Open Science Schooling

OPEN SCIENCE SCHOOLING

Erasmus+

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GUIDE
for Secondary Schools

UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

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Summary

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Open Science Schooling: Fostering re-engagement in science learning through open science schooling

Overview

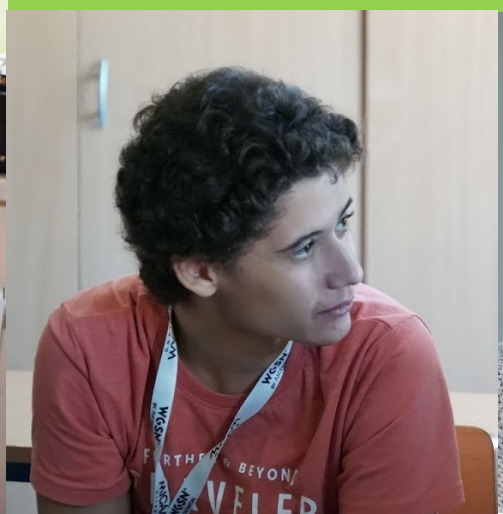













Guide

Practical useful guidance taking schools and teachers through the different steps in Open Science Schooling, offering practical examples and giving useful advice – presented attractively in open virtual formats and in variety of media forms.
The Open Science Schooling Guide for secondary schools and science teachers is the flagship outcome of the project and will offer attractive access to open science schooling in practice.
This Guide is interactive in the section “Same example Activities”. In each Scenario it is possible to have the abstract description of the teacher, the student and the school. Also it is possible in Curricular Implementation to show the subjects related with the Activity. It is also possible to search scenarios by subject involved in each scenario, using the “topic cloud” you will find on page 27 (you should click over the desired topic and, in the bubble that wil appear, click again over the involved scenario you want to reach).
The document has also some linked videos, search for the sign

What is Open Schooling?

"Open schooling" is where schools, in cooperation with other stakeholders, become an agent of community well-being; families are encouraged to become real partners in school life and activities; professionals from enterprise, civil and wider society are actively involved in bringing real-life projects into the classroom *(From the COMMISSION 2015, science education for responsible citizenship).*

"OPEN SCIENCE SCHOOLING(OSS)PRACTICEISREALISED INSTUDENTS'ENGAGEMENT IN FINDING REAL SCIENCE IN THEIR LOCALCONTEXTTHROUGHPRACTICAL ACTIVITIESOUTSIDE THE SCHOOL AND BRINGING THE ACQUIREDKNOWLEDGE BACK INTO SCHOOL.IN THIS WAY,STUDENTS GET A BETTER UNDERSTANDING OF HOW SCIENCE IS APPLIED IN REAL LIFE" *(From the OSS ProjectDeployment).*

The concept of open science schooling (OSS) tries to contextualise science meaningfully for students, using experiential learning (ideas of constructivism) and practical, hands-on activities with the aim of building or manipulating actual objects in order to generate knowledge (constructionism). The aim is to bridge science learning and students through the practical identification of science as it is used in the students' environment and context (e.g., local community). To achieve this end goal, OSS envisions to engage students in real-life science challenges in society and create a solid link between schools and the community. With that in mind, OSS involves students into cross-subject immersive mission-style learning activities, so that personalised learning is attainable through a variety of practice-oriented work.

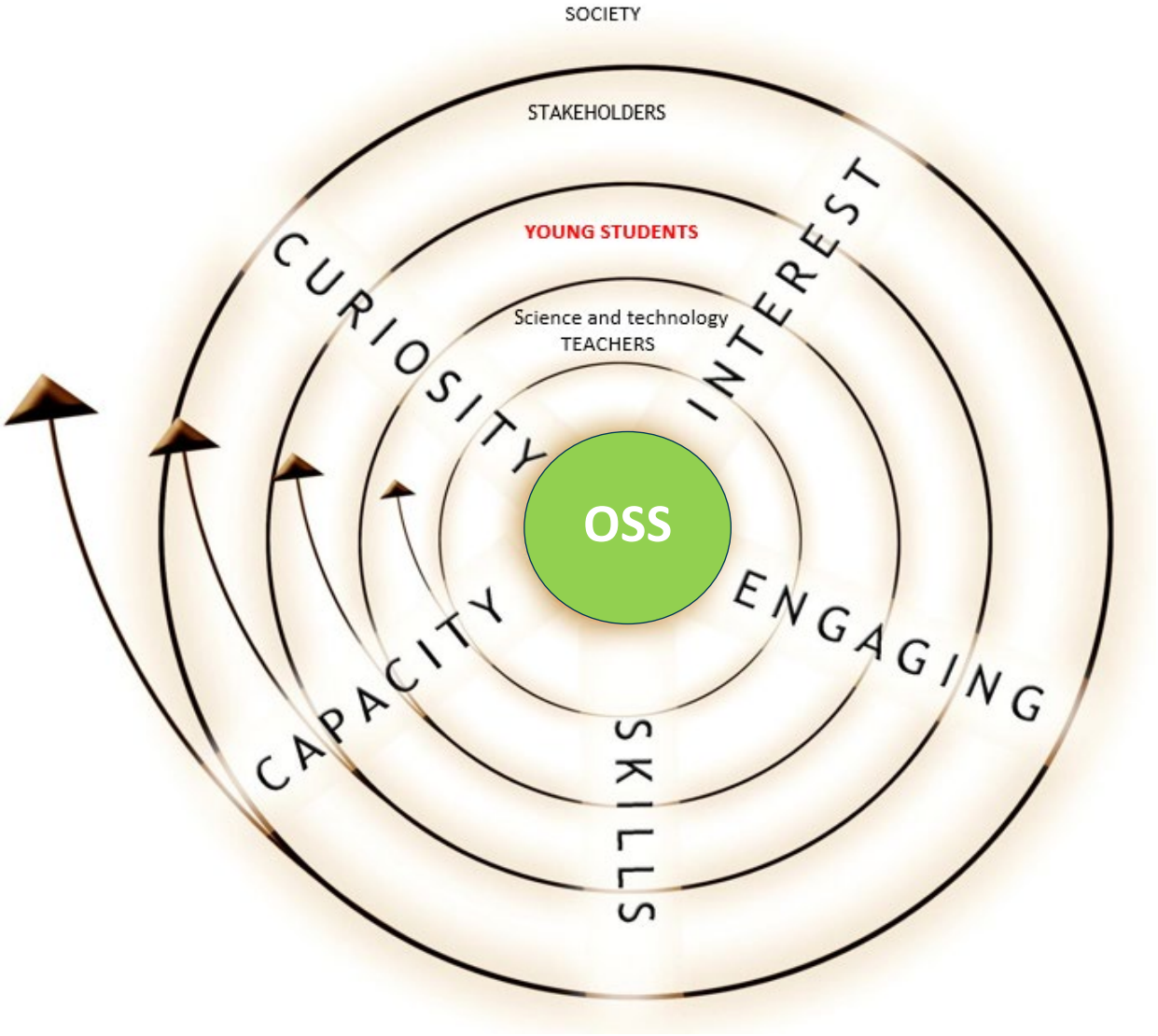
Why?

The Commission calls for the development of new science learning didactic, based on an Open Schooling approach, in which science learning processes are strongly linked to the students' participation in real-life science challenges in society and in real research and in innovation circles. Therefore, the project is called Open Science Schooling, combing the need for re-thinking science learning with open schooling didactic view.

For who?

Science disengagement takes place in secondary school and typically when the students are from 12 to 15 years old, indicating that science resistance is strongly linked to the development of the students identify and personality.

Therefore, Open Science Schooling targets secondary schools, providing teachers and students with the opportunity and resources to develop different learning systems in order to engage young students in science!


SOCIETY
STAKEHOLDERS
YOUNG STUDENTS
Science and technology
TEACHERS
OSS
CURIOSITY
INTEREST
ENGAGING
SKILLS
CAPACITY

Integration

The Open Science Schooling Pedagogical Model

Open Science Schooling (OSS) has been almost exclusively a theory, a concept used in research and policy-making. This makes it very difficult for secondary schools and science teachers across Europe to engage in practical experimentation with Open Science Schooling. The OSS project is one of the first systematic contributions in Europe to the development of resources based on practical experience implementing open science schooling.
The project evidently engages teachers, students and schools, but based on state of art research the project focuses on the participation and co-creation of the students, as innovation in science learning can be expected to be and needs to be driven primarily from students, not from science teachers. As leading EU researchers say: Why don't you start asking the students?

It's not about changing the content, it's about changing the learning system. It's not about changing what, it's about changing how.

How can I integrate Open Science Schooling?

If you're a teacher and you want to implement an OSS (Open Science Schooling) experience, the following recommendations on the stages required for starting a project will be of interest:

0. Be prepared to break the rules (though not the law) and assume that there will be significant changes made to the learning/teaching system, which you will lead.
1. First, you will need to contact the management team, of the school where you work, and the families of the students and tell them that you are interested in organising an OSS project.
2. Once the school's head teacher has given their approval, and taking into account that the OSS will be implemented on a cross-cutting basis (science subjects, social sciences, languages), you should ask yourself the following questions:

- ❖ Which teachers will be involved?
- ❖ In what subjects will it be implemented?

