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

Project Acronym: ODYSSEY

Project Title:

Oxford Debates for Youths in Science Education

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1. Introduction

1.1. Information about ODYSSEY project (goals, background, phases, tools)

Education systems in most European countries face the same challenge: to raise the level of achievements in the field of basic skills, including reasoning in STEM. In addition, students' rhetoric skills – argumentation, oral presentation – are insufficient, which leads to inaccurate use of language and susceptibility to 'fake news'. Rhetoric education supports critical thinking and the ability to use various sources of knowledge, with an emphasis on verifying their credibility, civic education and contributes to creating the ambiance of tolerance and democratic values.

The main goal of the ODYSSEY project is to increase the reasoning skills in STEM by participating in Oxford debates among 40% of students (13-19 years) taking part in the project from at least 32 schools: in Poland, Estonia, Serbia and Greece, during the project duration.

The goals of ODYSSEY project are:

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

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

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

In addition, the project will contribute to development of 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 following skills: public presentation and presentation of texts, discussions and negotiations, and participation in debates.

Project target groups:

- within the testing phase: students (13-19 years old) and STEM teachers from at least 32 schools, at least 8 from each of partner countries: Poland, Estonia, Serbia, and Greece, including at least 320 students and 32 teachers

- at the dissemination stage: around 300 STEM educators and teachers and their students (about 7,500 people) aged 13-19, from at least 4 countries of Poland, Estonia, Serbia, and Greece.

The project will be divided into 5 phases:

1) **Preparatory phase** - development of a project implementation methodology for institutions and scientists, national project implementation framework, guide on the rules of Oxford debates, educational packages for use in STEM school practice (5 packages in Polish, Estonian, Serbian and Greek, ultimately, after testing: 19 packages in English), elaboration of competition regulations for school debates;
2) **Recruitment** of at least 32 schools from 4 countries; 8-16 schools per country;
3) **Testing phase** will begin with a workshop for teachers, during which the rules for conducting the debates will be presented and the proposed topics will be discussed. Next, the teachers will prepare their students for the competition using the prepared materials for the debates. Each school will use "expert mentoring" - meetings with scientists. At the end of the test phase, in each partner country, there will be a competition in which two winning teams will be selected.
4) **Dissemination phase**, during which national conferences and workshops for teachers in partner countries are planned. The conferences will allow to present the experiences gathered by schools, present materials, discuss the role of the debate in STEM education. During the conference, the final debate of the winners will take place. During the workshops, the teachers will play "mini-debates" and get acquainted with the materials prepared within the project.
5) **Wrap-up phase** including the preparation of reports on the implemented activities, as well as practical possibilities of using the materials and the proposed method in school practice, including countries other than those of consortium (Poland, Estonia, Greece, Serbia), as a mean to provide project replication and sustainability.

The project is supervised and supported by scientists from various STEM domains and debate/rhetoric training experts.

1.2 Purpose of this document

This material is meant as a basic guideline for teachers participating in the project, mainly those involved in the testing phase (including competition), but also interested in benefitting from mentoring suport, as well as educational materials during the project and after its completion. It contains tips on involving students in the project, forming a school project team, working with educational packages on specific subjects. It aknowledges users with mentoring rules, facilitates debating training, and preparing for the competition.

1.3 What is debating?

A debate is a structured contest over an issue or policy. There are two sides - one supporting, one opposing.

Odyssey-Scientific Debate, proposed within the project, is a competitive debate format featuring a sharply framed motion (topic) that is proposed by one side (proposition) and opposed by another (opposition). Odyssey-Scientific Debate follows a formal structure which begins with audience members casting a pre-debate vote on the motion that is either for, against or undecided. In ODYSSEY project, a modified version of well-recognised formats of Oxford debate and public forum debate has been prepared, taking into account limitations set by school hours, and maximising students' engagement. Debates' rules are described in detail in separate manual: **Methodical guide for teachers about Odyssey Scientific Debates.**

1.4. Why is debating a good method for STEM classes?

Despite the greater job prospects, the number of students choosing science subjects is not increasing at the European level. At the same time, large numbers of people in these fields are coming up for retirement, with around 7 million job openings forecast until 2025.

Would a more creative approach to teaching convince students that STEM subjects can be engaging, interesting, and accessible for non-geniuses? STEM subjects sometimes require going in from a different angle – like debating.

In recent years, the teaching and learning argumentation (i.e. the coordination of evidence and theory to support or refute an explanatory conclusion, model or prediction) has emerged as a significant educational goal. Argumentation is a critically important discourse process in science and it should be taught and learned in the science classroom as part of scientific inquiry and literacy. Argumentation stresses the evidence-based justification of knowledge claims, and it underpins reasoning across STEM domains. In many ways, speech and debate serve as laboratories for the study of small groups. It provides plenty of opportunities for exploration, related to such key group concepts as integration, group identity, team culture, conflict management, leadership, administration, and competition. The competitive nature of debates plays a vital role in shaping the activity, and contributes to a unique opportunity for the study of groups.

Getting students to think critically about the impact of technology and then articulate this requires that they plunge elbow-deep into the topic. Debating makes children reason, critically assess and then communicate effectively. They may be our future scientists, doctors, programmers, or policy makers. Getting them to ask, and answer, hard questions about how we should deal with emerging technologies inspires them to think about real world application and think about their future. Debating is also a practical training for future STEM-career paths. In fact, the scientists devote a lot of time to assess, critique and defend the evidence to convince others in favor of their argument.

The essence of scientific argumentation is to make a claim, refine and then support it on the basis of **scientific evidence – which requires thorough knowledge of the subject, based on reliable sources.**

Jonassen and Kim (2010) explained the process of involving students in argumentation. It requires the provision of suitable and stimulating learning environment such as problem-based or project-based learning environment.

Secondly, the students should be provided with clear **set of instructions** and information about the structure/components of argumentation.

Thirdly, the students should be encouraged to **think and ask questions**. Usually, controversial questions help more in setting the ground for discussion and cross-questions. This sets the pace for collaborative argument that encourages dialogic interaction and collaborative reasoning. Such kind of interaction make the students support their views through valid evidences and challenging opposite views with countering ideas.

Engaging students in constructing arguments has assumed a greater significance in both science and humanities subjects (*Lu & Zhang, 2013*). One of the most cited benefit is the improvement in conceptual understanding of the content discussed through argumentation method (*Newton, Driver, & Osborne, 1999; Venvill & Dawson, 2010; Zohar & Nemet, 2002; Duschl & Osborne, 2002; Driver, Newton, & Osborne, 2000*). This result is concluded by assuming that **the degree of understanding influences the quality and complexity of an argument** (*Venville & Dawson, 2012*). The increased level of understanding results in more justifications to support an argument (*Sadler, 2004*). In fact, it might be more appropriate to conclude that improvement in argumentation skills and improvement in the degree of understanding occur simultaneously as prior knowledge helps in constructing arguments and the use of argumentation further improves the level of understanding (*Rudsberg, Öhman, & Östman, 2013*).

Psychologists view that argumentation involves high order thinking skills (*Nussbaum & Sinatra, 2003*) resulting in superior quality answers by incorporating valid justifications and refuting alternatives (*Iordanou, 2013*). Simply put, when you have to argue against your personal view you realise that there are two sides to the argument.

To sum up, the benefits of debating include:

- **Allowing to think about aspects and perspectives you may not have considered.**
- **Encouragement to speak strategically.**
- **Improving public speaking skills.**
- **Learning how to form a persuasive argument.**

It is assumed that participation in the project will positively affect both students and teachers, as well as institutions participating. An increase in interest in natural sciences and of reasoning in STEM among pupils is expected. Students may be more eager to look for information about

natural phenomena. The increase of rhetoric skills will be extremely important - the freedom of oral expression, selection of arguments, principles of debate, discussion culture.

STEM teachers, thanks to ready-made tools to work with students, will be encouraged to begin to use the Odyssey-Scientific Debate in school practice, also within science clubs, extra-curriculum activities etc.

Scientific institutions may become more open to presenting the results of their research to a wider audience, including recipients who do not yet use professional scientific vocabulary. Representatives of the institutions involved in the implementation of the project will enrich their tools base and develop skills in using modern information technologies in scientific and didactic work.

1.5. Expected results – impact on students/school practice

The project aims to:

- increase reasoning skills in STEM,
- increase interest in STEM,
- improved communication skills in mother tongue, argumentation and public appearances primarily among students engaged in testing phase,
- introduce the use the Odyssey-Scientific Debate in the school practice, STEM subjects in particular.

The degree to which the goals will be achieved will be measured by providing feedback from teachers in various project phases - see *Evaluation* section.

2. Competition for schools

A selected group of students, who form the competition team, during the school year will take part in the training to prepare to debates. Students will get to know debate principles, practice different roles in the debate and explore further topics based on prepared packages and through regular mentoring. The crowning event will be the ODYSSEY-SCIENTIFIC DEBATE COMPETITION (on national level, in each partner country).

Teams will randomly draw topics and then roles (side defending thesis/opponents of the thesis). Debates will be judged by the Judging Scientific Committee (representatives of the partner, experts, teachers unrelated to the rival team, etc.).

The two winning teams will take part in the final debate, which will be organised during the Final National Conference. The prize for the winners of the final debate will be announced by the local organisers.

The rules of the competitions will be elaborated in national versions by partners responsible for organisation of competitions.

Application and selection process

The application processes are organised individually by partners.

In Poland the application process has two stages. At the first stage schools send information of their interest in participation in the competition by filling in the online form. Selected schools get information on approval and then are requested to send the scans of declarations signed by director / legal representative of school. Example of the declaration used in Poland is presented in the Appendix no. 1.

In Poland, first 8 schools will be accepted in order of application submission. National organiser may decide to engage more schools in the competition (up to 16 in total), based on efficiency of project activities (e.g. location of school).

This limit is valid only for schools participating in the competition. Other interested schools may apply as well: all the schools will obtain educational materials; schools' representatives may be invited to preliminary workshop for teachers and will benefit from mentoring services.

Participation requirements

Schools participating in the competition should appoint 2 teachers leading the team of at least 10 students between **13 and 19 years old.** The schools will participate in the project in the school year 2019/2020. The two winning teams will additionally take part in the Final Debate, which will be organised by the end of 2020.

