball courts, etc.). During the academic year 2019/2020, the number of students who attended was approximately 362 and the number of teachers was 30. All students have high academic goals and work hard to achieve them. The majority of them succeed in entering universities of their preference. Apart from their school performance, many of them have various extra-curricular interests and participate in nationwide competitions (Math, Chemistry, Sports, etc).

Professor's statement about the project: The students understood the basic concepts of the art of speech, they learned persuasion techniques, they felt the power of their speech. Also, they gained more confidence, they learned to work together, to realize the importance of research and information, and to develop abstract and synthetic ability. So, after the involvement of the students in the project, the overall impression of the program was positive and absolutely satisfactory.

www.4lyk-lamias.fth.sch.gr

>>> Persuasion

The students understood the basic concepts of the art of speech, they learned persuasion techniques.

POLAND

Primary School no. 199 in Łódź (Szkoła Podstawowa nr 199)

Elsnera 8 Łódź

>>> Program

A well thought-out program, very well prepared. Teachers' support by lecturers was invaluable.

There are many innovative activities and projects in the school. The school has obtained a number of certificates, e.g. the School of Talent Discoverers, the Innovative School, the School with Class, a school friendly to students with dyslexia, etc.

Professor's statement about the project: The project is very useful for students who are learning the difficult art of argumentation. Learning to speak in the forum was also an important aspect, and some students believed in their own strength. A well thought-out program, very well prepared. Teachers' support by lecturers was invaluable.

http://www.sp199.edu.lodz.pl/

XIV Secondary school named after Nicholas Copernicus in Gdynia (XIV Liceum Ogólnokształcące z oddziałami dwujęzycznymi im Mikołaja Kopernika)

Wejherowska street 55, Gdynia

>>> Self-confidence

The students gained new knowledge, developed freedom of expression and self-confidence.

A school that focuses mainly on learning foreign languages, mathematics and science. Friendly to students with many interests. The motto of the school is the Latin maxim "per aspera ad astra", that is through hardships to the stars.

Professor's statement about the project: The students gained new knowledge, developed freedom of expression and self-confidence. They learned to obtain knowledge from various sources, especially from English-language scientific sources (as it is a bilingual group).

xivlo.pl

Primary School no. 62 named after St. Taczak in Poznań (SP nr 62 im. gen. Stanisława Taczaka)

Druskienicka street 32, 60-476 Poznań

The school is proudly named after General St. Taczak, a chemical engineer, a coal specialist. Following his, talents and skills of students are developed. The staff is experienced, and the students are smart and brave. We take part in many projects, activities and competitions. Thanks to cooperation with the local community, we have obtained funds for workshops and sports facilities through the Poznań Civic Budget.

Professor's statement about the project: The project was perfectly prepared – professional materials, interesting meetings with scientists, interesting webinars. It allows students to develop soft skills. It gives a lot of satisfaction and allows the team and its trainer to develop.

https://www.Facebook.com/SP62Poznan
http://szkolapodstawowa62.pl/

>>> Meetings with scientists

The project was perfectly prepared – professional materials, interesting meetings with scientists, interesting webinars.

IX Secondary School named after K. Hoffmanowa in Warsaw (IX Liceum Ogólnokształcąceim. K. Hoffmanowej)

Hoża 88, Warszawa

A school where everyone can develop their passions (including debates), as well as keep learning surrounded by a fantastic educational atmosphere.

>>> Opportunity

A great opportunity for science debates.

Professor's statement about the project: A great opportunity for science debates. Developing materials. A very valuable project.

www.hoffmanowa.pl

XIX Secondary School named after Warsaw insurgents in Warsaw (XIX LO im. Powstańców Warszawy)

Zbaraska street 1, 04-014 Warszawa

The school was established in November 1944 by its Patrons, Warsaw Uprising insurgents. We try to cultivate the tradition by bringing the history of the insurgents closer to the next years by organizing meetings with our graduates, competitions and field games. We try to be interdisciplinary and modern in the teaching process. The students take part in museum lessons, theater performances, cinema screenings and educational tours. Since 2005, we have been participating in the GLOBE Program by conducting hydrological and atmospheric research. We want the students of science classes to acquire, apart from theoretical knowledge, practical skills during field research. We cooperate with universities and schools from Germany. Volunteering has been operating in the school for many years, initiating many charity actions.