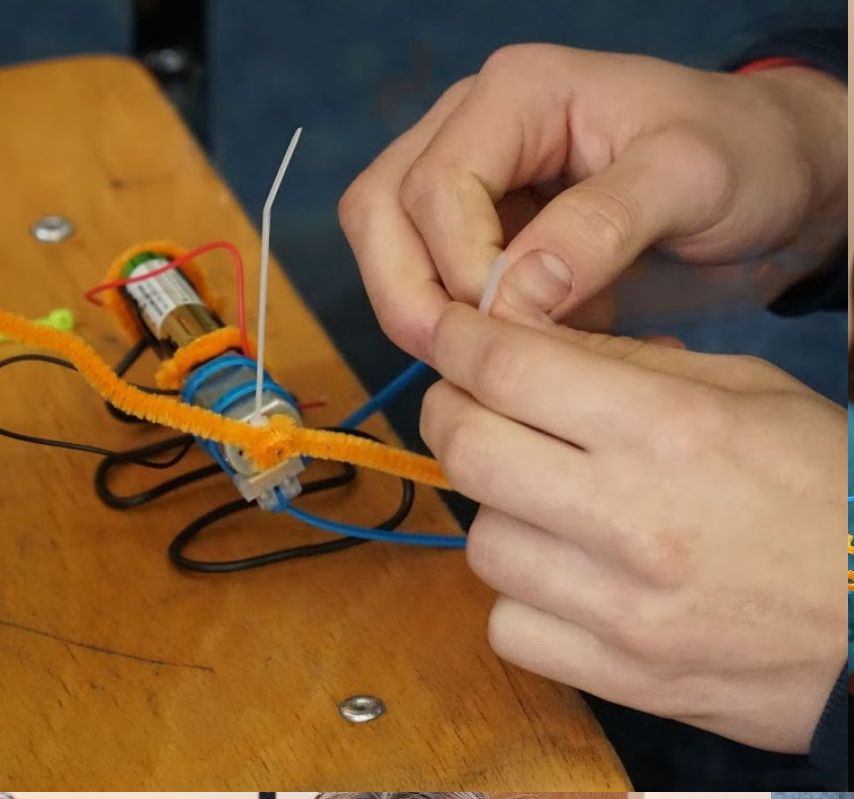
3. Once you know all the internal active components of the school that will be involved in the project, look beyond the school to the wider community and find stakeholders that may be interested in getting involved in the project. These consist of resources that will enrich the project's content and implementation. Below we propose a series of questions to ensure all local stakeholders are considered:

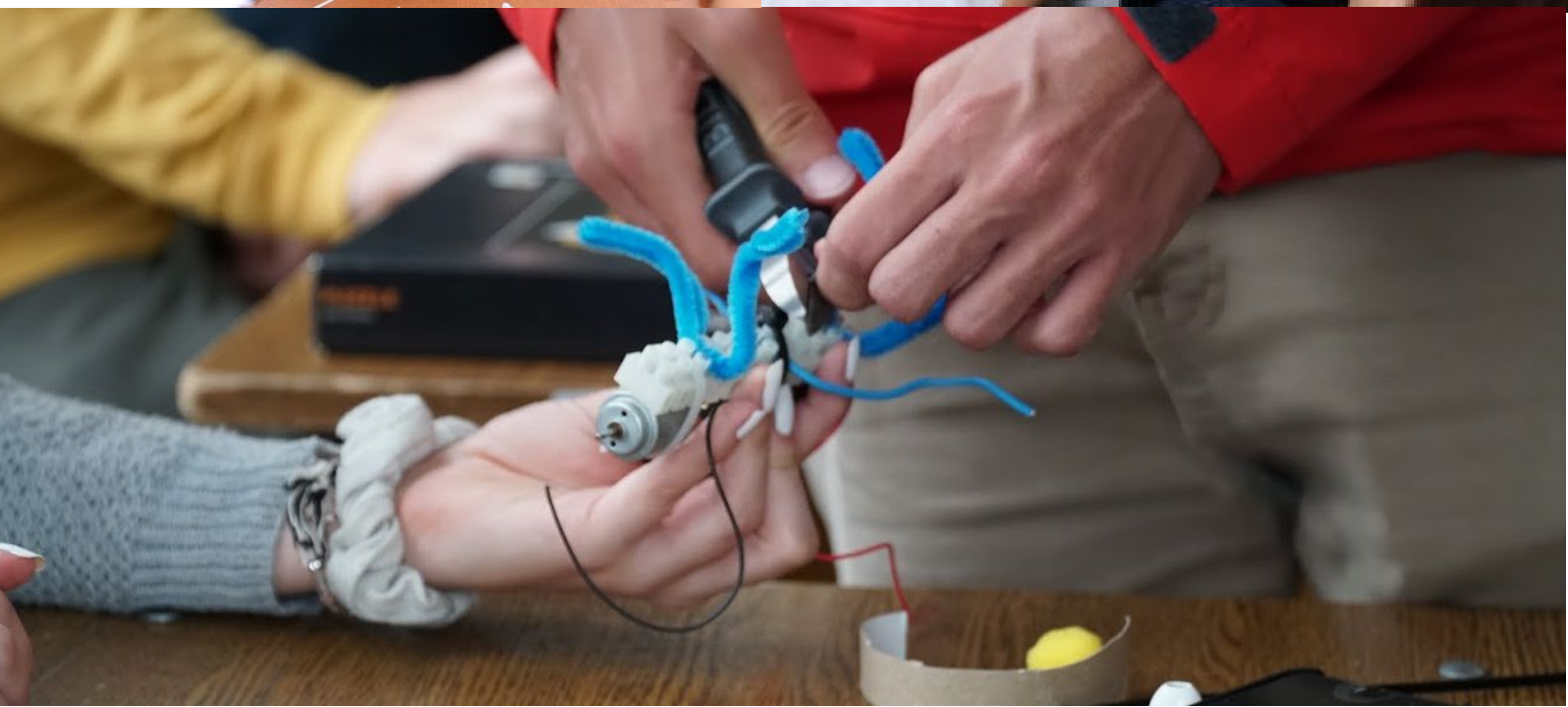
   - Is there a nearby university? Would its involvement enhance students' learning?
   - Are there any research centres that could get involved? Their contribution in terms of creativity and research could be enriching.
   - What local authorities could you contact? This is one mechanism that could give students access to their local communities and enable the actions implemented in the project to have an impact on the wider community.
   - What companies and independent professionals could enrich the project through their initiatives?
   - Are there any associations in the school's local area worth contacting?
   - Parents association of the students's school is an especial and very important stakeholder to include in the project

4. The next decision you make needs to answer the following question: will the project run as part of the school's official curriculum, or will it be an unofficial initiative? This will have an impact on the timetable. Will it take place during the school day, or will it be an after-school activity?
5. Finally, once the framework for implementing the project has been decided, you will need to plan the workload it represents and how many hours the staff will be required to spend per week on the project.

By following these five steps we can put the project into practice!

Practice





This point aims to answer the question “How can Open Science Schooling be practiced in real-life and in collaboration with the (science) community?”
As mentioned in the Integration section, first you need to conduct research on your local area and see what sectors of the wider community might want to get involved. Next, decide how to organise the students:

- How many students will take part?
- Will they all be in the same school year and/or same class?
- How many groups will be formed?
- How will girls and boys be distributed?

Finally, think about the potential missions that students will undertake.

Choice of the Mission

It is essential for students to know their environment in order to decide what mission is the most significant and interesting, while also having the greatest impact on the community. At this point, the teachers need to act as guides. Having suggested various ideas, they should let the students decide.
Another significant factor is, once the mission has been chosen, how long will it last? One term, two terms, the whole school year?

Some example cases

To enable you to follow this guide as easily and effectively as possible, we have put together some real case studies based on a range of school types (see the next Table), where the Open Science Schooling methodology can be implemented.

Administrative status	Public centre
	Private centre
Number of students over 12 years old	Small centre
	Big centre
Situation	Rural area
	Urban area
System of learning	Project Based Learning
	Traditional

Below we outline a range of Schools, and teacher-student profiles, that you may identify with:

SCHOOL A: Public and big centre in an urban area used to work with a traditional system of learning. (Lithuania)

SCHOOL B: Public and small centre in an urban area used to work with a traditional system of learning. (Poland)

SCHOOL C: Public and small centre in a rural area that works with traditional and PBL system of learning. (Catalonia)

SCHOOL D: Public and big centre from an urban area that works with traditional and PBL system of learning. (Portugal)

SCHOOL E: Private and big centre from an urban area that works with traditional system of learning. (Greece)

SCHOOL F: Public and big centre from an urban area that works with traditional system of learning. (Israel)

We also outline several profiles of people that could be involved in the project. The text with a blue background describes teacher profiles and the text with a green background describes student profiles.

Adam: 12 Years Old

Adam goes to secondary school. He's not really interested in any subject in particular and never knows how to respond to questions such as, "What do you want to be when you're grown up?" or, "What would you like to study?" His mum is a physicist and his dad a history teacher. Adam is passionate about two things. The first is astronomy, which he shares with his mum. The second is Science history, which he shares with his dad. His parents gave him a telescope for his birthday, and now Adam spends Saturday evenings star gazing. Now, he has lots of questions he can ask and talk about with his mum, and he also discusses them in physics lessons at school. This is the first time he has shown any interest in these classes.

Adi, 48 years old

She is a History and Communication teacher and Social coordinator her school. She has more than 25 years of educational experience and she is a mother of three boys.
Her passion is being an educator, giving her students tools for critical thinking. She expects her students to be involved and always think of how we can improve our society so it will be a good place for everyone. For a few years, I instructed the students' council in our school. She learned that when she gives them freedom to create and to lead projects, their ideas are creative and wonderful. We established a tradition in our school of adopting, every year, a different non-profit organization. We adopted organizations that work with autistic people, cancer patients, senior citizen and more. This process thought me a lot about student's leadership and made me an advocate for giving students options for working together and controlling their assignments.
She likes participating in science projects. Doing that in science was a great challenge for her on the one hand, however on the second hand it gave the students independence and a lot of responsibility. The fact that they were leading, that there was no fixed schedule and predetermined trajectory generated a problem in motivating students to work on the project in parallel to their other school assignments.

Aki: 26 Years Old

Aki is English teacher really excited about teaching. Having just completed his degree he wants to make the most of his expertise on new technologies to come up with innovative tools for explaining the subjects. These range from audio-visual practical sessions and collaborative work, based on immersion experience, to recommendations by science communicators and experiments, in formats designed for future generations. Public safety is directly connected to Aki's other great passion, firefighters. He wants to make the most of this opportunity to put together a work group that connects class work with safety workshops, open to local residents. Therefore, he intends to propose open multidisciplinary education, which helps students gain a different perspective on the practical application of chemistry.