The tasks of the schools are:

1. Indication of two teachers from school, who will lead the ODYSSEY activities.

2. Indication of a team of 10 students (project team), who will take part in preparations to the contest and choosing a team of at least 5 students, who will attend the debate contest.
3. Participation of one or two teachers in the one-day workshop.
4. Organizing and supporting the school team participating in the ODYSSEY debate contest till the end of their participation in ODYSSEY activities.
5. Participation of the group of students in the debate contest (at least 5 students – members of project team should attend each round) in locations indicated by organisers on own expense.
6. Participation of at least one teacher, trained to be a judge at the debate contest, in the Scientific Judging Committee in contest's rounds in which other schools are participating.
7. Participation of two teachers in online mentoring and Facebook-based bulletin board.
8. Conducting full training of debating skills and STEM topics with the project team, based on 5 packages of educational materials.
9. Participation of one or two teachers in ex-ante, ex-post evaluation surveys (online) and a Focus Group Interview (face-to-face or online), after implementation of the ODYSSEY activities.
10. Reviewing and providing feedback on project materials.
11. In case of getting to the final contest's round, conducting training on STEM topics with the project team, based on 5 packages of educational materials in English, taking part in the final event – Conference with model debate, on organiser's expenses, provided that all the financial documents confirming travel/accommodation expenses for reimbursement are delivered to the organiser in indicated time.
12. Supporting the dissemination of the Odyssey project activities and results.

Organisation of the competition

The organisation of the competition will take form of a **two-step process**.

1) **First step:** Debates Festival at the end of school year 2019-2020.

The Scientific Judging Committee will consist of representatives of the ODYSSEY Consortium and teachers from schools other than schools competing in a particular debate. It is possible

to invite professional debate judges from national debate associations to be a part of the Committee. Participating teams will gather together and conduct debates.

The debating teams will draw a topic and will have 15 minutes for preparations. In the preparation time, team members are not allowed to consult other persons outside team (teachers etc.). They may use printed materials brought with them and take notes. During the debate searching for information on the internet or using any electronic devices, including recording devices are not allowed. Team members are allowed to make and share written notes during the contest debate.

Contest may be based on CUP-SYSTEM, but national organisers may decide on other systems depending on the number of recruited schools. The information on the system will be provided in national rules of competitions.

At first stage, partners are drawn. Teams draw a topic of the debate, one of topics from educational materials. In Poland, each team can decide to reject a drawn topic once during the whole competition. In the cup-system, if 8 schools are recruited, 6 debates are conducted. Losing team is eliminated. In case of more recruited schools, number of debates and their organization will be adjusted accordingly.

2) **Second step:** 2 best teams chosen during first step will perform a model debate during final conference of the project (Autumn 2020). In case the national organisers decide to divide the competition into age categories, 2 best groups per catgory will be invited to the final conference.

At this step, teams will debate on topics provided by partners from other countries. 5 educational packages dedicated to topics other than topics prepared at the first stage will be made available to both teams by the end of September. The final debate will be conducted in national language, but materials will be in English.

Assessment criteria

Winning team will be chosen based on Judging Scientifc Committee's assessment. The Judging Scientifc Committee consists of at least 3 trained judges. The participating teams will be assessed by the Scientific Judging Committee according to the following principles:

I. Argumentation skills:
   a. Quality of Arguments
   b. Rebuttal Arguments and Refutation
II. Quality of Scientific Evidence
III. Debating Skills: Methodology
IV. Communication skills
V. Lingiustic skills: Use of Language / Structure of speech
VI. Teamwork
VII. Dialogic/Critical skills
   a. Quality of questions posed
   b. Quality of answers

For more details on the assessment criteria, please, check the Output O4. Guidelines for teachers on debates.
The decision of the Judging Scientific Committee is final.

The audience also chooses its preferred team.
The teams and speakers will be assessed by audience of the debate according to the following principles:

AUDIENCE	
Content/Matter	What the debaters say, their arguments and evidence, the relevance of their arguments
Style/Manner	How the debaters speak, including the language and tone used
Strategy/Method	The structure of the speech, the clarity and responding to other's arguments.

Prizes
Prizes in the debate contest will be proposed by national organisers.

In Poland two winning teams of Debate Festival will participate in the final conference, travel costs and accommodation costs will be covered/reimbursed for students and teachers.

One winning team, chosen during final conference, will be awarded with the main prize. In each country local organiser will specify the prize, e.g. in Poland the winning team will be invited for a scientific trip to Geophysical Observatories owned by the Institute of Geophysics PAS (travel costs and accommodation costs will be covered).

National organiseres may decide to award also best speaker from each debate. The best speaker may be chosen by Scientific Judging Committee or by the audience (as per decision of the national organiser).

3. Mentoring and communications

Mentoring services for teachers and schools will be based on 2 components:

- Mentoring related to methodology of debates
- Mentoring related to STEM topics and debate resolutions

In both cases, there will be online duties using the WEBEX CISCO type tool on particular thematic issues and the methodology and organization of debates (at least once a month, at least one hour of availability).

Teachers can also contact national organizing instituion via e mail. Results of mentoring will be used for FAQs and published on project website.

Mentoring involves also an innovative tool – **BULLETIN BOARD** – a convenient space for teachers participating in testing phase and scientists – experts on scientific topics for debates. It will be organized as an online group (e.g. closed Facebook group), aimed at sharing ideas, difficulties, challenges, experiences and solutions. Mentoring may also take a form of direct broadcast of testing debates with online participation of scientists. Detailed schedule on national levels will be settled during first workshop for teachers and can be modified according to changing needs of schools.

4. Practical issues – project implementation

Below you will find usefull information on practical implementation of the project in school.

Schools taking part in the competition should appoint groups of ten students, who will take part in the full training. In each debate only three speakers will participate actively, however all teams must be able to provide substitute representation, who should be ready to take over at short notice, for example if a team member is sick. Therefore, all 10 members should be involved in the research, preparation and practice sessions before the debate. Moreoevr, it is possible to indicate various speakers representing the team in various rounds of the competition.

It is necessary for participants to develop both a pro and con case, persuasively supported by evidence and reasoning. As most forms of debate are relatively short, participants usually center their cases on a few quality arguments. Each team, however, should research several arguments on both sides of the issue, so it can adapt its case to the opposing team's claims as necessary. Having arguments in direct contradiction with each other will enhance clash in rebuttals and prove to be a great learning experience. Organization of speeches through effective communication and clear outlines is important so any audience or judge, as well as the opposing team can follow each of the arguments and the supporting evidence. Effective persuasion requires credible, unbiased, quality supporting evidence, which may include a mix of facts, statistics, expert quotations, studies, polls; but it may also be real-life examples, anecdotes, analogies, and personal experience.

Mind them that they should not overwhelm their case with evidence; rather, they should select the best evidence to represent their claims.

Before the recruitment, students should be aware of the commitment (whole-school year full training participation in debates outside school, public presentations, additional, outside-curricula educational materials). Also, they should be fully informed of rules and benefits, and the support they will be provided with.

In order to introduce debate to maximum number of students and encourage them to become part of the team, it is recommended to organize some preliminary activities. Observing students during these activities is considered helpful as preparation for roles assignment; it allows to identify strengths, preferences and room for improvement.

In the **Appendix 2.** you will find areas to exercise and examples of simple „warm-up" exercises, which do not require familiarizing with Odyssey-Scientific Debates rules or STEM topics proposed for debates.

Moreover, in **Appendix 3**. we present 7 lesson plans, which will help your students to develop skills required for successful debating, such as communication, argumentation, searching for evidence, linguistic skills, as well as knowledge about debating rules, rebuttals, refutations and fallacies.

HOT TIPS FOR DEBATERS:

Remember that the first impression is the most important.

Avoid expressing extreme statements.

Try to use humor.

Learn to predict the opponent's arguments.

Work on the right diction and voice modulation.

Introduce intentional pauses in your speeches.

Try to give the impression of being free and confident.

Make sure to leave a good lasting impression at the end of the debate.

5. How to use ODYSSEY educational materials

5.1 ODYSSEY materials

Educational materials prepared in the framework of the ODYSSEY project include:

- **Methodological Guide for Teachers**

The Methodological Guide describes in detail the scheme of the modified Odyssey-Scientific Debate, format, structural parts, the couse of the debate, the debater's toolkit (principles, debater's coderoles), as well as a set of necessary information and tips that will facilitate both preparation of speech as well as conducting the debate and preparation for the role of the jury. The guide presents rules of debates and its structure in two formats: Classroom format and Contest Format.

- **5 educational packages in Polish**
- **5 educational packages in Greek**
- **5 educational packages in Estonian**
- **5 educational packages in Serbian**
- **At later stage (dissemination phase): 19 educational packages in English.**

Each educational package will contain:

- Presentation in Microsoft Powerpoint
- Webinar recording based on the abovementioned presentation (1-20 minutes) provided by an expert
- Material for teachers and students – a lesson scenario with questions, info-cards, story-cards, question-cards
- Worksheet for students allowing to prepare arguments and rebuttals.
- Each material is balanced, i.e. it provides information for both proposition and opposition.
- Moreover, links to additional recommended resources are provided

INFO CARDS contain definitions, facts, references to research results.

STORY CARDS contain case studies, fun facts.

QUESTION CARDS contain questions that help to form PRO or CON arguments.

Cards are in the appendix in a print-ready format to be handed out to students, mixed, drawn from etc.

In order to use the materials fully, we encourage you to conduct the training in two steps:

1) Familiarize students with debate rules and format and practice with them skills necessary for effective debating.

For this purpose we prepared some short exercises (see Appendix 2) and a series of 7 lesson plans (see Appendix 3), which will help your students to develop skills required for successful debating, such as communication, argumentation, searching for evidence, linguistic skills, as well as knowledge about debating rules, rebuttals, refutations and fallacies.

If you cooperate within the project with another teacher, whose subject is not STEM-related (eg. National language), this part could be conducted during other than STEM classes (e.g. during general educative hours).

2) Work with students on STEM topics proposed within the project.

We suggest that for each topic you should dedicate at least 3 school hours:

a) **General introduction to the topic** – during this lesson you may use the Power Point presentation with explanations of important terms, definitions, introduction to the problem. You may broadcast the video recorded by an expert. You may also conduct some tasks proposed in the package, which will help your students better understand the topic. The main body of material is comprehensive material interlaced with questions, tasks, activities aimed at activating students. At this stage you are not discussing the resolution yet, but familiarizing students with the topic in general.
b) **Preparation for the debate** – during this lesson students will develop argumentation for or against the resolution. You may use the INFO and STORY cards as evidence information and the QUESTION cards will help your stuents to construct arguments, anticipate arguments of the opposite team and construct rebuttals and refutations. For the Classroom format debate, it may be usefull to divide students into PRO and CON teams, as you have limited time for constructing arguments. However, for the Contest debate all team members should practice both sides of debate – PRO and CON, as they do not know in advance, which team they will form during the competition.
c) **Debate** – during this lesson you conduct the debate. For details regarding organisation of the debate and its timeline, please see O4: Guidelines for teachers on debating. The

timeline of the Classroom format debate is foreseen for 45 minutes. However, you should also dedicate some time for **providing feedback**. It may take place just after the debate or during the next lesson with the group. During summarizing you should mention all fallacies. It is also crucial that you correct all statements wich were not true – otherwise, students may treat them as facts. We suggest also that the audience should evaluate the speakers, as this is a very good exercise for active listening and critical thinking. You will find a template for audience evaluations in packages.