Professor's statement about the project: The *ODYSSEY* project greatly develops many students' skills, both substantive and rhetorical. It contributes to the increase of interest in natural science subjects and teaches responsibility and cooperation in a group. The substantive support of the project (packages for students and teachers, webinars) constitute an invaluable didactic support that fits very well with the content of the geography core curriculum. *ODYSSEY* teaching materials are used in our school in work with students as part of the implementation of science subjects, as well as during educational hours.

https://lo19.pl

>>> Cooperation

The ODYSSEY project contributes to the increase of interest in natural science subjects and teaches responsibility and cooperation in a group.

1st Secondary School in Ełk (I Liceum Ogólnokształcące w Zespole Szkół nr 2 w Ełku)

Sikorskiego 7, 19-300 Ełk

The school has about 700 students and 25 departments, and its patron is Krzysztof Kamil Baczyński. We belong to the UNICEF School Club.

Professor's statement about the project: Interesting project, very well prepared. Interesting lectures.

https://www.zs2.elk.pl/

1st Secondary School named after Bolesław Chrobry in Gniezno (I LO im Bolesława Chrobrego w Gnieźnie)

Kostrzewskiego 3, Gniezno

1st Secondary School in Gniezno is the oldest secondary school in Gniezno with a long and noble history. The history of the school dates back to 1863, when the Prussian authorities agreed to create the so-called Higher City School for Boys with German as the language of instruction, and three years later the school was nationalized. From then on it was called the Royal Gniezno Junior High School.

Prussian authorities wanted to create a strong center of German language from the school. Polish youth, expressing their opposition to the Germanization policy, in 1894 founded an underground patriotic organization. The aftermath of its activities was the participation of school students in the Greater Poland Uprising. The high level of education in the Gniezno junior high school is evidenced by the careers achieved by many alumni, many of whom became scientists, athletes, independence activists etc. Currently, school offers science, humanities and mathematics profiles. Students of Secondary School No. 1 in Gniezno have the opportunity to learn foreign languages such as: English, German, French, Rus-

>>> Idea

A very interesting idea regarding the analysis of problems in the world around us.

sian and Spanish, as well as Italian and Latin as part of extracurricular activities.

Professor's statement about the project: A very interesting idea regarding the analysis of problems in the world around us. Rich resources that guide the team leader in the correct course of the analysis process.

www.1lo.gniezno.pl

XIV Secondary school named after S. Staszic in Warsaw (XIV LO im. S. Staszica w Warszawie)

Nowowiejska 37a, 02-010 Warszawa

About the school: Secondary School No. 14 continues the glorious tradition of the School with great success and remains at the forefront of Warsaw schools. The school is also an organizer of Warsaw Debate League.

Professor's statement about the project: Participation in the project allowed students to broaden their knowledge in an attractive way. All the materials provided were very well prepared and made it easier for the students to prepare for the debate tournament. The tournament itself was a unique experience for students, as the previous tournaments in which they participated did not relate to natural sciences.

www.staszic.waw.pl

>>> Tournament

The tournament itself was a unique experience for students, as the previous tournaments in which they participated did not relate to natural sciences.