Althea: 47 Years Old

Althea took a degree in Teaching and also Biology. She has been a teacher for the last twenty-four years. She has worked in lots of schools, in a variety of countries, and has worked with different methodologies. This has led her to the conviction that learning through networks helps us as a society and reduces the generation gap. In the same way that English has enabled her to connect with people internationally and culturally, scientific and technological knowledge, applied openly to society, allows ideas to be conveyed to a whole range of people from very different realities. For this reason, she is currently involved in a project that brings together old people in the neighbourhood and secondary school students, based on knowing the investigation of the University research groups. The subject material ranges from the university projects with the study of natural history, including respect for nature, browsing the internet and researching information online, in dictionaries and in encyclopaedias.

Anna: 54 Years Old

Anna is Chemistry teacher and she has been a science teacher for more than twenty-five years. She studied a Chemistry degree, and she loves being able to share what she is passionate about with her pupils. She teaches twelve- to fifteen-year-old students and she's always looking for a way to get them excited about studying chemistry. She thinks the most important thing about her job is to pique students' curiosity and motivate girls to take an interest in pursuing science. This prompts her to arrange interesting nature outings to study climate change. At the same time, she also seeks out areas of the lab to do practical lessons and use the secondary school's equipment. Her professional experience has shown her that teaching and learning are most effective when they take place through doing. This philosophy has always motivated her to try and connect her classes with real life and give her students a say.

Artur, 44 years old

Artur is a curious Biology teacher and this is his first "love". To better know his "love" he needed to study the English language which enabled him to know more about the newest discoveries in biology and to share a few ideas in the classroom. This is how he became a Biology-English teacher. This job to be honest, is kind of definitely challenging one and can be also exciting and satisfying. He is always looking for the answers for the questions "why? what? when? ..." Satisfaction motivates him to carry on and do more. Fortunately, there are always fantastic and smart students to do so. He has got some hobbies, he collects butterflies and moths but not only and also investigates and does research their ecology. Trips and photography are his next love.

Daniel, 12 years old

Daniel goes to secondary school. He's really interested in robotics, and his parents have signed him up for an after-school club at school in which students design and build a robot and then take part in competitions. His 16-year-old sister has a physical disability and uses a wheelchair. Despite her disability, she plays basketball twice a week. Daniel always says that he'd like to design an amazing robot that would help his sister and her friends from basketball do lots of other things. He is worried about emergency situation specially for people with physical disabilities.

David: 45 Years Old

David studied History more than fifteen years ago. He has two years' experience as a Social Science and History teacher, working at a secondary school. His chief interest is flying drones and taking part in drone racing championships with his two daughters, aged eight and ten. When his daughters ask him questions about the drones, planes and machines in relation to aeromodelling, a world they've discovered through David, he realises he answers their questions by basing his explanations on historical moments that were important for the development of these machines. Furthermore, when he talks to friends and colleagues about his classes at secondary school, he says that he would like to connect grand inventions and important technological and scientific advances with their historical context, as he believes that it constitutes an essential part of their study.

Diego, 17 years old

Diego is Venezuelan but he immigrated to Madeira Island. He likes to listen to music specifically classic rock. He practices karate and he is really into all the sports.
Her favourite subject is biology and because of it in the future he would like to be a zoologist but he is not sure of it wet. Normally he studies 2 or 3 hours a day and he spend almost that time studying maths.
Her opinion about science is that it's a combination of different types of knowledge and it helps to develop the world around us for example, to have a better quality of life nonetheless if we abuse of it we will have several consequences.

Dominika, 14 years old

She likes Maths, Biology and Art. She is interested in experiments, singing and playing volleyball. Dominika enjoys learning science. During a few lessons at school she has seen some interesting experiments and she really likes them, but according to her there are too little of them. She watched a lot of laboratory based movies, but nothing can replace practical activities. She takes part in scientific events and programmes developing her skills and interests. In the future she wants to become an architect.

Glòria, 52 years old

Glòria has been a teacher of Biology for 30 years. When she was a student, she learned Biology in a theoretical method and she realized that sometimes she memorized without understanding the concepts, so, when she becomes a teacher she tried to teach the concepts with practical demonstrations in the laboratory and she do still do it today. She nearly always tries her students to question where or what or who or how … the things happen. She wants her students to like the subject, have fun with the topic and like to discover more things related to the topic we may be studying at the moment. Sometimes, she succeeds. She bases her methodology on asking them some questions first, before getting inside the topic itself, so, they can realize their knowledge and become curious about the coming lesson. She wants her students to be critical with science and distinguish between science and pseudoscience, and give arguments for and against.
Her centre is near the natural environment so she tries to take advantage of it to teach biology in context.
Her hobbies are also related to nature. She loves hiking, skiing, cycling, dancing … she feels that when she goes up a mountain is like a learning process: you may suffer on the way up but enjoy the view once on the top. Her job is also a hobby because she enjoys learning from her students in many senses: the way they react, they talk or explain things…and this is also a way to learn.

Hannah, 16 years old

When she works in science projects she felts not sure whether her team understood the project correctly or not. She was expecting the experience to be interesting, since she has never met before with students from other countries, but she was a little bit worried that the work will be very intensive. She also thought that it will be hard to communicate in English during the project. She thinks that in practice the communication was pretty good. The meeting with people from other countries really was an outstanding experience, and the work wasn't too much intensive at all. In fact, she thinks it should have been more intensive. We saw that every team understood the project a little bit different, but she thinks that this fact led to the diverse variety of project outcomes that we saw during the project, and it is a positive result in her opinion.

Ilias, 34 years old

Ilias was born in Katerini, Greece. He had a great childhood there and when he graduated lyceum it was time for him to go to Heraklio (Crete) to has his degree in Physics. It was then that he realized that teaching was something that fascinated him. In order to learn more about it, he had a master in "New technologies and research in didactic of Physics", in another Greek city called Ioannina. He returned in Katerini and started teaching in "Platon School of Katerini". He got married and had two great children. A few years later, he realized that he had to try and find more attractive and engaging ways of teaching. In order to do so, he started a PhD in finding new tools for teaching STEAM. Ilias has also participated in a lot of Erasmus+ projects through the last years. He likes travelling and playing games with his children.

Jana, 14 years old

Jana is a huge fan of social media. In fact, she likes to think of herself as a "youtuber" and when she's older she would like to publish social media content professionally. She already has a large community of followers, and one of her videos has reached one hundred thousand views across a range of platforms.

She is also a follower of the "Fridays for Future" movement, and her videos often talk about climate change and environmental pollution. For this reason, she has read a great deal on the topic and makes the most of any opportunity to publicise it amongst young people of her age

John, 15 years old

John is a very good student. He is from Greece but he has spent the most of his time in USA so he knows how to speak English fluently. He either wants to become an actor or a teacher. He gets out with his friend and has fun but also spends his time studying. His favourite subject is Maths. He loves his parents a lot. His mother is a doctor and his father is also a teacher. He could also become an influencer on the Instagram, so he always takes some nice photographs while he is out with his friends. John also loves sports. He plays basketball and everyday he goes to the gym because he wants to make a great muscular body. John also likes watching movies. He is very friendly and kind and loves everyone. Last, but not least, he has a dog, because he loves animals, and the name of his dog is Arthur.

Laura, 15 years old

Laura has no interest in science. She’s never felt involved and doesn't see how it could help her. Despite this lack of interest, she plays sports with her class mates and friends every day of the week, after school. She tries to apply the values she has learnt doing sport, such as dedication and teamwork, to everything she does. However, she doesn't find it easy to feel motivated to learn about science or discover a connection between science and her passion for sport. What she learns in class could be applied to understanding sport in a variety of ways, to improve its practice at school and in the wider community. The practical application of sport in their school particularly for children with special needs is very important for her.

Liudmila, 46 years old

Liudmila is a Language teacher and coordinator projects. Her first love of languages came from her experience of learning English at school. Her teacher said that your obtained knowledge is the key to success and developing of a person's mind-set. She also mentioned that speaking languages means travelling and filled her 12 years old mind with wonderful images of the world's most beautiful sights: London Tower, Houses of Parliament, stunning architecture of World's ancient cities like Rome, Barcelona, exotic sounding and looking different local foods and different traditions. Her first teacher was creative and broad- minded. At that time, she did impossible thing- transformed her little classroom, situated in a small Lithuanian town Pasvalys, into a heaven of images, sounds, tastes and atmosphere as blessing for the soul. She made her spirit come alive and when she becomes a teacher herself, she always tried to remember the importance of inspiring her students not only to learn a language or any other subject ,but to learn to love it, feel it and try to live in it. Feelings are so important in a teacher's job. The saying says: "They may forget what you said but they will never forget how you made them feel".
Project based learning is also about how students feel while learning. It gives them a possibility to feel many various feelings which, later on, becomes so important and handy in life.

Mark, 36 Years Old

Mark studied a degree in Physics. He worked in the video games industry for many years, and for the last five years he's been a teacher. He has a great rapport with teenagers. He decided to change his career so that he could teach the science behind the video games to future generations, who will develop new technologies that will be applied to the design of virtual worlds. His goal is to encourage students' creativity and environment interesting. He also wants them to see learning in science applied to the activities they like most in life. At the same time, he is really worried about the climate change. He wants to understand where the students' focus lies in environmental issues, through doing questionnaires and observing student development during practical sessions in the computer lab. This will help to improve the positive qualities of their skills, such as teamwork, leadership, taking decisions in stressful situations, etcetera.

Natalia, 17 years old

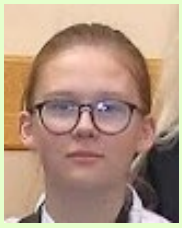
Art, music and science, these are the three words that describe her the most accurately. Since childhood she's been a big fan of opera performances, especially the ones composed by Tchaikovsky. Apart from that she loves nature and horse riding. Her favourite part of that sport is going on recreational rides in the forest. Following that interest, in her spare time, she loves to sketch horses and her beloved dog - Bella. Despite the strong interest in art and music, she wants to pursue a career in Medical Sciences in the future. Additionally, being a creative person, she loves to incorporate her ideas in various social projects, which she creates with her friends. Science gives an ideal opportunity to exchange ideas with other people and create unique solutions to challenging problems.