Implementation of proposed materials and activities will contribute directly to the development of 4 of the 8 key skills defined in the framework of the European Reference Framework: **communication in the mother tongue, communication in a foreign language (packages available in English), learning skills, social and civic skills.**

5.2 Presentation of topics

Below you will find short descriptions of all proposed topics. In national versions of the guidelines, teachers will get detailed information on topics and their relation to national curriculum, as well as suggestion on what subject and on which level material could be used during regular classes.

Packages offered in Polish (and later on in English):

Topic: Flood protection in mountain catchments
Resolution: In mountainous catchments, hydrotechnical solutions are more efficient for flood protection than nature-based solutions
Description
Students will consider the advantages and disadvantages of managing the catchment of mountain rivers with natural-based methods and hydrotechnical solutions, such as building a large retention reservoir. The materials focus on possible environmental consequences, in context of flood risk.
Proposed school subjects

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GEOGRAPHY
Suggested age of students
13-19 (for 13-15 it requires more thorough focus on introducing background)

Topic: Anthropogenic seismicity
Resolution: Locating a new important infrastructure and human habitat should not be allowed in the area of anthropogenic seismic hazard
Description
Students will consider whether places threatened by anthropogenic hazards should be excluded from any human activity and infrastructure development, or maybe investors should be obliged to use shock-proof structures. The impact of mining on the natural environment is also explained. This topic tackles issue of conflicts of interest in man-environment relations
Proposed school subjects
GEOGRAPHY
Suggested age of students
13-19 (for 13-15 it requires more thorough focus on introducing background)

Topic: Sea transport in the Arctic
Resolution: Sea transport in the Arctic Ocean should be developed
Description
This material gives insight into problems of the Arctic areas from the point of view of the needs of the economy, in particular the transport of countries located in this zone. Students learn about the economic benefits of shortening the transport routes as well as environmental threats (environmental pollution, acceleration of glacier melting processes).
Proposed school subjects

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GEOGRAPHY
Suggested age of students
13-19 (for 13-15 it requires more thorough focus on introducing background)

Topic: Wind Energy
Resolution: In mid - latitudes, wind energy should be developed rather than other renewable energy sources.
Description
Students will consider environmental, technical and economic aspects of using wind energy in the perspective of climate change. Reliability of such energy source will be considered, as well as landscape modification, wildlife threat and climate change influence.
Proposed school subjects
GEOGRAPHY
Suggested age of students
13-19 (for 13-15 it requires more thorough focus on introducing background)

Topic: Geoengineering vs climate change
Resolution: Governments should invest in geoengineering techniques to counteract climate change
Description
We have just a decade to reduce emissions and achieve the Paris Agreement's highest ambition of limiting warming to 1.5°C. We have been warned, repeatedly, of the high stakes of our present climate gamble. If we continue on our current course, radical solutions are going to be needed sooner rather than later. Students will consider whether geoengineering is a safe, efficient and necessary method to combat climate change.
Proposed school subjects
GEOGRAPHY/CHEMISTRY/PHYSICS

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Suggested age of students
13-19 (for 13-15 it requires more thorough focus on introducing background)

Packages offered in Greek (and later on in English):

Topic. Energy Issue: Nuclear Energy and Renewable Energy
Resolution: Exploiting nuclear power is the only solution to meet the energy problem
Description
The use and cost of energy affect the daily life of each person on earth. Many topical issues arise from energy use, such as greenhouse gas emissions, acid rain and climate change. The most important issue is that global economies are using non-renewable energy sources (fossil fuels) in high-level percentage. However, the dependence on the depletion of fossil fuel stocks in combination with the increasing energy demand put the urgent need for exploiting other forms of energy. Modern societies ask for energy solutions that on the one hand could cover the energy needs of the global population and on the other hand are sustainable and safe for the environment. Due to this educational package, students are asked to decide if the exploitation of nuclear energy vs. renewable forms of energy might effectively respond to the challenges with which the global community is meeting, such as the increased demand of electrical energy, the renewability and sustainability of planet Earth and the consequent environmental hazards. Students will be called to express their relative argumentation For or Against the resolution after the research and study of the topic.
Proposed school subjects
Physics – C΄ Class Junior High School (Gymnasium) (Units 3 & 4) **Physics** – B΄ Class High School (Lyceum) (Unit 1.3) **Geology-Management of Natural Resources (optional) – A΄Class High School (Lyceum), Units (9.6-9.11).**
Suggested age of students
14-17 years old

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Topic: Space Exploration
Resolution: The future of humanity depends on space exploration
Description
Since antiquity, humans used to watch the night sky and guess the secrets that were hidden in this galactic dark veil. Men used their imagination to plan trips to space and they were dreaming of travelling to the moon. The dream came true fifty years ago due to the landing of Apollo on the Moon. The 21st century is justifiably characterized as the century milestone for the space exploration. The future of humanity seems to be strictly related to the space exploration, since many scientists support the idea of building colonies in space because of the rapid population growth, the research of new hospitable universes and the need for more energy and natural resources. But, what about the relative hazards of such scenarios? Many scholars and stakeholders emphasize that the high cost of the space exploration as well as the intense competition about the domination of space etc. might provoke serious problems for humanity in the future.
Proposed school subjects
● Physics – B' Class Junior High School / Gymnasium (Unit 5.1) , A'Class High School / Lyceum (2.1) ● Chemistry – B'Class Junior High School/Gymnasium (4.1) ● Geology-Geography- A'Class Junior High School (B1.1) • Biology – B' & C' Class Junior High School/Gymnasium (2.4), C'Class High School / Lyceum (General Education) (2.4.1) ● Geology and Management of Natural Resources (optional)- A'Class High School / Lyceum (2.1-2.4, 9)
Suggested age of students
12-18 years old

Topic: Nanotechnology: Health and Environment
Resolution: The use of nanomaterials causes severe health problems
Description

Nanotechnology, as the study and the technological production of mini-objects (with at least one dimension sized from 1 to 100 nanomenters) is characterized as an important dimension of the fourth industrial revolution (4IR). As such, nanotechnology and its technological applications, that is the production of various forms of nanomaterials, pose questions regarding its positive or negative consequences to health, to the environment and to the daily life.

The current educational package of Odyssey project will provide Greek students with the necessary scientific information, in order to invent arguments for or against this controversial issue during a debate and to expand their scientific understanding concerning its impact in daily life.

Proposed school subjects

Biology – B' Class Junior High School (Units: 1.2,4.1,4.2), C' Class Junior High School (Gymnasium) (Units: 1.2,1.3,2.4), B' Class High School (Units: 1.1,1.2,2.3)

Chemistry - B' Class Junior High School (Units: 1.1,1.2,1.3,2.1,2.4,3.1), C' Class Junior High School (Units: 4.2,4.3,4.6), B' Class High School (Units: 1.1,2.1,2.8,5.1,5.2)

Suggested age of students

14-16 years old

Topic: Internet Access & Development

Resolution: Global internet access can be achieved only through wireless networking.

Description

Within the context of the fourth industrial revolution, Internet plays a critical role concerning various dimensions of social change all around the world. Internet's usage growth emphasizes not only the necessity of universal access to it, even for the developing countries, but, also, the need for faster speeds and wider reach.
At this point, an important scientific issue arises: is it cable networks or wireless networks that are more reliable for safe, fast and global access to Internet?
Due to the current educational package, students will have the opportunity to examine the advantages and disadvantages of satellites, micro-satellites, optical fibers, 5G technologies, relative health problems etc. As a consequence, students will be provided with all the necessary scientific information that will permit them to problematize and debate about this modern scientific issue.

The project has been funded with the support of European Commission within ERASMUS+ programme

Proposed school subjects
● Physics A΄ Class Junior High School (8), C; Class Junior High School (6.1, 6.2, 10.1, 10.2, 10.3), B΄Class High School (General Education) (1.3, 4.4) ● Informatics A΄ Class Junior High School (1.4, 4.12, 4.13, 4.14, 5.15), C΄ Class Junior High School (3), Introduction to the Principles of Informatics Science, B΄ Class High School (3.3, 3.4), ● Chemistry C΄ Class Junior High School (5.1, 5.4, 5.5) ● Biology: A΄Class Junior High School (1.2), C; Class Junior High School (4.1) ● Science Technology B΄ Class High School/Technological Direction: Chapters. 1 (pp. 6-39), 2 (pp. 22-39), 3 (pp. 40-56), 6 (pp. 121-126) ● Modern World-Citizen and Democracy: B΄Class High School (Units 4 & 6)
Suggested age of students
12-18 years old

Topic: Biotechnology: Health and Environment
Resolutions: ● Biotechnology is the enemy of human health. ● The environment will benefit from the advances of agricultural biotechnology.
Description
The 21st century is characterized by the rapid growth and discovery of new technological and scientific achievements. However, many of the technological and scientific developments of modern society raise concerns and objections in the community about whether they ultimately promote sustainable development, in contrast to those persons that are fervent supporters of every new scientific and technological discovery. In recent years biotechnology is one of the scientific areas that has witnessed rapid growth and progress. Life sciences are the ones that have a central role in the development of technology and science and are directly and positively linked to health, the natural environment, agriculture and industry. But, is it true? The goal of this educational package, is a detailed study of biotechnology so that students acquire the necessary knowledge base to be able to formulate arguments for or against its implementation in everyday life.
Proposed school subjects

Biology 3rd class of Gymnasium (Unit 6) 1st class of High School / Lyceum (Unit 4.5) and 2nd class of High School / Lyceum (Units7-11) In more, the educational guide of *Biotechnology: Health and Environment* can be implemented within the context of the innovative and creative research activities (project) for the above students.
Suggested age of students
15 -17 years old.