School Complex no. 1 in Tychy (Zespół Szkół nr 1 im. Gustawa Morcinka w Tychach)

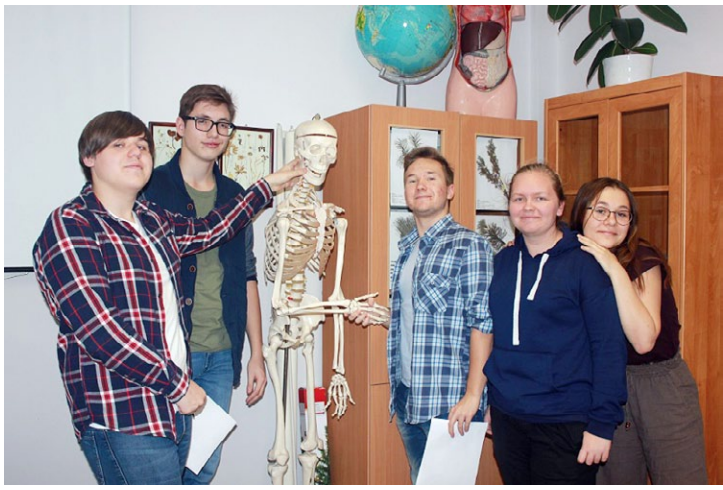
Wejchertów 20, Tychy

The School Complex No. 1 in Tychy (MORCINEK) is a school that is proud of its long-standing tradition; in this facility students' curiosity and teachers' experience meet. It enables education in

general secondary school classes, including sports championship and technical secondary school. Since 2015, the school has belonged to the honorable group of UNESCO Associated Schools. The school's motto is: "No matter who you are, you will discover yourself with us."

Professor's statement about the project: *ODYSSEY* debates in which we participated are an attractive form of presenting content in the field of natural sciences. They enabled the development of students' (and teachers') skills. The materials prepared by the organizers were distinguished by exceptional transparency and usefulness. They will certainly serve many times during geographic education in our school.

https://zs1tychy.weebly.com
https://www.Facebook.com/Zespół-Szkół-nr-1-w-Tychach-262006320517261/



Private Language Secondary School in Legionowo, Academy of the Future

Parkowa 27b, Legionowo

The school offers multidimensional education and comprehensive preparation to apply for admission to prestigious Polish and foreign universities in groups with the following profiles: language-medical, language-economic, language-legal, language-science, language-sports. The school provides education based on tutoring in classes of up to 18 students. It provides classes with academic tutors, meetings with outstanding personalities from the world of science, art and culture, integration and project trips.

Professor's statement about the project: A very nice program that trains the ability to discuss, acquire knowledge, and inter-school contacts.

http://www.academyofthefuture.pl/

>>> The ability to discuss

A very nice program that trains the ability to discuss, acquire knowledge, and inter-school contact.

Primary School no. 7 named after Erasmus of Rotterdam in Poznań

Galileusza 14, Poznań

Primary School No. 7 in Poznań is a good school in a housing estate, open to the needs of the environment. The school takes care of every child, taking into account their needs, abilities, family and social situation. The school conducts multi-stage changes in the direction of development, undertakes innovative activities and introduces innovative teaching and upbringing methods.

Professor's statement about the project: The project enabled the development of key competences among students, especially communication in the mother tongue. The received training materials were of a high standard and allowed to expand my own knowledge of contemporary geographic problems.

https://sp7poz.nazwa.pl/nowa/

>>> Key competences

The project enabled the development of key competences among students, especially communication in the mother tongue.

SERBIA

VI Belgrade Grammar School (Šesta beogradska gimnazija)

Milana Rakića 33, Belgrade

The school offers a large number of extracurricular activities and clubs for students, which, along with the broad education provided, lays a good foundation for further education. Students of the VI Belgrade Grammar School are regularly among the top ones ranked for enrollment in universities, and many of them have achieved significant results in their profession. The school supports free thinking, and works in accordance with the latest teaching and pedagogical methods.

Professor's statement about the project: This project is the best thing we've had in the past several years. We had an opportunity to implement exactly the things missing in our teaching practice – public speech, confronting different viewpoints, argumentation. I wish this would have wider application.

http://vigimnazija.edu.rs/

>>> Missing things

We had an opportunity to implement exactly the things missing in our teaching practice.