Nicoleta, 32 Years Old

Nicoleta has just completed his doctoral thesis in Maths. He really enjoyed doing research and wouldn't mind continuing in this field one day. At the moment, though, he wants to do something more practical. He'd like to convey his passion for maths to future generations, which is why he's working in a secondary school as a teacher. He's still got lots to learn about this profession but he researches all the new methodologies that are being developed for teaching science and maths. At the same time, Nicoleta volunteers at an old people's association where he enjoys designing activities for doing maths. He thinks that it's a good way of stimulating people's minds and developing communication, because numbers are the same for everyone.

Paula, 16 years old

She is a friendly person, responsible and creative. She plays volleyball five times a week and she love this sport. She likes the music too, and she plays the electric bass. In her future, she would like to study something related to science or education.
When she participates in science projects she could discover that we can find science everywhere. She thinks that learning with practical experiences is better than learning in the classroom because you can understand everything much better. In this kind of projects, she has learnt a lot of things!



Rugile, 14 years old

Rugile always liked science and wanted to explore it more, observe, do interesting experiments, think like a scientist and know how things work. Because science is everywhere, what we eat, how we come to who we are, how our body works our environment… There is so much information out there and she wants to learn as much as she can, she wants to know why. Science gives her the WHY.
She enjoys working in team, it was much more fun than working alone. We all had different strengths and we tried to combine them to accomplish the best results. She felts special when she got a mission to do. She was engaged and she got an opportunity to explore.

Sergio, 42 years old

Sergio currently lives on Madeira Island, but he is from a small village, Silveiro, which is part of the Aveiro district. He is married and the father of two boys, aged eight and six. He loves to travel and get to know new cultures and meet other people, he just feels sorry for not being able to do this more often and for longer. He is a Biology and Maths Teacher although he prefers Biology. His students are between ten and twelve years old. He loves their curiosity about science. He sees himself as a funny and adventurer person and he likes to show and transmit this part of him in classes. He loves teaching and he always look for new challenges and new methodologies to work with students. He loves teaching, yet it is becoming harder as time goes by, thus the need of changes to the Education System. He considers Science essential since it has unravelled the unknown and helped us emerge from the shadows of ignorance and the unknowns of the Universe.

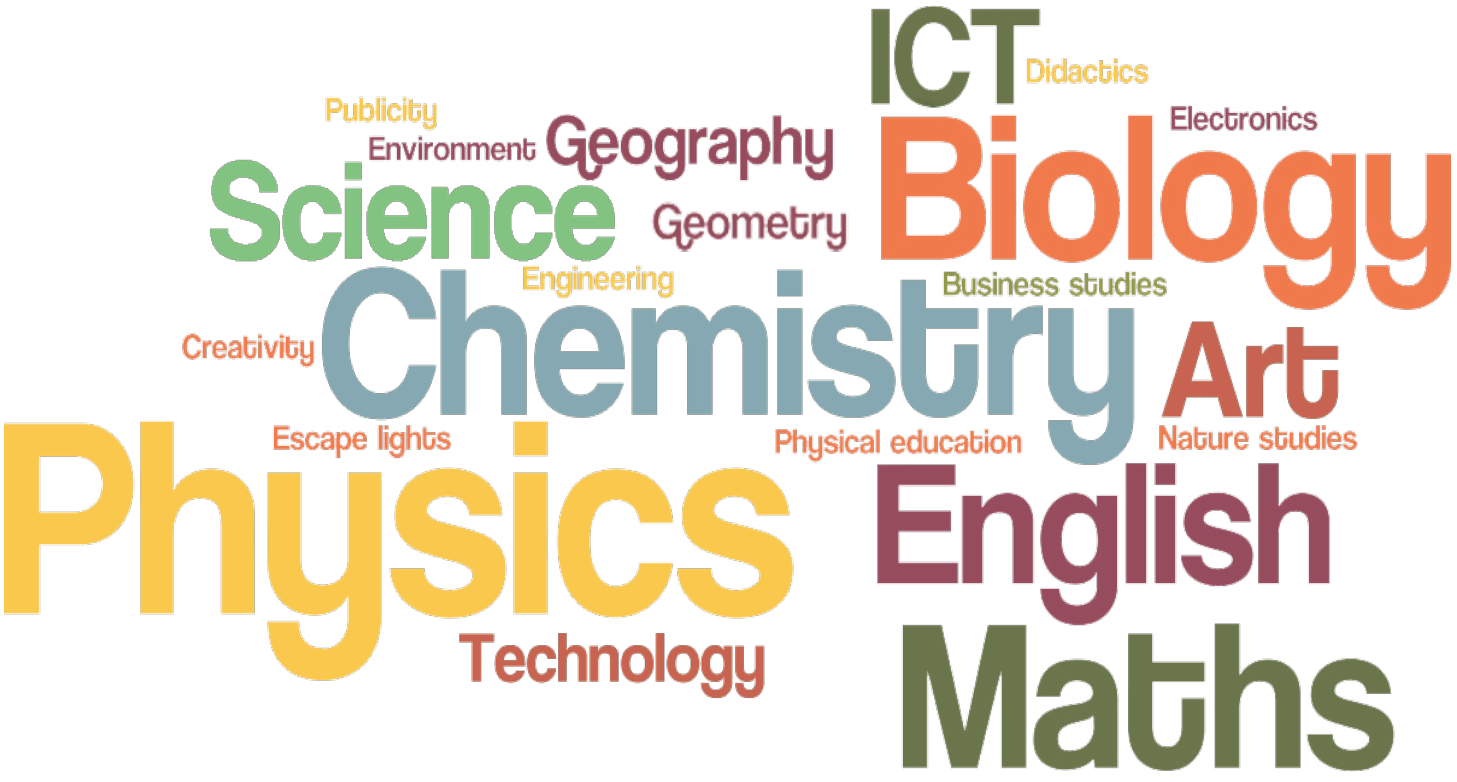
Sofia, 17 years old

The favourite subjects of Sofia are Biology and Maths. In her spare time, she enjoys doing roller-skating, playing violin and watch Netflix series. Her favourite dessert is ice-cream. She considers school something important, which helps us prepare for our future despite being exhausting. In the future she would like to be a doctor to help people to overtake and cure their diseases.
She thinks science is one of the most important things in the world because it is everywhere and in all we do. Science is also very important to find the right medication and cure for illness.
What worries her most and she would change if she could would be in favour of the environment, that is, less pollution like avoiding plastic, etc.

Some example Activities

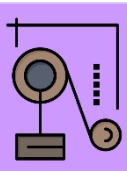
Based on the Erasmus+ Development project, the following is a range of activities that could be used as a source of inspiration.

You can browse all scenarios or access each one directly by their related topics by clicking over the desired topic in the following topic cloud and clicking on the links in the pop-up that will appear:



SCENARIO 1


People
Teachers: 6
Students: 24
Curricular implementation
1-2 h per week
4-5 subjects
Extracurricular implementation
2-3- h per week
Where and How
School, city, library, trips, events…
In groups of 5 students
Students
Brainstormed the ideas, are freedom
Teachers
Are experts in the topic Mission and sometimes just supervised the students
Criteria
Local environment, local project in healthy body, parent's club, municipality support
Mission topic
Inclusive science learning in nature: practice into the learning process of children with special needs
Nicoleta
Laura
SCHOOL A



Geometry in Nature

Description

Our search for geometrical patterns in nature began just when the ground got covered with snow. We split up into teams and divided ourselves among zones. We used our bodies to form geometrical shapes; Is this like a trapezoid? Having drawn various geometrical shapes in the snow, we used glass cups to mark the corners, and flags to draw the names. We searched geometrical riddles in a Vase. First, we prepared the vases. We filled them with soil and decorated them with white geometrical shapes. We investigated some spices – dill and pepper – and their seeds. The students were reminded of what sprouted spice plants looked like. Everyone drew a geometrical shape on top of their vase's soil, then poured the seeds into the drawn shape and watered them. After some time the students saw the GROWN shapes of the figures they had drawn. All of us were convinced that Geometry exists in nature just beside you. The students show their products in a Fair for old people and for children.

Learning Objectives

To teach the children with special needs identify geometrical figures appearing in different environments / To help the children understand that geometry is a necessary part of everyday life / To creatively consolidate the obtained knowledge and turn it into practical experience.

Previous actions of the teacher in order to develop the Activity

The first thing the Special pedagogue made sure the children did was memorize the name for each geometrical shape they were likely to see outside in nature. The teachers of Science and Maths also cooperated presenting the material beforehand during their regular lessons.

Description of the importance and implication of the stakeholders

The teachers contact with an old people association in order to share the results of this project, and encourage students to teach what they've learned to other children in a cultural fair.

Strengths of Activity

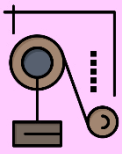
Interactive engagement, collaborative learning, better attention, increased students' engagement, more student ownership of learning process, sharing the results with different collectives.

Outlook

New active learning methods like the ones mentioned above are transforming the way our students live, study, play and think. With the help of the projects we can make sure our students think in a positive way concerning the planet, nature and humankind.