Packages offered in Serbian (and later on in English):

Topic: Environmental protection / Species preservation
Resolution: When talking about our planet, the best way to preserve natural ecosystems is rewilding.
Description
Today, many regions both in Europe and worldwide are uninhabited, with vast areas where original flora and fauna could be restored. Although this statement sounds reasonable, it simultaneously raises many questions. This is why it has strong debating potential. On the PROs side, several points deal with the disappearance of wildlife and the extinction of many species. They tell us that today's flora and fauna are not original inhabitants of our ecosystems. The main assumption behind this view is that the Pleistocene epoch should be taken as a measure of the original/wild state of our ecosystems. According to this view, until that moment, the majority of the world's ecosystems were independent of man. So, if man is the main culprit for the disappearance of wildlife, now he must undertake radical measures for its conservation. However, there are many CONs in the case of rewilding. Firstly, economic reasons, because such an ecological approach would be too expensive – with uncertain outcomes. New and old animal and botanical species would be exposed to unpredictable relations. In other words, they would be placed in new ecological roles – altogether, this is a risky undertaking. The second group of CON arguments question whether Pleistocene is a measure for the original ecosystem.
Proposed school subjects

The project has been funded with the support of European Commission within ERASMUS+ programme

Biology
Suggested age of students
15-18 (grammar schools and vocational high schools)

Topic: Application of algorithms
Resolution: The development of AI technologies will cause numerous social and economic problems for people in the near future.
Description
AI researchers and engineers should understand the dual nature of their work and learn more about the (social/theoretical) issues of AI abuse. AI should not deny people the right to data privacy, such as individual, family or community rights. Numerous research and predictions by scientists say that by mid 21st century we will have developed artificial general intelligence – machines capable of human-level performance. When the machines become "better than us", will we be able to secure normal coexistence with them? Intelligent machines will have great influence on jobs that humans (still) perform. The question is how much can their algorithms be objective and transparent and how much would they influence security. On the other hand, AI technology can and should be developed for the greater good and security and should serve humanity. Robot Mario is a good example of this, assisting people with dementia. The latest research from MIT recommends using robot NAO for helping children with autism. The use of AI in law and forensic science is yielding excellent results: "officer Hart" (Harm Assessment Risk Tool) in Great Britain helps decide on the detention of suspects. In addition, the Chicago police uses AI to track bomb threats and prevent conflicts in the real world. Many researchers claim that if AI leads to job shortages and the extinction of some occupations, others would emerge in the meantime, so robots would not take over human jobs.
Proposed school subjects
IT / Mathematics
Suggested age of students
15-18 (grammar schools and vocational high schools)

The project has been funded with the support of European Commission within ERASMUS+ programme

Topic: Structure of information networks
Resolution: In the future, social media/the Internet will be the best means for the dissemination/communication of STEM knowledge
Description
Traditional schooling and education i.e. knowledge transmission can hardly keep up with the rapid change of the modern world. Knowledge is more accessible, but its quality is sometimes questionable. The Internet technologies are an inevitable reality. However, we need more efficient tools to secure the validity of information, at the same time not limiting freedom of speech. Many respectable universities have successfully launched MOOCs, making high-quality courses available to thousands of people. Platforms such as Coursera enable distance learning (cheaper and can be attended alongside a full-time job). Social networks are an excellent means of instant dissemination of knowledge. However, the Internet and social media suffer more severely from problems such as filter bubbles, echo chambers, and infostorms. The consequences of such phenomena are fake news and the spread of pseudo-scientific "theories" such as creationism, the anti-vaccination movement and flat Earth theories.
Proposed school subjects
IT
Suggested age of students
15-18 (grammar schools and vocational high schools)

Topic: Food production
Resolution: The future of humanity depends on the conservation of honeybees.
Description
When talking about the importance of bees, a quote attributed to Albert Einstein usually comes up: “If the bee disappeared off the face of the Earth, man would only have four years left to live.” The quote was cited by the media many times, even by the more credible ones, as well as in literature. However, as it turned out, it was a hoax or fake news. The quote appeared in a leaflet from 1994 published by the French association of beekeepers. But the issue it raises nevertheless remains unresolved. The bees are key for the pollination of a number of plants used in human nutrition, but the question whether our food supply would be endangered remains unanswered. Could homo sapiens survive without bees?

The majority of calories used every day in people's nutrition come from wheat, corn and rice, and these are all plants that do not require pollination.
Proposed school subjects
Biology
Suggested age of students
15-18 (grammar schools and vocational high schools)

Topic: Neurobiology of animals
Resolution: The scientific community has a moral obligation to prevent animal use in experiments.
Description
At first glance, this topic mainly deals with moral questions, and the debate can unroll in many ways, depending on our ethical standpoint. In that sense, if we think that non-human animals are moral beings, we will consider that the use of animals in scientific experiments is problematic, etc. Also, argumentation may be founded in biology and genetics, since we belong to the common genetic fund as animals. Apart from topics concerning biology and neurobiology, the debate about moral obligations of the scientific community to prevent animal use in experiments would have students discuss many ethical, economical and political questions.
Proposed school subjects
Biology
Suggested age of students
15-18 (grammar schools and vocational high schools)

Packages offered in Estonian (and later 4 out of 5 in English):

Topic: Oil Shale Use in Estonia

Resolutions:

- Using oil shale for energy generation is the only way to balance the uncertainty of producing solar and wind energy due to weather conditions.
- The only way to stop using oil shale for Estonian energy production is to switch to nuclear energy.
- The benefits of bulding an offshore wind park near Hiiumaa island outweigh the potential environmental damage.

Description

The Estonian energy sector is almost exclusively dependant on oil shale as it plentiful in the country's easterns parts right next to the Russian boarder. Oil shale is an organic-rich sedimentary rock and can be either burnt directly to generate heat and power, or can be made into shale oil, which can substitute crude oil. Compared to ither fossil fuels, oil shale and shale oil are costlier (both in environmental and financial terms) to process and are less effective. As the climate crisis becomes more apparent, discussions about stopping oil shale mining altogether have surfaced, but have not always been based on scientific data and facts. This educational package seeks to give students the change to debate on a deeply relevant and timely topic. This package will be available in Estonian exclusively as oil shale is not a prominent energy source in other European countries (or, in fact, other countries globally).

Proposed school subjects

7th grade Science, Biology; 8th grade Geography, 9th grade Chemistry
Additionally covering these cross-cutting themes for grades 7–9: **Environment & Sustainability, Citizens Initiative & Entrepreneurship, Information Environment, Values & Morality.**

Suggested age of students

13–16

Topic: Energy Management

Resolutions:

- Driving a car running on electricity generated from fossil fuels is eco-friendlier than driving a car running on petrol.
- In order to reduce the harms of climate change, people should allow wind turbines to be set up in their back yards.
- Solar panels are better to use in pwer production than wind turbines.
- Because the production of wind & solar energy is unpredictable, people must get used to the idea that electricity might not always be available in the near future.

Description

As global demand for energy continues to rise rapidly and environmental concerns deepen, questions about sustainable energy production take center stage. The future of energy management presents many wicked problems, combining technological issues with social problems. Often the answers are more focused on risk mitigation rather than a uniquely "rights" and "wrongs". This educational package will be universal and translated to English.

Proposed school subjects

7th grade Science; 8th grade Geography, 9th grade Physics, Chemistry
Additionally covering these cross-cutting themes for grades 7–9: **Environment & Sustainability, Citizens Initiative & Entrepreneurship, Information Environment, Values & Morality.**

Suggested age of students

13–16

Topic: Climate Crisis

Resolutions:

- Global ocean levels will rise about 2 metres by the end of the 21st century, and that's why we cannot develop costal areas anymore.
- To combat the climate crisis, every person has to skip at least one air flight a year.
- Organic tomatoes from Spain are eco-friendlier than local greenhouse tomatoes.
- All species have to adapt to the effects of climate change, except for humans.
- Students must learn about climate change at school, not spend their Fridays protesting.

Description

Although the energy-related educational packages address the topic of climate crisis, a separate package presents the opportunity to broaden the students' viewpoint. The climate crisis is entwined with energy production and consumption issues, but is also a wider concern affecting other aspects of scientific research and our daily lives. This educational package explores the local and global effects of climate change, the problem of individual (consumer) choices versus the accountability of industries etc. This package combines scientific issues with ethical ones in a more straightforward manner.

Proposed school subjects

7th grade Science; 8th grade Biology, Geography, 9th grade Physics, Chemistry
Additionally covering these cross-cutting themes for grades 7–9: **Environment & Sustainability, Citizens Initiative & Entrepreneurship, Information Environment, Values & Morality.**

Suggested age of students

13–16

Topic: Biodiversity

Resolutions:

- Extensive lawnmowing should be banned in urban settlements.
- It is better to keep bees in cities rather than on farmlands.
- The beach rose (Rosa rugosa) should be eradicated from nature.

Description

Cities are usually considered purely artificial enivironments rather than areas rich in diverse species. But in reality, cities can be more biodiverse than the surrounding areas, usually extensive farm lands and production grounds. Scientific literature shows that the wellbeing of urban dwellers is liked to the urban settlement's biodiversity. This educational package explores the concept of biodiversity and puts it in a relevant (close-to-home) context. Students will explore the importance of bees, the effect of invasive species, and other practical issues concerning biodiversity.

Proposed school subjects

7th grade Science; 8th grade Biology, Geography
Additionally covering these cross-cutting themes for grades 7–9: **Environment & Sustainability, Citizens Initiative & Entrepreneurship, Information Environment, Values & Morality.**

Suggested age of students

13–16

Topic: Circular Economy

Resolution:

- Plastic packaging is vital for storing foodstuff hygienically.

Description

This educational package introduces the concept of circular economy – the idea that today's economy is based on take-make-waste, whereas circular economy strives to leave out waste as much as possible, and to concentrate on reuse, recycling, etc. This educational package encourages students to consider production & consumption, the carbon cycle in ecosystems, and sustainability issues on the whole.

Proposed school subjects

7th grade Science; 8th grade Geography, 9th grade Chemistry
Additionally covering these cross-cutting themes for grades 7–9: **Environment & Sustainability, Citizens Initiative & Entrepreneurship, Information Environment, Values & Morality.**

Suggested age of students

The project has been funded with the support of European Commission within ERASMUS+ programme

13–16

The project has been funded with the support of European Commission within ERASMUS+ programme

APPENDIX 1. Participation Agreement

ODYSSEY PROJECT – PARTICIPATION AGREEMENT

BETWEEN SCHOOL AND ODYSSEY PROJECT INSTITUTION

NAME OF SCHOOL	
LEADING TEACHER **Contact e-mail**	
Address of School:	
NAME OF ODYSSEY PROJECT INSTITUTION	
Contact e-mail	
Address of Institution	

About ODYSSEY

The ODYSSEY project (Oxford Debates for Youths in Science Education) seeks to develop 13- to 19-year-olds argumentation skills and to increase interest in STEM subjects by organising debate competitions on science topics. Rhetoric education supports critical thinking and the ability to use various sources of knowledge, with an emphasis on verifying their credibility, civic education, and contributes to supporting tolerance and democratic values.