VII Belgrade Grammar School (Sedma beogradska gimnazija)

Šejkina 21a, Belgrade

The school is known for taking an active part in the life of the local community, and the numer-

ous projects organized by the republic and local authorities and non-governmental organizations. Excellent arts clubs, such as creative writing, help students of this school attain excellent results in national competitions.

Professor's statement about the project: We expected this to be just another teacher training which wouldn't contribute to our work much, but we were surprised when it turned out that it was more than a training. The training was very useful, as well as the guidelines, and project cooperation as a whole. I think we've learned a lot, both us and the students.

www.sedmagimnazija.com

1st Kragujevac Grammar School (Prva kragujevačka gimnazija)

Daničićeva 1, Kragujevac

One of the oldest high schools in Serbia, it was founded in the heat of the fight for national identity and independence of Serbian educational institutions. This is why it was awarded the status of special national significance in 2008. With numerous extracurricular activities and clubs, this school has three specialized programs for talented students in Mathematics, IT and Computer Science, and Biology and Chemistry. The school's yard hosts a Science Park with interactive objects enabling all interested students to improve existing and gain new knowledge in natural and social sciences.

Professor's statement about the project: This was a very significant project and we really enjoyed it. Although the educational system doesn't leave much room for this type of activity, which makes it difficult to incorporate it in the curriculum, we managed to make everything happen in the end. And we got far more than we invested. Now we have teaching materials at our disposal which we can use in the years to come.

https://www.prvagimnazija.edu.rs/

>>> Enjoy

We got far more than we invested.

School of Electrical Engineering Nikola Tesla (Elektrotehnička škola „Nikola Tesla“) Belgrade

Kraljice Natalije 31, Belgrade

The school offers students excellent education in electrical engineering and informatics. It is named after the great Serbian inventor and physicist Nikola Tesla who, according to his contemporaries, was ahead of his time a whole century with his work. Persistent and dedicated work, and significant results in numerous competitions by students of “Nikola Tesla” try to duly represent the school and its name. The school has a large number of laboratories and workshops for practical teaching, which makes it the best electrical engineering school Serbia. The building that houses “Nikola Tesla” was declared a cultural monument in 1964 and is protected by law due to its age and magnificence.

Professor’s statement about the project: The Project was very useful for both us and the students. I think it helped us get to know our students in a different way, in a different light. Although they were hesitant and insecure about debate, since they weren’t used to such forms of teaching, its competitive side motivated them to find the best arguments so they would beat the opposing team. This way, they’ve improved their presentation skills and argumentation.

http://www.teslabg.edu.rs/

>>> Different way

I think the project helped us get to know our students in a different way, in a different light.

Grammar School “Svetozar Markovic” (Gimnazija „Svetozar Marković“)

Branka Radičevića 2, Niš

The high school was named after a Serbian literary critic, philosopher and political activist of the second half of the 20th century, Svetozar Markovic. The school’s mission rests on dedication to growth and education of students ready to think without prejudice, to understand others and contribute to the society they live in to create a

better world. The school complex has a unique botanical garden, invaluable as an "outdoor classroom", and it is one of the favorite spots for both students and teachers of this school.

Professor's statement about the project: The project was prepared and executed brilliantly, from the training to the competition and the final conference. As for its implementation in teaching, the debate has really managed to "shake" my students and involve them in teaching. I was surprised to see even students of social sciences, who are traditionally not too keen on physics, very motivated to debate on physics-related topics.

https://gsm-nis.edu.rs/

>>> Organization

The project was prepared and executed brilliantly, from the training to the competition and the final conference.