SCENARIO 2


People
Teachers: 6
Students: 24
Curricular implementation
1-2 h per week
4-5 subjects
Extracurricular implementation
2-3- h a week
Where and How
School, city, library, trips, events…
In groups of 5 students
Students
Brainstormed the ideas, are freedom
Teachers
Are experts in the topic Mission and sometimes just supervised the students
Criteria
Local environment, local project in healthy body, parent's club, municipality support
Mission topic
Elaboration and commercialization of bookmarks
Liudmila
Rugile
SCHOOL A



Nature bookmarks

Description

To “Let’s Capture the Nature making the bookmarks with the dried leaves” we went on “nature hunt” to collect and identify different kinds of leaves. Our leaves feel: Smooth, wet, bumpy, crunchy, and rough. We identified the shapes: like a hand, a fan, a heart, an oval, a raindrop, etc. We made observations: Leaves have veins, stems can be different colours, and Leaves can be used for decorations! (This is how we came up with the idea of making the Bookmarks). We collected different leaves and flowers and dried them out (it took 2 weeks). We started creating placing the leaves in various combinations and patterns on the lamination paper. We captured the “Pictures” using the lamination machine. This activity requires accuracy and patience. BUT the results were amazing!

Learning Objectives

Will identify and be able to describe the shapes found in natural surroundings / Will learn how to collect and preserve leaves for making an herbarium / Will learn how to assemble the bookmark patterns / Will present the results to broader community by producing the bookmarks.

Previous actions of the teacher in order to develop the Activity

Integrating OSS into learning English our students were offered to do the “Leaf Investigation” We studied the shapes and qualities of different leaves, their texture and colours.

Description of the importance and implication of the stakeholders

The activity was important for all the community (the students, teachers, parents and even staff helped with the collecting of the raw material- flowers and leaves).
It created the ways how to bring different people (generations) together under one purpose. We have created a rich collaborative environment.

Outlook

With these activities we wanted to show that schools will need a much wider variety of places for learning — from spaces where large groups can work together to secluded corners for concentration, and everything in between. We have moved away from the notion of students in rows silently listening to a guru at the front, to more interactive, technology-rich learning environments where the relationship between teacher and student is radically different and environmentally friendly

SCENARIO 3

People
Teachers: 3
Students: 18

Curricular implementation
NO

Extracurricular implementation
2-3- h per week

Where and How
Trips, librairies…
3 groups of 6 students – different classes

Students
Have been offered 5 different Missions and they also have 3 ideas. During a meeting student decided to work on that

Teachers
Help the students and tutored the choices and the conclusions

Criteria
Local environment, the teachers are experts in the topic
Mission

Mission topic
Investigating the relationship between body mass index, weight and abundance of the moths

Artur

Dominika

SCHOOL B

Moths diversity in a natural reserve

Description

Students were invited to collect field data in moths by using the light traps. Also trap system is designed to count moths. Sometimes students went to reserve and provided moths catching in the reserve at nights, but usually the teacher was going there (during the school year). Then every Saturday the meetings with students were held at school were students were identifying the moths. The Latin names of species were written in a special database. Then students prepared the posters showing the diversity of moths in natural reserve during the scientific conference for young scientists in the capital. During the meetings and field research the group of students were camping, catching and observing other animals, taking photographs and recording the films.

Learning Objectives

Analysing the level of local biodiversity and his importance in measurement of environment quality / Working the scientific method in practice / Having a positive attitude according to conservation and protection

Previous actions of the teacher in order to develop the Activity

The teacher got the allowance from local authority to provide the field research in local reserve which was done thanks to cooperation with the university and teacher's scientific interest in this subject. Bibliography was known to the teacher and previous contact to university was created.

Description of the importance and implication of the stakeholders

The Faculty of Biology and Environmental Sciences of University was involved in the project. Thanks to the cooperation we could apply for allowance to provide and took part in the research. We could use the light traps and know-how the scientific procedure. We were also invited for scientific conferences for young scientists.

Strengths of Activity

The results were strong. Students knew how does the real science work and look like. They knew in practice what is science for, its practical use and full process of scientific method. The results were scientific posters, speeches and articles.

Outlook

Based on this experience we can still present our findings showing up to our local community how rich our local reserve is by preparing local events e.g. moths exhibition in local museum.

SCENARIO 4


People
Teachers: 3
Students: 18
Curricular implementation
NO
Extracurricular implementation
2 -3 h per week
Where and How
School and University. Workshop of all the groups
Students
Analysed and take decisions, they work on by themselves
Teachers
Very experts in the topic.
Contact with the University
Criteria
Local environment. Cooperation and support of the local University
Mission topic
The goal is to create and showcase an attractive science activity during the science event – Biologists' Night
Althea
Natalia
SCHOOL B

Give 5 to a butterfly!

Description

The students provided the workshop “Give 5 to a butterfly” in Faculty of Biology and Environmental Sciences at University. The aim of that activity was to make the butterflies and moths interesting topic for teens. They also wanted to present the entomologist every day practice and how to do the field research in entomology. Participants of the workshop could identify species by themselves and preparing the microscopic slides of insects’ bodies – investigating their anatomy and morphology. Before the workshop students prepared the showcases with moths, practiced microscopic slides preparation, prepared the presentation about moth’s biology and ecology.

Learning Objectives

Knowing the ecological patterns used in assemblages of insects / Understanding the relationships existing in ecosystems / Understand the necessity of scientific research enabling understanding how the ecosystems function / Knowing how to present the results of new scientific discoveries.

Previous actions of the teacher in order to develop the Activity

The activity is based on the outcomes created during the project. We got the knowledge about the moths and butterflies, their biology, ecology, morphology and conservation matters. Based on our experience in realising two previous activities students were ready to create and provide additional and attractive activity during the popular science event – Nights for biologist.

Description of the importance and implication of the stakeholders

The event took place in the universities laboratories which enabled providing such workshops for other schools coming. The faculty such cooperation is also important, because scientists there can share their knowledge with the society.

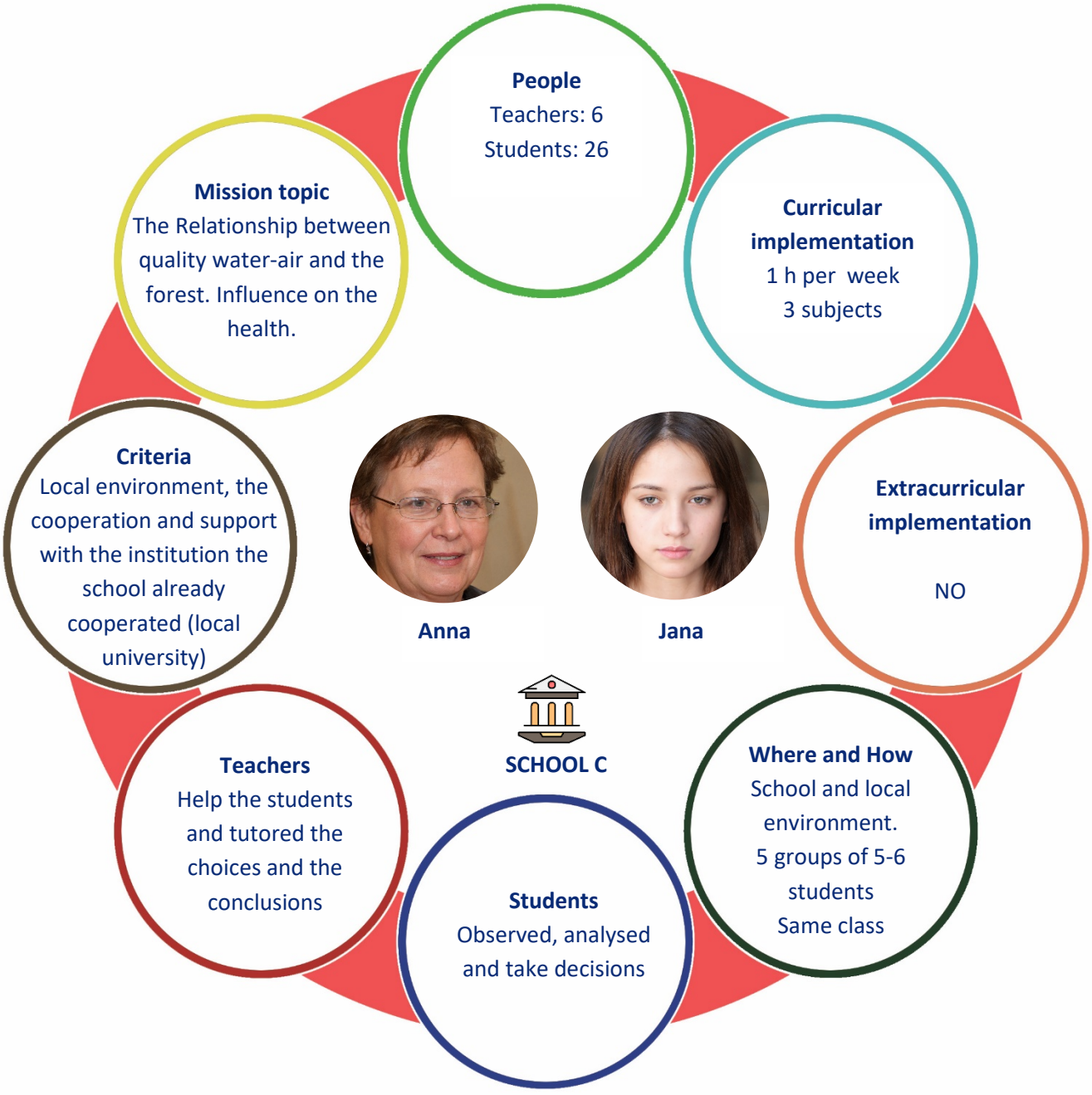
Strengths of Activity

To do so, it requires lots of time and the students need to work in group, divide tasks, prepare and practice such workshop and feel confident in the context of presenting field. The teacher needs to apply very early before the event, and he is not sure about the result of the final workshop.

Outlook

This activity can be developed, repeated and practised during similar or other events.

SCENARIO 5


People
Teachers: 6
Students: 26
Curricular implementation
1 h per week
3 subjects
Extracurricular implementation
NO
Where and How
School and local environment.
5 groups of 5-6 students
Same class
Students
Observed, analysed and take decisions
Teachers
Help the students and tutored the choices and the conclusions
Criteria
Local environment, the cooperation and support with the institution the school already cooperated (local university)
Mission topic
The Relationship between quality water-air and the forest. Influence on the health.
Anna
Jana
SCHOOL C

Study of the air and water quality of the river

Description

Divided into two groups, the students taking part in the project will study the water quality of the river as they walk through the town and the air quality of different locations. A third group of students in the project will document all the processes on video. Measuring air quality will be based on consulting data found on the web, which uses real-time measurements from the Air Quality Monitoring Network, which is part of the Government. Information was provided by the University. The students made a survey about the health problems related to the pollution. To measure water quality, samples will be taken from different points of the river to determine basic physicochemical and biological parameters.