ODYSSEY is financed by the European Commission's Erasmus+ programme, coordinated by the Institute of Geophysics, PAS, Warsaw, Poland.

The tasks of participating school

The schools will participate in the project from [DATE] to [DATE]. The tasks of the schools shall consist of:

1. Indication of two teachers from school, who will lead the ODYSSEY activities
2. Indication of a team of 10 students (project team), who will take part in preparations to the contest and choosing a team of at least 5 students, who will attend the debate contest.
3. Participation of one or two teachers in the one-day workshop in [MONTH, YEAR, CITY]
4. Organizing and supporting the school team participating in the ODYSSEY debate contest till the end of their participation in ODYSSEY activities.

5. Participation of the group of students in the debate contest (at least 5 students – members of project team should attend each round) in locations indicated by [NAME OF ODYSSEY PROJECT INSTITUTION], on own expense.
6. Participation of at least one teacher, trained to be a judge at the debate contest, in the Scientific Judging Committee in contest's rounds in which other schools are participating.
7. Participation of two teachers in online mentoring and Facebook-based bulletin board.
8. Conducting full training of debating skills and STEM topics with the project team, based on 5 packages of educational materials provided by [NAME OF ODYSSEY PROJECT INSTITUTION].
9. Participation of one or two teachers in ex-ante, ex-post evaluation surveys (online) and a Focus Group Interview (face-to-face or online), after implementation of the ODYSSEY activities.
10. Reviewing and providing feedback on project materials.
11. In case of getting to the final contest's round, conducting training on STEM topics with the project team, based on 5 packages of educational materials taking part in final event – Conference with model debate, on organiser's expenses, provided that all the financial documents confirming travel/accommodation expenses for reimbursement are delivered to [NAME OF ODYSSEY PROJECT INSTITUTION] in indicated time.
12. Supporting the dissemination of the Odyssey project activities and results.

SCHOOL declares that is free to enter into this Agreement and that there is no term or condition, which would prevent it from performing the tasks detailed in this document.

- Benefits for the SCHOOL

The participating school will:

Be identified as such on the ODYSSEY project website.

Be recognised in the reports and other materials produced in the ODYSSEY project

Receive prepared educational materials (packages with lesson plans, worksheets, additional resources), as well as online mentoring support and access to Facebook-based closed group: bulletin board

Have opportunity to prepare and conduct ODYSSEY Scientific debates, learn the principles, practice different roles in the debate and explore topics based on prepared high-quality materials

Become a significant member of project evaluation focus group

The project has been funded with the support of European Commission within ERASMUS+ programme

Take part in competition with attractive award

Receive Certificate of participation at the end of the project.

Note: No fees, charges or royalties will be paid to or by the school.

- Additional notes:

- If the indicated teacher is not able to carry out project activities at one point, another teacher will be indicated, who will continue the activities. The change of leading teacher requires written form for its validity (electronic version is accepted).
- The school confirms that all participating persons know and accept RULES OF ODYSSEY COMPETITION, including DATA MANAGEMENT section.
- [NAME OF ODYSSEY PROJECT INSTITUTION] reserves the right to remove the school not fulfilling its obligations, outlined in this document.

Signatures:

ODYSSEY PROJECT INSTITUTION REPRESENTATIVE Date:	HEADMASTER OF SCHOOL/LEGAL REPRESENTATIVE OF SCHOOL Date:

Appendix 2. Practical "warm-up" excercises

Practice active listening:

Throughout the debate you and your entire team should be listening out for points to refute and rebut in the other team's arguments. Write clearly and pass them on to the next speaker or to the captain for their summation. During the debate, take notes, quotes and statistics so that you are prepared to call into question the arguments put forward by the other team.

Examples of excercise:

- Group split into pairs, GREEN & GREY (for example – GREENs are even numbers on students' list, GREYs are odd numbers on students' list)
- Ask GREYs to wait outside the classroom
- Inform the GREENs that whilst they are listening to their partner, everytime their partner says something that evokes their 'inner voice' i.e. they want to ask a question, makes them think about something etc... they put their hand up for five seconds then put it back down.
- Ask them to do this for the entire conversation - GREENs are not allowed to speak, interact with GREYs, ask questions, confirm that they understand etc.
- Next inform the GREYs outside that they are to speak for 3 minutes to GREENs about an experience, their last holiday anything positive that has happened to them lately.
- GREYs come back to the classroom and start talking for 3 minutes
- At the end of the three minutes ask the GREYs how they felt whilst talking to GREEN partner, emotions evoked etc... general answers back are normally 'didn't feel listened too, didn't understand why they were putting their hand up, lost my track, they obviously weren't listening,' etc...

You can run the exercise again, this time allowing the teams to interact, ask questions, become involved in the conversation etc... and compare the two conversations, which was more satisfying etc..."

The project has been funded with the support of European Commission within ERASMUS+ programme

Public speaking excercises

Speak Nonsense

According to research, an excellent presentation is 38% your voice, 55% non-verbal communication and just 7% your content. In other words, your delivery matters even more than what you say, and this exercise helps you refine it. Find a paragraph online in a language you don't understand or simply write down a few lines of jibberish, and practice saying it aloud as though you're giving a speech. Pay mind to your tone, inflections, and generally how you can use your voice to create more interest.

Learn from the Pros

Look online for speeches that are widely accepted as exceptional. The most popular TED Talks of all time is a great place to start. Pick a talk that you're interested in and watch it through a critical lens. Analyze the narrative structure the speaker uses, what makes their delivery effective, how their visuals enhance their talk and other components that make their speech extraordinary.

30 Seconds without fillers-no 'uhmmmms"

Filler words like "uh" "um" and "yyyy" „you know", not only make your talk more difficult to listen to, but they also make you seem less prepared and authoritative. For this exercise, record yourself giving a talk on any topic for 30 seconds, taking care to omit all filler words. Whenever you use a filler word, start over and try again. Do this exercise ten times, filler-free.

Tell a Photo Story

Storytelling is critical to engaging your audience and helping them retain the information you're sharing. To practice developing narratives, find an interesting photo online and record yourself presenting a story about it. Discuss what you think the backstory is, who the people are, their dreams, their motivations, and anything else that'll tell a compelling story about them.

Be Excited About Something You Don't Love

Enthusiasm is contagious. If you want your audience to be excited about your topic, then you need to show enthusiasm for it. Choose something you're indifferent about, say, a kitchen utensil, and practice speaking about it enthusiastically. Use your voice, emphasis, and body language to make it seem like the most exciting thing in the universe.

Debating abilities

I Couldn't Disagree More Game

This quick exercise helps to improve general communication skills, confidence, to encourage quick thinking and listening skills and also to improve rebuttal skills and to develop the ability to deal with points of information.

Divide students into pairs. Ask one student to make a statement (this statement could be serious, silly, topical, controversial or obvious – for example – STAR WARS MOVIES ARE THE BEST SERIES IN HISTORY OF CINEMA). The next student has to reply to the statement by saying 'I couldn't disagree more' and then give a reason why. For example: ''I couldn't disagree more. STAR WARS is an overrated commercial series with many inconsistencies and trivial ideas.

Now they take opposite roles, the second student makes a statement, the first one responds „I coudln't disagree more ….'

Complete the sentence

This activity involves promoting discussion about major issues. To start, the teacher should write a number of incomplete statements on a blackboard/whiteboard. After each statement some room needs to be left.

Example Statements:

- The best way to fight poverty is…
- People commit crimes because…
- Giving aid to less developed countries is good because…
- Democracy is important because…

Then, the teacher reads a statement and asks the class to fill in the rest of the sentence.

It is important to remember that there are no right or wrong answers: encouraging pupils to express an opinion and encouraging discussion is the most important thing.

The project has been funded with the support of European Commission within ERASMUS+ programme

Appendix 3. Lesson plans dedicated to developing debating skills in general

This part of the guideline was prepared by Foteini Englezou, president of the Hellenic Institute of Rhetorical and Communication Studies, expert in rhetorical skills and debating. We present here 7 lesson plans, which will help your students to develop skills required for successful debating, such as communication, argumentation, searching for evidence, linguistic skills, as well as knowledge about debating rules, rebuttals, refutations and fallacies.

Lesson Plan 1. Communication skills

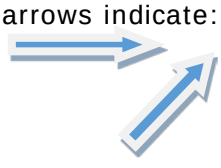
Title: Communication Skills

Objectives: Students get acquainted with basic communication skills

Direct Teaching (15'): Vocabulary relative to the main communication skills and the use of body language

Interactive Activities (30'):

1. **The circle of self-presentation:** All the students form a circle. In clock position, each student gets in the circle pronouncing loudly and articulating clearly her/his name. At the same time he/she accompanies her verbal act with a gesture or movement. After having heard and noticed the previous speech act, all the other students, repeat what it is said and done. The next student does exactly the same and so on.
2. **The alphabet game:** All the students form a circle and then they close their eyes. The teacher randomly chooses one of the students for announcing a scientific term which starts at A. In clock position, the student next to her/him has to say an analogous term B, then C etc. without opening the eyes. During the game, it is important to actively listen where is the source of sound and to continue the alphabet of scientific terms.
3. **Inflections:** Say *goodmorning*, *goodafternoon*, etc. by changing your voice as the arrows indicate: - not change in inflection



VOCABULARY

Basic Communication Skills

Active Listening: Active listening is necessary for debating. Focus on the arguments of your opponent. Understand what it is said. Then, pose clarification questions and rebut the opposite arguments.

Image Source: http://www.fhsoralcomm.net/

Speaking Voice

The speaking voice is the most important tool of a speaker. Take care of the following elements:

Volume: Is it easily heard? Is it vibrant and dynamic?

-inflection up or changing pitch

-inflection down

-inflection up and down

4. **Giving emphasis:** Students articulate the following sentence by giving emphasis to different terms of it (the bold ones). For example:
   *The **teacher** gives the notebook to the student.*
   *The teacher **gives** the notebook to the student.*
   *The teacher gives **the notebook** to the student.*
   *The teacher gives the notebook to **the student**.*
   Keep up with different sentences.
5. **Style variety:** Each student repeats the following sentence in a different style. For example: *What have you done? I am waiting for your response*. (with interest, with anger, with calm etc.)
6. **You don't like it… but you made me love it!!!**
   Each student chooses to talk about something he/she is indifferent (e.g. a kitchen utensil, a piece of furniture, an item of clothing, a school object etc.). He/she has to use the best speaking voice and talk about it with enthusiasm. Bu giving emphasis and using the body language he/she has to present it as the most exciting thing in the world. In the end of the activity, the classmates vote for the most persuasive speaker.
7. **The Color Game**
   The teacher brings a deck of colored cards in classroom (red, yellow, green, orange) and asks students to choose a card and, then, to give a short speech (one to two minutes) relative to the color that he/she has chosen.
   -If the student picks a red card, he/she has to talk about an important person in his/her life.
   - If the student picks a yellow card, he/she has to talk about an object that he/she likes.
   - If the student picks a green card, he/she has to talk about a club, a football team, an organization, a group, a band that they admire or that they belong to.
   - If the student picks an orange card, he/she has to talk about something in the world that he/she would

Pitch: Does your voice convey life, feelings, colors or is it monotonous?
Voice quality: Is your voice clear, mellow, open, enthusiastic?
Articulation: Is your articulation clear, crisp, controlled? Is your mouth fully open? Are your lips flexible?
Rhythm: Are you talking too fast or too slowly?
Vocal variety: Does your voice convey emotion? Is it natural and vital?