Primary and secondary school "Petro Kuzmjak" Ruski Krstur (Osnovna i srednja škola sa domom učenika „Petro Kuzmjak" Ruski Krstur)

Rusinska 63, Ruski Krstur

The school was named after Petar Kuzmjak, the first educated Rusyn teacher in the area. Since the school is in a municipality with mostly Rusyn population, the teaching in both primary and secondary school is in the Rusyn language. The school also has a well-equipped student dorm with a modern kitchen, a PE hall and outdoor sports grounds. In addition to education, the school plays an important role in preserving the Rusyn language and culture, so it is of great significance for this ethnic community in Serbia.

Professor's statement about the project: My strongest impression was how much debate helped students develop a deeper interest in the course content and approach it more thoroughly. Debate helped them understand how and where mathematics could be applied, since they debated everyday topics related to mathematics and other sciences. I'm going to try and use this teaching approach in the following years.

https://petrokuzmjak.com/sr/

>>> Deeper interest

My strongest impression was how much debate helped students develop a deeper interest in the course content.

School of Economics and Trade "Paja Marganovic" (Ekonomsko-trgovinska škola „Paja Marganović")

Oslobođenja 25, Pančevo

The school specializes in teaching subjects related to economics and trade, as well as services. The school has a number of specialized classrooms for hands-on teaching, and offers extracurricular activities and clubs in natural and social sciences. This way, the school's teachers try to develop creative abilities, critical thinking and general knowledge of their students, along with professional knowledge and skills.

Professor's statement about the project: This type of "mental and verbal gymnastics" has shaken up the students quite a bit. Us teachers too. My students are used to having "digested" lessons they then learn by heart, so at first it wasn't easy for them to get to grips with research, building argumentation and public speech. But, over time they managed to develop the necessary skills and, most importantly, I think they've improved their abilities significantly. I would like to have more opportunity in the future to "play" with my students in such an interesting and useful way.

https://www.ekosko.edu.rs/

>>> Mental gymnastics

This type of "mental and verbal gymnastics" has shaken up the students quite a bit.

XIV Belgrade Grammar School (Četrnaesta beogradska gimnazija)

Hadži-Prodanova 5, Belgrade

This school is one of the best grammar schools in Serbia. Some of the best Serbian performing artists, media personalities and scientists attended this school. They owe their success at least in part to the excellent clubs and extracurricular activities offered in the school. The students of the XIV Belgrade Grammar School sing in a choir, participate in plays and recitals, study linguistics and catechesis, debate, take part in the United Nations club, organize art exhibitions and charities, make soap, attend culture events and institu-

tions. This school has a long-standing tradition of organizing and participating in debate competitions.

Professor's statement about the project: Although our school has a debate club, we haven't had the opportunity to debate on science topics nor to use debate as a form of teaching. It turned out the results of the project implementation were quite impressive. We managed to activate a large number of students, to spark their interest in research on topics they wouldn't normally find so appealing, to teach them to thoroughly research the problem at hand and to point out to them that each claim they make needs to be supported by arguments or evidence.

http://www.cetrnaestgim.edu.rs/

>>> Opportunity

Although our school has a debate club, we haven't had the opportunity to debate on science topics nor to use debate as a form of teaching.

USEFUL LINKS

ODYSSEY: Educational toolkits

Educational toolkits (English)
https://odyssey.igf.edu.pl/?page_id=345

Educational toolkits (Polish)
https://odyssey.igf.edu.pl/?page_id=348

Educational toolkits (Greek)
https://odyssey.igf.edu.pl/?page_id=357

Educational toolkits (Estonian)
https://odyssey.igf.edu.pl/?page_id=351

Educational toolkits (Serbian)
https://odyssey.igf.edu.pl/?page_id=354

ODYSSEY: Methodological Guide for Teachers

(English, Polish, Greek, Serbian, Estonian)
https://odyssey.igf.edu.pl/?page_id=210

ODYSSEY: National frameworks for implementation of Oxford debates in STEM in school practice

(English, Polish, Greek, Serbian, Estonian)
https://odyssey.igf.edu.pl/?page_id=210