Learning Objectives

Knowing the physical and chemical properties of the water of the river and the air around us / Searching data from reliable sources and using IT programs to make diagrams / Realising about the impact of polluting substances in water and air quality and health / Learning from the forests as reservoirs of medicinal and food resources that can contribute to improve health quality.

Previous actions of the teacher in order to develop the Activity

A search in the local community has been conducted to find out who could help (different enterprises). As the Forest was the common topic for all projects, this group decided to study air and water quality for the importance of living in a healthy environment. The City Council has told us that the nearest place with a measuring station in capital of its region. A comparison with other big cities was carried out.

Description of the importance and implication of the stakeholders

Having open access to data from the Government Weather Stations has been essential. Members of the University research group have taught us how to access these data.

Professionals from the local television station have taught us about the lighting, sound and operating equipment needed to record video.

Strengths of Activity

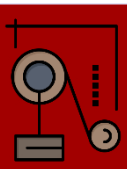
As pollution is a world problem nowadays, the students felt motivated to learn more about this issue in our local area. They wanted to know the levels of pollution in the air and water and see if this had any consequences in the health of the inhabitants.

Outlook

Making people aware that the forests are reservoirs of medicinal and food resources that can contribute to improve health quality and that it is necessary the forest conservation.

SCENARIO 6


People
Teachers: 6
Students: 26
Curricular implementation
1 h per week
3 subjects
Extracurricular implementation
NO
Where and How
School and local environment.
5 groups of 5-6 students
Same class
Students
Observed, analysed and take decisions
Teachers
Help the students and tutored the choices and the conclusions
Criteria
Local environment, the cooperation and support with the institution the school already cooperated (local university)
Mission topic
Elaboration of cosmetics: Search for natural materials and home-made recipes to extract natural essences from selected plants
Glòria
Paula
SCHOOL C



Isolation of essences from local plants for cosmetics elaboration

Description

Students started this activity searching information from different sources in books or from the internet about the process of soap making. They observed the aromatic plants found near the school and their use in medicine and organized the plants in a herbarium. Then they collected some aromatics plants, made the micro-distillation of rosemary in the laboratory so as to obtain the essential oil. They collected used oil to recycle it for the process and finally the students made different attempts to find the right recipe to get a good texture of soap with a good smell and colour.

Learning Objectives

Being able to extract essential oil from the aromatic plants in our forests by micro-distillation / Recognising those plants in our forest's areas which have therapeutic or other chemical properties / Practising the scientific method / Point out the importance of the 3 Rs (Recycle, Reuse, Reduce) to get some of the sustainable goals / Learning from the forest as a reservoir of natural resources for economic development.

Previous actions of the teacher in order to develop the Activity

Teachers searched information around isolation of essences from plants. During the school year 2019-20 the group visited a Natural Centre of Herbs and Plants in the area. Teachers learnt how to do a micro-distillation in order to extract oil essences. How distinguish different aromatic plants and their uses. They also learnt some recipes about soap making. They collected aromatic plants, dried them and made the distillation process at school using recycling oil.

Therefore, the teachers gave the students the needed theoretical information and the possibility to practise the processes afterwards.

Description of the importance and implication of the stakeholders

Having stakeholders involved in the project was very useful. The four participants worked together well so as to achieve the goals as a team. They had to decide on the topic related to the forest, had to organize their tasks etc.

Strengths of Activity

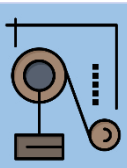
As pollution is an interesting topic to students, they were motivated when doing this research and activity. Mainly because they were the ones who decided on this project so this made them feel more involved.

Outlook

Making a collecting used oil to be recycled in a near future in our High School. This project involved students and teachers and give us the opportunity to make students become more sustainable responsible.

SCENARIO 7


People
Teachers: 4
Students: 11
Curricular implementation
2-3 h per week
4 subjects
Extracurricular implementation
2-3 h a week
Where and How
Mainly on Saturdays, in several places. school, institutions and companies.
2 groups of the same class
Students
They have chosen the Mission freely
Teachers
The teachers only gave some examples of topics that could work related to our society
Criteria
Local environment
Mission topic
Making a research about renewable energies available in the own community
Mark
Diego
SHOOL D



What renewable energies in my community?

Description

The objective of this activity was to know the perspective and knowledge that this expert had on the energy obtained through the sun and the wind, with more emphasis on the second.
It was possible to conclude which areas of community have a higher incidence / radiance of the sun for better use of solar energy. As well as the heights of the year in which the values are higher or lower.
The participants came to these conclusions through the discussion, the analysis of data collected over the years, the analysis of graphs. It was also possible to know and manipulate / experiment / test some of the instruments that are used to collect and process the data that were used.

Learning Objectives

Analysing the advantages and disadvantages of each type of renewable energy / Justifying the use of renewable energies / Studying the instruments are used to collect data to support these studies Characterising of the best materials to use for the construction of energy collection instruments.

Previous actions of the teacher in order to develop the Activity

Contacts were made with various companies exploring renewable sources, as well as other institutions. Research of experts who were available to work with students on the project accordingly. Contact with the specialist who accepted the challenge, with the objective of planning the activity: objectives, necessary material, place to perform the activity, schedules, preparation of the activity with the students.

Description of the importance and implication of the stakeholders

The possibility of working with an expert such as the Engineer. The ability to experiment / work with some data collection instruments on sun irradiation and wind values.

Strengths of Activity

Creating a liaison with your project's area of expertise. Awareness of what is going on in our surroundings, regarding the application / development of renewable energies.

Outlook

Based on this activity the students were able to use the information and knowledge to outline the course of their project. Preparing upcoming activities based on the results and conclusions of this workshop.

SCENARIO 8


People
Teachers: 4
Students: 11
Curricular implementation
2-3 h per week
4 subjects
Extracurricular implementation
2-3- h per week
Where and How
Mainly on Saturdays, in several places. school, institutions and companies.
2 groups of the same class
Students
They have chosen the Mission freely
Teachers
The teachers only gave some examples of topics that could work related to our society
Criteria
Local environment
Mission topic
Choosing the most useful renewable energy for my school
Sergio
Sofia
SHOOL D

A Solar and Wind energy in my county?

Description

Following the project, the students made an exploratory field trip along your county. Its objectives were: to know, on the spot, the different energy infrastructures of existing renewable energies; to know, in loco, the importance of the courses of water-taken to the mini hydro power stations; to know, in loco, the importance of the hidden precipitation in the supply of the soils and consequently of the mini hydric ones; recognize the importance of studying wind and radiation; know the advantages and disadvantages of photovoltaic and wind systems; know other small applications of solar energy (solar radiation), solar cookers (roasting sweet potatoes).

Learning Objectives

Learning the different energy infrastructures of existing renewable energies / Recognizing the importance of studying wind and radiation / Knowing the advantages and disadvantages of photovoltaic and wind systems / Familiarising with other small applications of solar energy (solar radiation) such as solar cookers (roasting sweet potatoes).

Previous actions of the teacher in order to develop the Activity

Site survey on the island of Madeira where renewable energy sources can be found (based on previous student research): photovoltaic panels, mini hydro, wind towers. Visit planning: which are the best places to visit, time setting, and contact with the companies who manage and operate. All of this planning was done in conjunction with an Engineer.

Description of the importance and implication of the stakeholders

As already mentioned in previous activities, the Engineer welcomed us in this activity, contributing with his training and knowledge. Your network of contacts was important for this activity. Companies that have allowed the exploration / visit of some of their facilities, with the support of our specialist.

Strengths of Activity

The possibility to see in situ the application of all knowledge, data that were adjusted in previous activities.

Take note of the disadvantages and disadvantages of the location where to place the photovoltaic panels, wind towers, mini hydro.

Outlook

Being able to explore the inside of a wind tower would be very important for students. The conclusions of this activity allow students to learn about the advantages, disadvantages and obstacles that exist in programming and renewable energy exploration projects.

SCENARIO 9

People
Teachers: 3
Students: 22

Curricular implementation
2 h per week
4 subjects

Extracurricular implementation
2-3 h per week

Where and How
At school, on Saturdays. Sometimes outside the school, during the week. 5 groups of 4 students of the same class

Students
They made some research in the local community and discuss with the teachers the final Mission

Teachers
There were some discussions between the teachers and the students

Criteria
Local environment, the teachers are experts in the topic Mission, the interest of the students in these subjects

Mission topic
Improving the emergency lighting system of the own school

Aki

Daniel

SCHOOL E

Working on the emergency lightning of our school

Description

We had some lessons for the students to remember the things needed from the previous years. We also made some experiments to capture their interest. The next thing was to visit a local enterprise called “Olympia Electronics” that has to do with emergency lighting and fire alarm systems. The students had the chance to talk with people working on this field and learn from them. The students gathered all the information needed and then started designing a new emergency lighting system for our school by using the newest technology. In order to confirm that what they have done is right, we also had a discussion with an electrical engineer specialized in emergency lighting systems.

Learning Objectives

Making the connection between class and real life / Working in groups / Scientific thinking / Investigation of laws of Physics and realizing how they are applied / Creating something that could be in use.

Previous actions of the teacher in order to develop the Activity

The first job was to find the plans of the emergency lightning of our school that was made 7 years ago. We found the subjects from our curriculum that had to do with light, engineering and design, created some lesson plans and some experiments. Then we contacted a local enterprise that creates emergency lights.

Description of the importance and implication of the stakeholders

Their participation was important for the students because they realized that the people working on this field are normal people like them and they can manage to do the same in some years. It was also interesting for the students to see with their own eyes how these things that they learn in school are applied in every aspect of our lives.