Body Language

Posture: Is your posture poised, confident, erect, comfortable, relaxed?
Gestures: Are your gestures natural and meaningful? Do they intend to enhance your verbal message? Are they lively and precise?
Facial expressions: Are you facial expressions natural, animated and friendly? Are they appropriate to your speech content?
Eye contact: Is your eye contact with the audience natural? Do you establish bonds with your judges and the audience? Do you hold the audience's attention?

Image Source: https://ideas.ted.com/how-to-watch-a-presidential-debate-or-win-it-tips-from-amy-cuddy/

TIPS: During the debate, it is important that you are not always hidden behind your notes. Even if you have to use your notes, don't lose eye contact with your audience. Glance briefly at your notes!

Avoid to use filler words like "uh", "um" and "y'know"!

like to change (in home, in neighborhood, in the town, in school, in herself/himself etc.)

Don't forget to put natural pauses into your speech!

Lesson Plan 2. Expressing scientific argumentation

Title: Express your scientific argument, not your opinion

Objective: Students can understand the difference between the expression of an opinion and an argument

Direct teaching: Definitions of the key-terms: *fact*, *opinion*, *claim*, *scientific argument*. (10')

Exercise: Identify statements about Climate Change that are Opinions with an "O", Facts with an "F" and Arguments with an "A". (5')

● For most Europeans the climate change is real, it is happening now and we are causing it. _____

● The planet's average surface temperature has risen about 1.62 degrees Fahrenheit (0.9 degrees Celsius) since the late 19th century, a change driven largely by increased carbon dioxide and other human-made emissions into the atmosphere. _____

(https://www.ncdc.noaa.gov/indicators/
http://www.cru.uea.ac.uk/cru/data/temperature
http://data.giss.nasa.gov/gistemp)

● The human activity is primarily responsible for the climate change because of the rising levels of atmospheric greenhouse gases which result from human activities such as burning fossil fuels causing global warming, loss of sea ice, a level rise etc. A survey by German Scientists Bray and Von Storch confirm that 83.5% of climate scientists believe human activity is causing "most of recent" global climate change. _____

Interactive activities (10')

1."*I believe that…and I explain the reason why…*" (Egglezou, 2014:275)

The teacher holds an envelope which contains various topics. For example:
● *genetic modified food*, ● *going into space is (is not) important for scientific development*, ● *recycling metal*, ● *effect of*

Laboratory Still Life, Dan Shank
Image source: http://mimimatelot.blogspot.com/2012/04/laboratory-still.html

VOCABULARY

Fact: The term defines exact, objective and detailed information on a specific topic that it is proved to be true and it is used for building an argument.

Scientific facts consist of observations or measurements which are repeatedly realized and verified by scientists. Despite it, their truth is temporary, if new data arise.

Opinion: The term defines an idea or judgment that one or more persons have about a phenomenon, a process, a person etc. based on subjective feelings and beliefs.

Reason: The term defines a logic statement which consists of a cause,

nanotechnology on research and development of medical technologies, ● *use of high tech in agriculture*, ● *stem cell research is (is not) ethical*, ● *hacking*, ● *use of antibiotics,* ● *value of vaccines,* ● *mapping of DNA,* ● *artificial intelligence in robots etc.*

The teacher asks each student to pick a topic and to express a personal opinion on it either positive or negative "I *believe that…*". Then, each student has to give at least one reason for justifying her/his claim "*I explain you why…*". After that, the teacher moves onto the next person. Students aim to be as persuasive as possible.

2. ***Four corners debate (20')***

The teacher of the classroom invites students to debate on a confrontational topic such as: "The development of artificial intelligence will cause many social problems". He/she writes on four signs the following opinions: **Strongly Agree**, **Somewhat Agree**, **Somewhat Disagree** and **Strongly Disagree** and he/she places each one of the signs in each corner of the classroom. Students move to the corner that best reflects their opinions and feelings about the topic. Each group of students in each corner take some minutes to exchange ideas about the topic and write down the reasons that supported their decision. Then, one student of each group shares their arguments with the audience of the classroom (Najam, 2017).

an explanation or justification for an opinion/claim.

Scientific argument: The term defines a claim which is supported by reason and evidence for explaining the natural world.

Watch the following video:

How to write scientific arguments
https://www.youtube.com/watch?v=8J63hWQw2hU

Materials: pen, notebook, envelope, topic cards, internet

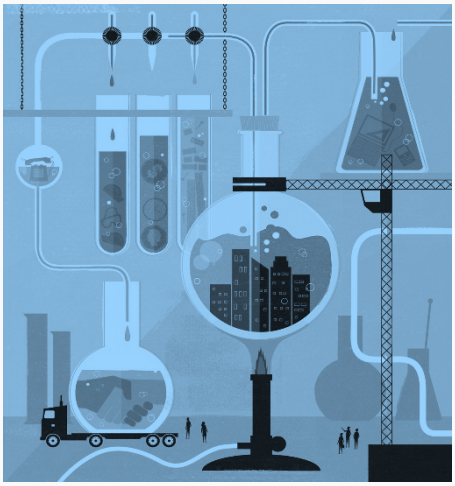


Image Source: https://everettcc.instructure.com/courses/1352089/assignments/syllabus

Lesson Plan 3. Argumentation

Title: Build a valid scientific argument

Objective: Students use the basic structural parts of a valid scientific argument

Direct teach. The Toulmin's Argumentative Pattern and its vocabulary and types of questioning arguments (5')

Toulmin's (1958) Argumentative Pattern (TAP)

Qualifier

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Comprehension Exercise: Write the structural parts of the following argument according to Toulmin's argumentative pattern. Then, present them to the audience of your classroom. (10')

The combustion of coal, petroleum and natural gas for our ever-increasing energy needs releases to the atmosphere carbon dioxide, sulfur dioxide, various metals and nitrogen oxides. The burning of such fossil fuels is undoubtedly responsible for the increased manifestation of various respiratory illnesses in the Chicago area, such as asthma, respiratory inflammation and lung cancer. **This is true, because** all the above gases are dangerous and extremely toxic. Currently, 14 people die every day in the U.S. as a result of asthma, and Illinois has the highest asthma rate in the country. Approximately 64,000 Americans die prematurely each year as a result of heart and lung disease caused by air contamination, exceeding the annual death rate resulting from car accidents. Children are more vulnerable than adults are because they have a faster breathing rate. According to the Center for Children's Health and the Environment, asthma is currently the most prevalent cause of hospitalization for American children, and is becoming increasingly more common for adults (E Magazine, Nov/Dec 1999). For avoiding such health problems, 58,825 trees would need to be planted annually to absorb the amount of carbon dioxide emitted into the atmosphere, so as to offset the negative environmental impacts of its release (CDAIC, 2001).
(https://www.iwu.edu/greenetwork/IWU_Energy_Assessment_2001.pdf)

Data: _____

Claim: _____

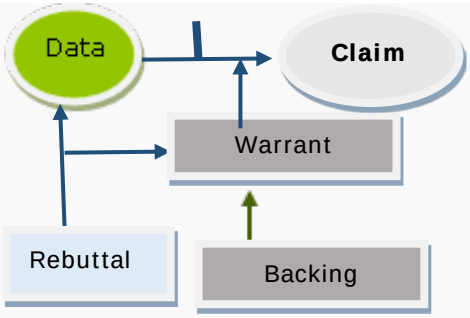
Warrant: _____

Backing: _____

Rebuttal: _____

_____

When you debate, for constructing your argument, replace **only** the basic structural parts of Toulmin's argument with the short phrase **CUE & I**.
Claim (in the place of claim)
Up-coming (in the place of warrant, of the explanation)
Evidence (in the place of backing)
&



For Toulmin, argument is the logical transition from certain data to a claim through the use of a warrant that confirms this move.

Data: The term defines the information that supports the claim based upon what the student already knows.

Qualifier: The term defines the words or phrases that influence the certainty or the specificity of the claim.

Warrant: The term defines the link between the data and the claim (theory, reason, principle).

Backing: The term defines further information that strengthens the validity of the warrant.

Rebuttal: The term defines the circumstances under which the given data or warrant are not trustworthy; hence, the argument might be not sound.

_____
Materials: Pen, notebook
_____

TIP for the debating process

After having used the basic structural parts of an argument, don't forget to refer to its **impact**. The impact of an argument is related to the reasons why this is important for the audience.

Impact (why it is important for the audience)

_____

Argumentation activity (15')

Take the topic of Biotechnology. Break students in small groups (4-5) and ask them to create and write one pro and one con argument on the resolution: "*Biotechnology is necessary for the sustainability of human societies*". The structural parts of the argument must follow the phrase CUE & I.

Keep in mind that…

… your argumentation will raise various kinds of questions by the opposition side. For example:

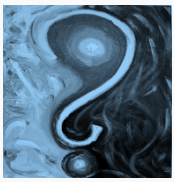
- *Could you explain exactly how biotechnology will ensure sustainability?* (clarification question)
- *If bio-fuels are the answer to climate change, how can you justify the increased carbon emission since 2009 that the EU's renewables law was put in place?* (challenging question)
- *What is your thesis about the use of biodiesel made from virgin palm oil?* (Establishing question of an idea or argument that will be developed later)

Oral exercise (15'): A student from each team presents the produced argument on biotechnology and the classmates pose as many questions as possible to her/him.

"This is important because…" (Hannan et al., 2012:26-7).

_____

Questioning the arguments



The main types of questions that are usually posed during a debate cross-fire are:

a.Clarification questions: Their goal is to reveal the weak points of an argument by asking further explanation.

b. Challenging questions: Their goal is to "attack" an argument and undervalue its trustworthiness.

c. Establishing questions of an idea or argument: Their goal is to prepare the ground for developing later a new idea or argument.