Strengths of Activity

They worked well as a team and with the help of experts they managed to create something needed in real life.

Outlook

To learn more about natural sciences and engineering, because now, they know how significant these things are.

SCENARIO 10


People
Teachers: 5
Students:23
Curricular implementation
1 h per week
3 subjects
Extracurricular implementation
2 h per week
Where and How
Trips, museums, library, school, companies of wine
4 groups of 5-6 students of the same class
Students
Brainstormed the ideas, are freedom
Teachers
Are experts in the topic
Mission and sometimes just supervised the students
Criteria
Local environment
Mission topic
Exploring the wine making process: wine production in ancient times and the evolution of the process
Ilias
John
SCHOOL E

Wine production

Description

We watched the videos about wine production and then the students had to do some research about it. How was the wine produced in the ancient times and how it is produced now? We explained some things about the chemistry and engineering with the lessons planed created from the teachers. In all of them, they had acquired some basic knowledge about wine producing it was time for the visits. The students discussed with people that produce wine and show all the stages of production realizing how important science is.

Learning Objectives

How is wine produced / Connecting everyday things with science / Making presentations / Working in groups / How to research.

Previous actions of the teacher in order to develop the Activity

The first job was to find videos explaining how the wine is produced. We found the subjects from our curriculum that had to do with wine making and created some lesson plans and some experiments. Then we contacted two local wine producers and scheduled visits in both.

Description of the importance and implication of the stakeholders

It was important for the students to see that the things that they have learned in class are applied in order to produce wine.

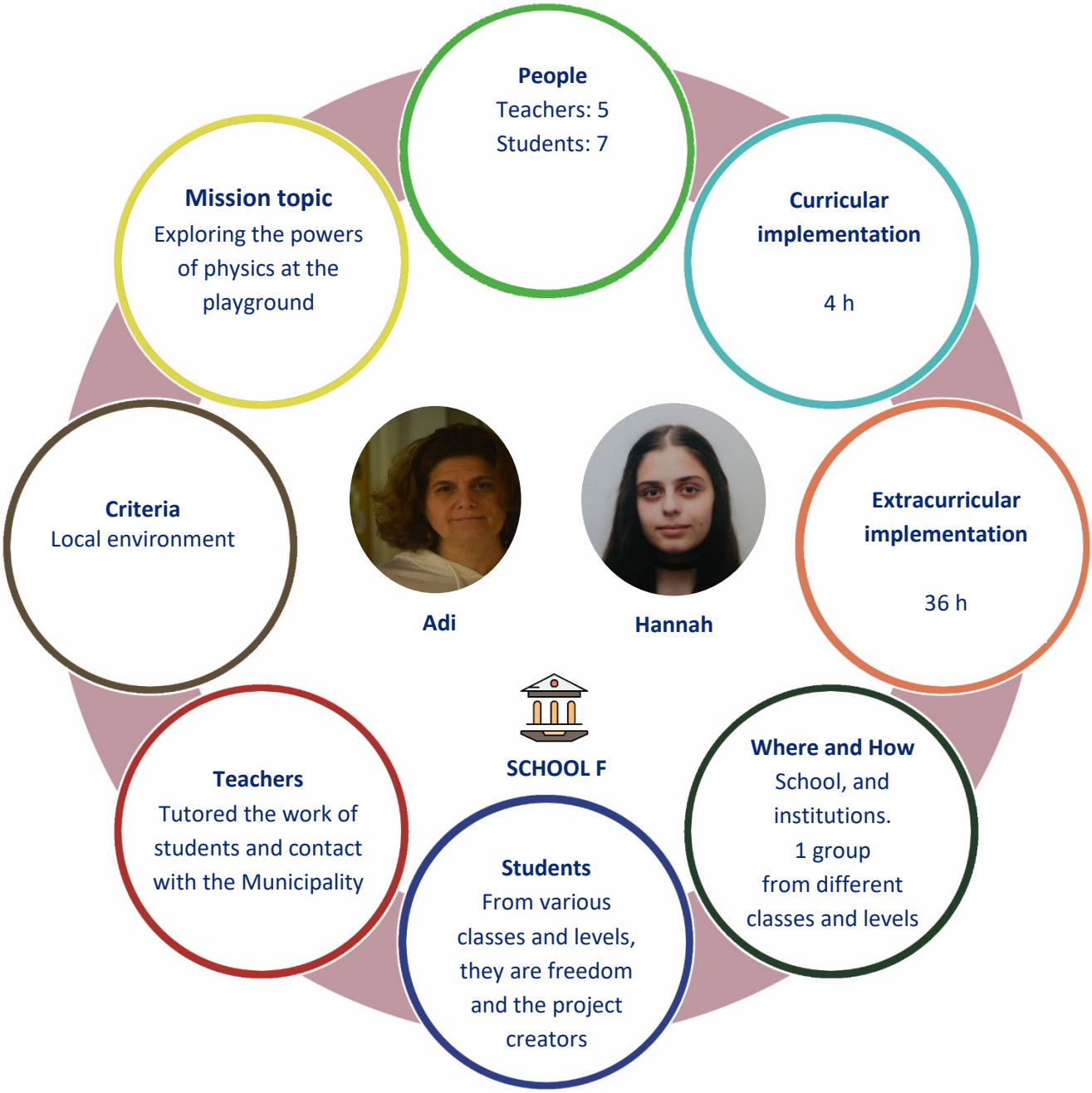
Strengths of Activity

Wine is connected in our country with all the happy moments of the adult life. The students see their parents and grandparents enjoying drinking wine with their meal, they see that when couple is getting married, they share a glass of wine etc. It is a subject that captured their interest and they enjoyed working on it.

Outlook

We believe that chemistry is a little bit more attractive for our students after this project.

SCENARIO 11


People
Teachers: 5
Students: 7
Curricular implementation
4 h
Extracurricular implementation
36 h
Where and How
School, and institutions.
1 group
from different classes and levels
Students
From various classes and levels, they are freedom and the project creators
Teachers
Tutored the work of students and contact with the Municipality
Criteria
Local environment
Mission topic
Exploring the powers of physics at the playground
Adi
Hannah
SCHOOL F

Installation of signs for playground

Description

The students want to explain to the youngster users the physics behind all playground facilities, and divided the assignments among themselves. Each one of them thought of an experiment to be held regarding the facilities of the playground. One of the students took upon himself to design signs for each of the facilities. The teachers helped with the physics involved in each facility in the playground. One of the students took upon herself to phrase and formulate the wording of the signs. A meeting was held with the Mayor of the city, in which the activity was presented and described, in order to introduce the idea, and receive his support for the cause.

Learning Objectives

Raising awareness, of students and the public, to laws of physics / Making data accessible and user-friendly / Connecting daily environment to study-matter / Encouragement towards scientific thinking / Investigation of laws of Physics, and defining what applies at which facility.

Previous actions of the teacher in order to develop the Activity

Field research: Listing and taking inventory of the various facilities and structures existing at the playground, meeting and consulting with an engineer, meeting and consulting with teachers regarding how to conduct the project.

Description of the importance and implication of the stakeholders

The involvement of the Municipality is extremely important, in order to have municipal support to raise the awareness of the citizens.

The option of expanding the idea of constructing scientific signs in a variety of additional municipal parks.

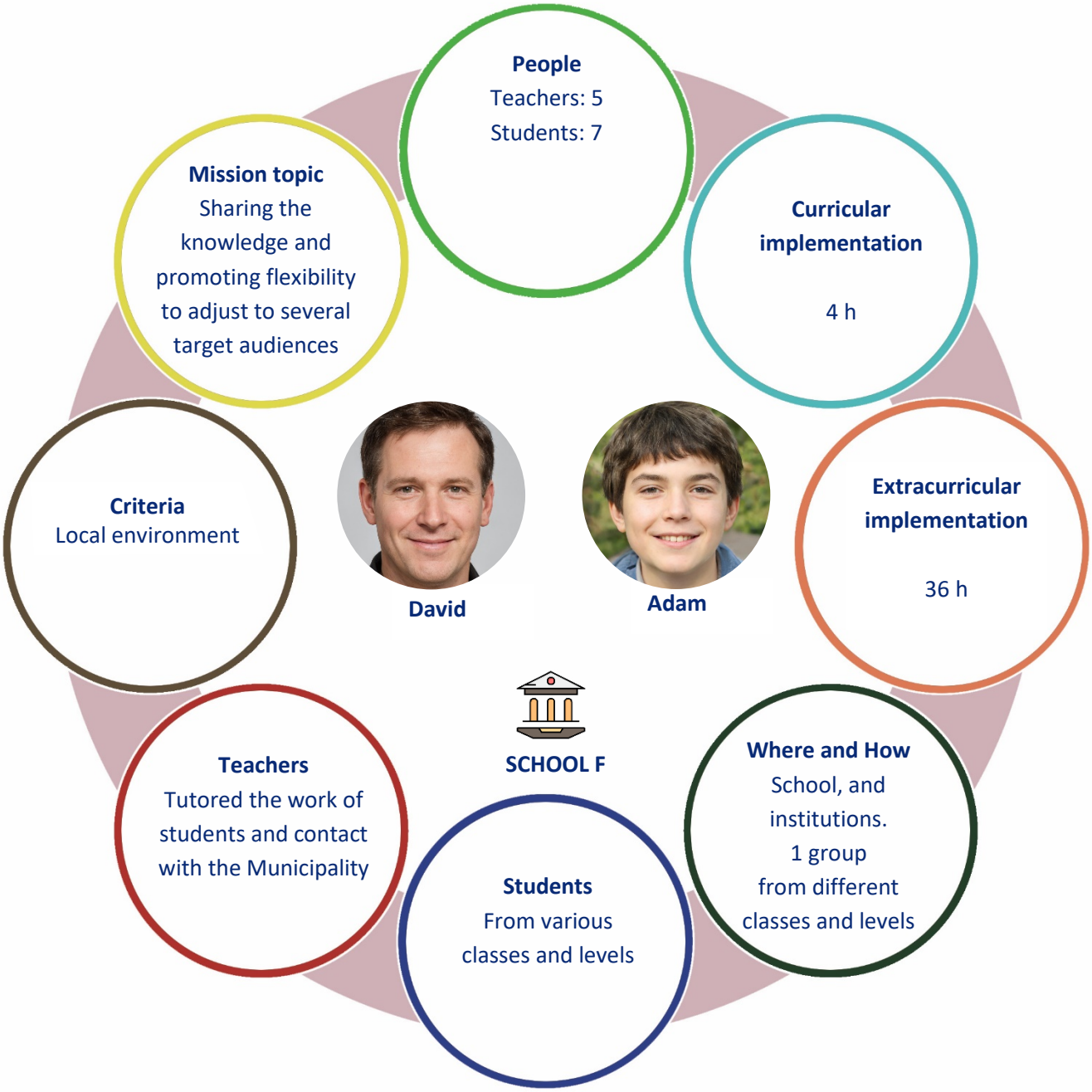
Strengths of Activity

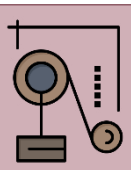
The idea of establishing these signs for the public, raises the sense of capability for the students, to be able to develop relevant ideas, and potentially exposing physical principles and bringing the population closer to easily understanding basic science that is in their reach, daily.