Lesson Plan 4. Searching for evidence

Title: Searching for evidence

Objective: Students get acquainted with the research of reliable evidence for supporting their arguments

Direct teaching (15'): Vocabulary, Critical Questions for evaluating science e-resources, ways of presenting evidence

_____

Searching for scientific evidence, data, facts and information as reasons for justifying a claim is one of the main responsibilities of the researchers-debaters. There must always be a **reasoning that reveals how evidence supports the claim.**

"The critical thinker is a skeptic, that is one, who is unwilling to accept any assertion or idea until or unless, evidence can be demonstrated sufficient to warrant its acceptance." (Zeidler et al., 1992:438)

_____

Vocabulary

Research: The term defines the meticulous and extended study of a specific topic which provides the actant with new understanding of it and further information on the topic.

Evidence: The term defines all the objects, documents, official documents, measurements, laws, statistics, etc. which

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The evidence used must be valid, sufficient, relevant to the claim, accurate and credible. It has to be specific, identifiable and it has to stem from authoritative sources.

During the debate, the following information must be provided when evidence is orally introduced: *Author's last name* and the *year of publication*.

As evidence must be available in case that a judge or an opponent asks for it, the written form of the evidence must include the following information: *full name of the author, publication date, source, title of article, date accessed for digital evidence, full URL-if applicable, other qualifications, page number(s)* (Rostrum, 2015, p.24).

_____

Keep in mind that not all types of scientific evidence are of high quality.

Exercise (5'): Grade from 1 to 4 the strength of the following pieces of evidence (1 is the minimum and 4 is the maximum). Can you explain to your classroom why you classified the evidence in this way?

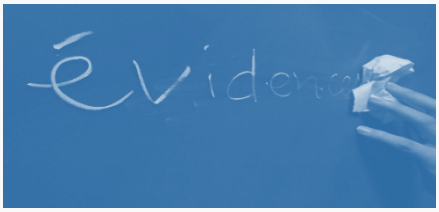
Anecdote: Children have to stop get vaccinated with MMR. For my brother the autism diagnosis of his daughter corresponds with the timing of her vaccination with MMR.

Case Report: Acute pancreatitis rarely complicates pregnancy. Despite it, it is reported the case of a 34-year-old woman who underwent medical abortion [...]. She developed a severe acute necrotizing pancreatitis which required 14 days of intensive care after the abortion. Other possible etiological factors, i.e. gallstone, alcohol intake and hyperlipidemia, were excluded. The reported case of acute pancreatitis was most likely drug-induced (Hallberg et al, 2004). So, our patient will have an abortion as she is suffering because of acute pancreatitis.

Opinion of an expert: Biofuels are not part of the solution of climate change. "Biofuels made from palm oil, rapeseed, and other food crops are destroying forests, pushing people off their land, and could fuel the next spike in food prices," said Marc-Olivier Herman, a campaigner with Oxfam. (https://www.dw.com/cda/en/biofuels-good-or-bad-for-the-environment/a-44354834)

Systematic review: The climate change is irreversible. Earth would continue to warm well beyond the 1.4F already observed because of human emission to date. The amount of warming that occurs because of increased greenhouse gas emissions depends in part on feedback loops. Positive (amplifying) feedback loops increase the net temperature change from a

are appropriate for proving the truth of a statement, phenomenon, event, etc.



Scientific evidence: The term defines the empirical evidence which either empowers or disempowers a scientific theory and/or hypothesis.

Citation: The term defines a reference, to a, mainly, published source. The reference regards the expression of valid information relative to the examined topic as it is presented by other authors in order to empower or to undervalue the trustworthiness of a claim.

Material: Search engines, Google Scholar, databases, notebook, pen

Critical questions for evaluating Science e-resources

- Is the content of the site accurate and reliable? Unbiased towards different race, gender and culture?
- Who is responsible for the content of the site?
- Does the site reflect bias to one point of view?
- Does the site encourages inquiry learning through the use of collaboration activities, on line quiz and science activities by using animations, sound, graphical organizers, sound maps etc? (https://www.ncsu.edu/imse/3/evalweb.htm)

How to find and present your evidence

- Read carefully the text(s).
- Highlight the key-points of the text that serve as evidence.
- Quote directly from the text the passages that focus to the point you want to make.

given forcing, while negative (damping) feedbacks offset some of the temperature change associated with a climate forcing. The melting of Arctic sea ice is an example of a positive feedback loop. As the ice melts, less sunlight is reflected back to space and more is absorbed into the dark ocean, causing further warming and further melting of ice. (Source: National Research Council, 2011d) https://www.nap.edu/resource/12781/Climate-Change-Lines-of Evidence.pdf

Searching Activity (25'): Break students in small groups (4-5) and ask them to create one pro and one con argument on the resolution: *Electric cars are eco-friendlier than cars running on petrol.* Then, they have to find appropriate evidence that supports their arguments, cite the sources and present their arguments and evidence to the audience of the classroom.

- You can paraphrase pieces of evidence, that is present them in your own words. Be careful not to alter the content!
- Summarize evidence for avoiding too much detail, but be sure that you can develop the topic, if it will be asked.

Image Source: http://education.abc.net.au/home#!/media/1906585/a-rough-guide-to-types-of-scientific-evidence

Lesson Plan 5. Linguistic skills

Title: Enhancing students' linguistic skills

Objective: Students get acquainted with linguistic rules that will facilitate the structure and presentation of their arguments during the debate

Direct Teaching (15'): The rule of three, transition words, figures of repetition

The implementation of the rule of 3 in debate

1. Remember that the structure of your speech is composed by **three** parts: i) an interesting introduction, where you announce your main arguments ii) the main body of your speech where the main arguments are developed and iii) the conclusion, where you summarize your main arguments.

INTRODUCTION		
ARGUMENT 1	**ARGUMENT 2**	**ARGUMENT 3**
CONCLUSION		

VOCABULARY

The rule of three: The term defines a principle for writing and delivering persuasive speeches, like in fairy-tails (e.g. *The three pigs*). It is based upon the repetition of three similar patterns (words, phrases etc.) in order to catch the interest of the audience (March, n.d.).

Also, the rule of three adds persuasive power to the speech. For example: *The climate change is definite. Irreversible. Irrevocable.*

2. Remember that you don't vocalize more than **three** arguments during your speech.
3. Remember that you repeat each of your arguments **three** times (what you will say/introduction, what you say/main body, what you said/conclusion)
4. Remember that the basic structure of an argument is composed by **three** parts (claim, explanation, evidence) and then by the Impact to the audience.

Structure of an argument

1. **Claim (claim)**
2. **Up-coming (warrant, explanation)**
3. **Evidence (backing)**

& **I**mpact to the audience.

Oral activity (20'):

Time for a short argumentative speech! Watch out the grammarian!

Students are divided in groups of four, while the teacher defines for each group a **student-grammarian** who will be responsible in the end of the activity to give an individual feedback to the speaker of the assigned team. The teacher assigns a common debate topic (e.g. *Cell phone radiation is safe*). During the preparation phase (10') each group invents arguments for or against the topic according to the rule of three for structuring their argumentative speech and their arguments as well, while they use transition words. After the delivery of the argumentative speech by one student of each group, the grammarian presents the improper as well as the exceptional uses of language, he/she spots errors in language use, syntax, structure and vocabulary and other linguistic misuses.

Oral activity (10'): Figure out the figures of speech!

Image Source: https://www.oneclearmessage.com/the-rule-of-three-in-humour-and-public-speaking/

Transition Words: The term defines the words that connect arguments and/or structural parts of the speech, arguments to rebuttals etc. showing the relationship that exists among them. There are various categories of transition words. For example:

- **Chronological:** *first, second, third, next, then, after, following*
- **Cause-Effect:** *so, thus, therefore, hence, consequently, due to, etc.*
- **Addition:** *similarly, also, additionally, moreover etc.*
- **Opposition:** *but, though, however, on the other hand, conversely, yet etc.*
- **Example***: one such, another, for instance etc.*

Figures of speech

For giving liveliness and clearness to the expression of your ideas and to your speech, the moderate use of figures of speech might help you. For example:

Metaphors: The figure attributes characteristics or qualities of one thing to another. "*The knowledge is power".*

Epanaphora: Sentences or phrases start in the same way. "*Zero* poverty. *Zero* hunger. *Zero* discriminations. That's how

The teacher divides the class into groups of four. Then, he tells each group to come up with a topic. For example (*animal testing should be banned*, *cell-phone radiation is safe*, *technology is the future of education*, *space exploration is a waste of money* etc.) After, he asks them to create statements about that topic using figures as metaphors, epanaphora, epiphora that could be used in the introduction or the conclusion of their speech. Students present their ideas to the classroom and get a feedback by their classmates.

sustainable development is achieved".

Epiphora: Sentences or phrases end in the same way. "Solar energy *is sustainable*. Wind energy *is sustainable*. Geothermal energy *is sustainable*."

TIP: A right 'dose' of **humor** is always acceptable in your speech

Lesson Plan 6. Rebuttal and refutation

Title: Rebuttal and refutation

Objective: Students learn how to critically respond to the opposite arguments

Direct Teaching (15'): Vocabulary, Internal Structure of rebuttal, rebuttal approach, examples of rebuttals

A debate is not a debate, if there is no confrontation of arguments. A good debater has, first, to carefully listen to the opponent's arguments and, then, to rebut them successfully. If in the constructive speeches, you are building arguments, in the rebuttal speeches, you knock them down.

Example of attacking an argument

1st move (what they said): The opposition research-team told you that the production of electricity based on the use of nuclear energy would be the only solution to the problem of climate change, because it consists of a zero emission technology, since it emits no carbon dioxide at all.

2nd move (why it is wrong): The fact is that the waste of CO2 would stop but the problem of radioactive waste would remain unsolved although it is extremely dangerous and it has to be carefully looked after for several thousand years.

3rd move (what we said): This is important because it shows that our thesis that electricity must be obtained by

"He who knows only his own side of the case knows little of that." (John Stuart Mill, 2001)

Detail from "*The School of Athens*", Raffaello Sanzio da Urbino

VOCABULARY

Refutation: The term defines the speech act that demonstrates the

renewable energy technologies is the only solution to the climate change problem…

4th move (why it is right): … because renewable energy technologies don't harm the environment as they straight from it and they won't run out.

Example of rebuilding an argument

1st move (what we told you): We told you that the production of electricity through the use of nuclear power is the main solution to the problem of climate change.

2nd move (What they told you): The opposition research-team said that our thesis is wrong because of the danger of the radioactive waste that remains unsolved.

3rd move (Why they are wrong): But they failed to think that the safe, environmentally-sound disposal of high level waste is technologically proven, with international scientific consensus on deep geological repositories. Such projects are well advanced in some countries, such as Finland, Sweden, France, and the USA.(http://www.world-nuclear.org/information-library/nuclear-fuel-cycle/nuclear-wastes/radioactive-wastes-myths-and-realities.aspx)

4th move (why we are right): So, the fact that countries where plans for deep geological repositories have been advanced demonstrates that there is a successful solution to the problem of radioactive waste and consequently, that our thesis is right.

Interactive argumentative activities

Activity 1 (10'): *Yes, and… yes but…* (Gleeck, 2009)

The students are divided in pairs. During the first round of the game, the A student makes a claim, the B student has to respond "Yes but…" and develop his opinion. Then, the A student has to respond again "Yes but…" and develop his opinion, too. The goal of the game is to make students get acquainted with the expression of rebuttals. For example:

A: *The use of wind turbines can provide energy for the home, if it is connected to the traditional power grid*.

B: ***Yes but***, *wind power is not consistent. Even if you choose the best location, the wind will not blow at the same speed continuously.*

A: ***Yes but***, *in this case the wind turbines can charge batteries, which in turn can provide power to the home, when it is not blowing*. (if more ideas exist, the game can be continued).

During the second round, after the initial claim of the A student, the B student responds "Yes, and…" and he/she

falsity of the opposite argument (mainly by attacking the warrant). Refutations generate offensive arguments.

Rebuttal: The term defines the speech act that offers a counter-argument to the opponents' one for challenging its truth. Rebuttals generate defensive arguments.

Both rebuttals and refutations are important during a debate.

Internal Structure of a Rebuttal

-What they said…
-Why it's wrong…
-What we said…
-Why it's right…

(Quinn, 2005:123)

Your rebuttal approach

●Identify which argument you want to attack.

●Show what is wrong with this argument (the warrant? the claim? the facts? the impact? etc.)

●Don't limit yourself to the attack of the opposite argument. Present the reasons why your approach is more trustworthy than the opposite through the comparison and contrast of the two approaches.

develops her/his idea. Then, the A student does the same. The game can be continued, if students have more ideas to share). For example:

A: *The use of wind turbines has several advantages as regards the production of electricity*.

B: ***Yes, and*** *it respects the environment, since it cause absolutely no pollution.*

A: ***Yes, and*** *don't forget that it is essentially free. Keep in mind that aside from the initial cost of installing the turbine, homeowners will have a ready supply of wind-generated electricity for decades.*

Activity 2 (10'): *I couldn't disagree more…* (ESU, n.d.)

The teacher makes a claim and asks students to give reasons that support their disagreement with the claim.

For example:

Teacher: "I believe that the use of wind turbines would reduce the harms of climate change".

Then each student in a circle would express her/his disagreement with the previous student by saying:

Student A: " I couldn't disagree more, because the use of wind turbines could contribute to a warming climate. A Harvard research reported online October 4 in *Joule* that if the United States sprouted enough wind turbines to meet its entire demand for electricity, the turbines would immediately raise the region's surface air temperatures by 0.24 degrees Celsius, on average (Gramling, 2018)".

Student B: "I couldn't disagree more. This effect doesn't mean that it is causing climate change. This warming effect, as Miller told Business Insider. That is a different from the global warming and climate change caused by burning fossil fuels" (https://www.businessinsider.com/climate-effects-of-wind-power-cause-local-warming-2018-10). And so on…

Activity 3 (10'): *The alley debate* Students are divided into two groups and form two lines two meter apart facing each other. Each group-line is assigned to stand for a topic and the other side is assigned to stand against the topic. The teacher sets the topic. One student stands between the two lines and starts moving in a zig zag path in order to listen all the students' arguments for and against the topic. In the end of the path, he/she announces which group influenced her/him more and explains why. (https://debate.uvm.edu/dcpdf/Training%20Games.pdf)

Roy Scott/ Ikon Images/Corbis (http://discovermagazine.com/InnerVoice)

Materials

Pen, notebook, Internet

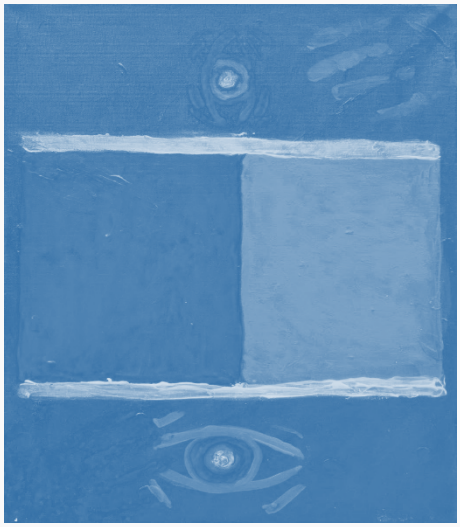
Watch the following videos:

1.*Debate Lesson: Refutation and Rebuttal* (https://www.youtube.com/watch?v=l6_6i-OJ_e4)

2. *Yes, but… yes, and…* (Fred Gleeck,2009) (https://youtu.be/cSzCfsGvwj0)

3. *Alley debate* (https://vimeo.com/93594356)

The project has been funded with the support of European Commission within ERASMUS+ programme



Opposition, Ivan Golubovskiy

Image Source: https://www.saatchiart.com/print/Painting-Opposition/1006528/3716753/view)

Lesson Plan 7. Fallacies

Title: Fallacies
Objective: Students get acquainted with the recognition and examination of fallacious arguments developing their critical thinking

The project has been funded with the support of European Commission within ERASMUS+ programme

Direct teaching (15'): Vocabulary, types of common fallacies

If you want to become a critical thinker, a critical researcher, an independent citizen, if you want not to become an easy prey to dogmatists and to believe in simple solutions to complex problems, it is important to train your mind and your critical thinking. Recognizing fallacies is the first step in achieving this goal! Keep in mind that fallacious reasoning undermines your scientific literacy and an informed decision-making.

Exercise (30'): Each one of the following examples reflects a fallacy. Can you recognize in which category of fallacies it belongs and write it down?

● God exists because the Bible says so and the Bible is the word of God.(Slick, 2008)

_____

● Of course, radioactive waste is too dangerous for the humanity. Everybody knows that; it hardly seems possible to accept your argument.

_____

● Elon Musk has warned again about the dangers of artificial intelligence, saying that it poses "vastly more risk" than the apparent nuclear capabilities of North Korea does. (https://www.theguardian.com/technology/ 2017/aug/14/elon-musk-ai-vastly-more-risky-north-korea)

_____

● Maria's objection to the use of vaccines should be entirely dismissed, since she never examines deeply any subject.

_____

● The universe could not have been created from nothing. So, it must have been created by an intelligent life form.

_____

Science is simply common sense at its best, that is, rigidly accurate in observation and merciless to fallacy in logic, (Thomas Huxley)

VOCABULARY

Critical thinking: The term defines the evaluation of the worth, accuracy, or authenticity of various propositions (Zeidler et al., 1992:438)

Fallacy: The term defines each argument that is considered correct and, from a psychological point of view, is persuasive but, after examination, it becomes clear that it has violated some rule of logic.

Image Source: https://sanamagan.wordpress.com/guest-center/logical-fallacies/

List of Common Fallacies

●**Argument against the person:** when you attack a person's character or credibility than the worth of that person's argument.

●**Appeal to authority:** The conclusion of your argument is true (?) because a valid authority or expert on the issue says so, without further evidence.

● Richard Dawkins, an evolutionary biologist and perhaps the foremost expert in the field says that evolution is true. So, it is true.

_____

● During the operation of nuclear power plants, radioactive waste is produced, which in turn can be used for the production of nuclear weapons. In addition, the same know-how used to design nuclear power plants can to a certain extent be used to build nuclear weapons (nuclear proliferation). (https://timeforchange.org/pros-and-cons-of-nuclear-power-and-sustainability)

_____

● It is observed that persons who go out at night often develop the malady. So, night air is assumed to be the cause of malaria, and elaborate precautions have to be taken to shut it out of sleeping quarters. (Stuart Chase, 1956)

_____

● There has to be life on other planets because as of today no one has been able to conclusively prove that there is no life.

_____

● I don't believe that our scientific Institute should spend money for wind turbines in backyards research. Only two cases of their use were reported by our scientists last year in the local society. These facts don't justify a further research.

_____

● While radiation is dangerous in high doses, there is no evidence of adverse health effects at low doses. So, at low doses of radiation don't harm health. (http://www.world-nuclear.org/information-library/current-and-future-generation/the-nuclear-debate.aspx)

_____

● **Appeal to nature:** Your argument supports that whatever is natural, it is good, healthy and beneficial.

●**Appeal to popularity:** The trustworthiness of your argument results from its popularity.

●**Begging the question (circular reasoning):** The conclusion of your argument is identified to its premises which are not proved by the use of evidence.

The Thinker (Inspired by Auguste Rodin) (https://blog.prototypr.io/5-fallacies-about-creativity-c1b09f5aa5f9)

● **False analogy:** Your argument compares two phenomena or notions that are alike only in secondary characteristics.

● **False dilemma:** Your argument reduces a complex issue in two and only two mutually exclusive choices, although other options might exist.

● **Faulty causation:** Your argument supports that a person or event A is the cause of the occurrence of a later event B, just because it happened before it.

●**Hasty generalization:** Your argument is based upon too little, not valid and insufficient evidence.

● **Slippery slope:** Your argument supports that a certain thing or situation (A) will inevitably lead to a domino effect of other negative things.

The project has been funded with the support of European Commission within ERASMUS+ programme

● The argument made by a scientist, who recently visited our classroom, was that if we don't switch to alternate forms of energy, we will destroy the Earth.

_____

● Our premium herb tea is lovingly brewed from the finest freshly-picked and delicately dried natural T. Radicans leaves. Those who dismiss it as mere 'Poison Ivy' don't understand that it's 100% organic, with no additives, GMO's or artificial ingredients It's time to Go Green and lay back in Mother's arms.

_____

● Parents shouldn't buy cell-phones to their children because they don't want to feel guilty for the adverse health effects that the cell-phones radiation causes.

_____

The Thinker (inspired by Auguste Rodin), Nik Tod

Image Source: https://www.saatchiart.com/art/Painting-THE-THINKER-Inspired-by-Auguste-Rodin/881243/2984047/view)

● **Appeal to ignorance:** Your argument is true because there is still no evidence that proves that it is false and vice-versa.

● **Appeal to fear:** Your argument intends to convince the audience for its truth by creating fear or anxiety to them because of its fearful content.

● **Appeal to emotion:** The argument is not based to logical reasoning or evidence for supporting a claim but to the emotional response of the audience.

For more details on fallacies, watch the following video:
An illustrated book of bad arguments.
https://youtu.be/zD1DkTtUdpk

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