Outlook

Consulting experts in the field, on how to promote this cause and raise awareness to physical principles that occur within facilities at play grounds.

SCENARIO 12


People
Teachers: 5
Students: 7
Curricular implementation
4 h
Extracurricular implementation
36 h
Where and How
School, and institutions.
1 group
from different classes and levels
Students
From various classes and levels
Teachers
Tutored the work of students and contact with the Municipality
Criteria
Local environment
Mission topic
Sharing the knowledge and promoting flexibility to adjust to several target audiences
David
Adam
SCHOOL F



Designing and preparing lesson plans

Description

The students meet to design the lessons. Discussion regarding the targets and the way the lessons will be carried out. Dividing assignments and discussing the objectives in further detail while implementing into lesson layout structure. Brainstorming regarding how the lessons will work, discussing all that is needed to prepare towards the lessons, and coordinating the process in teams. When the end result led to creating active stations, for students to be able to experiment themselves and construct their own scientific conclusions and results

Learning Objectives

Studying and understanding physic laws related to various playground facilities / Defining & experiencing various kinds of energy / Creating worksheets / Developing responsibility / Leadership development / Group work, cooperation.

Previous actions of the teacher in order to develop the Activity

Field research and collect data to be incorporated in the lesson. Collaborative work deciding what to include and how to design the structure of the lessons. Into work groups developing ideas further for implementation among various age groups. Dividing responsibility and creating work teams

Description of the importance and implication of the stakeholders

The involvement

The involvement of the school principle and the cooperation and encouragement throughout the education system, among participating schools, to develop and carry out these lesson plans, provides an important base and strengthens the essence in raising scientific awareness and familiarity with these subjects among students, from a young age.

Strengths of Activity

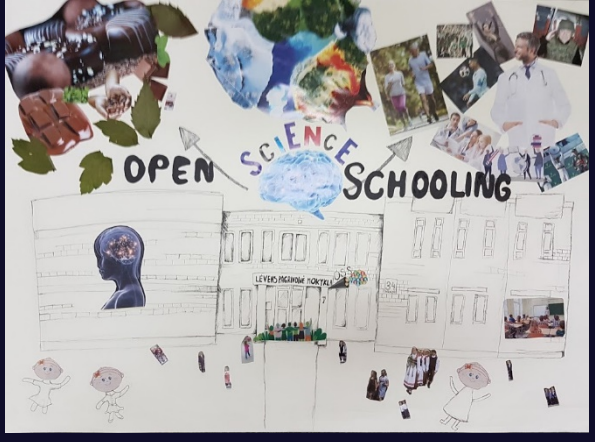
This activity raises interest among the students and develops curiosity to examine and learn about daily facilities around us

Outlook

Consulting

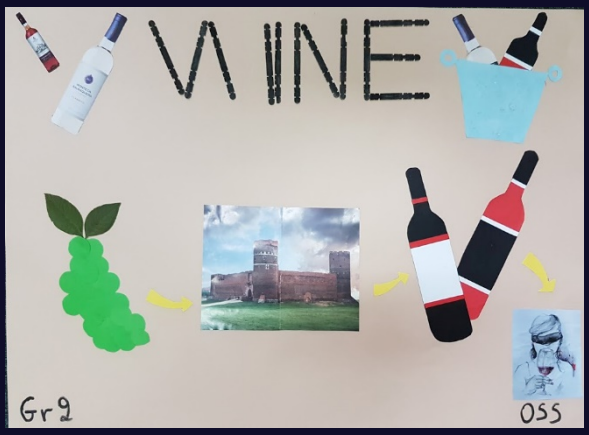
We are planning to develop lesson plans for the science teachers to incorporate and use in their classes


SCIENCE IS EVERYWHERE
KNOWING NATURE
OUR FEELS
PROBLEMS
FUN
LEARNING WITH FUN
SHARING
POLISH TEAM 1
KNOWING CULTURE
OSS
CREATIVITY
KNOWING COUNTRIES
TEAM WORK
EXPLORE TOGETHER

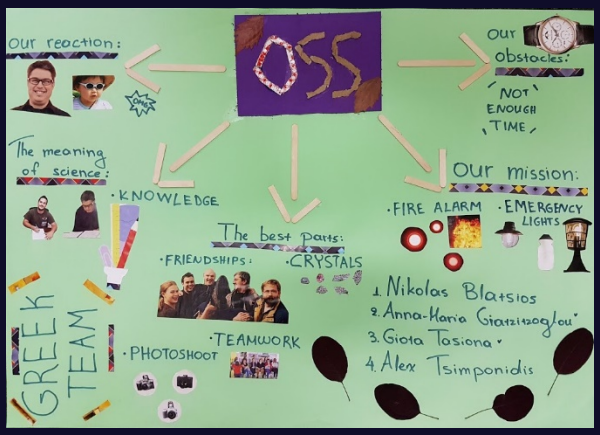

OPEN SCIENCE SCHOOLING


the ISRAELIS
The Traditional System
Dream
And this is our
JOURNEY
Explore
Future Plans
Create


River
Biomass boiler
Lights
Pump
FOREST
Temperature sensor
LCD
water tank
OSS
Air

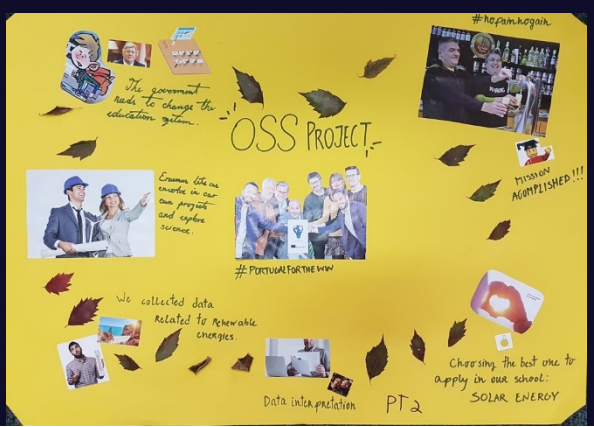

WINE
Gr 9
OSS


Challenges
Future ideas
Things we learned
Keep developing
Grow
Excited for our plans
Best about the project
OPEN
SCIENCE SCHOOLING
Initial Reaction
Meaning of science
Express yourself
PT 1


Our reaction:
OSS
our obstacles:
NOT ENOUGH TIME
The meaning of science:
Our mission:
·KNOWLEDGE
·FIRE ALARM
·EMERGENCY LIGHTS
The best parts:
·FRIENDSHIPS
·CRYSTALS
·TEAMWORK
·PHOTOSHOOT
GREEK TEAM
1. Nikolas Blatsios
2. Anna-Maria Giatzidoglou
3. Giota Tasiona
4. Alex Tsimponidis


OSS
PROJECTS
SOUP
EXOTIC SPECIES


MEETING PEOPLE
TRAVELLING
OPEN
SCIENCE
SCHOOLING
POLAND


#nopainnogain
The government needs to change the education system.
OSS PROJECT
Mission ACCOMPLISHED!!!
#PERFECTFORTHEWIN
We collected data related to renewable energies
Choosing the best one to apply in our school: SOLAR ENERGY
Data interpretation
PT 2


We made bookmarks FROM NATURE
We studied different types of soil
(CLAY, SAND, LOAM)
OUR SCIENCE MISSIONS

Evaluation

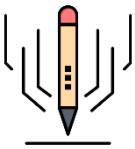

learning
experimentation
cocreation
learning
classroom
real life
progress
informal workshops
schooling
observational
hands-on
technology
technology
habilities
motivation
knowledge
practice
knowledge
transfer
science
real life
evaluation
personal
motivation
hands-on society

The experience will be evaluated on the basis of the teachers' opinions as well as changes noted by students.

By the Teachers

To find out the evaluation of the project by the teachers, it is proposed to perform a pre-test at the beginning of the project and a post-test once it has finished or is in the last phase. Here are five questions for each test:

Pre-test	Post-test
What would you like to change about the education system?	Has it been easy to get support from the management team?
What attracted you to the Open Science Schooling?	Has it worked as expected with the rest of your colleagues?
What are your expectations for the implementation of this methodology?	To what extent have your expectations been met?
What do you think are the strengths of the Open Science Schooling team that both the faculty and students will work with?	What would you keep in a new experience working with Open Science Schooling?
What do you think will be the most difficult challenges you will encounter in this experience?	What would you change to a new experience working with Open Science Schooling?



By the Students

To facilitate feedback and learn about students' perceptions formed throughout the project, we have put together a questionnaire designed by the Erasmus+ project. The design of the students' questionnaires is based on a selection of existing questionnaires: Constructivist Learning Environment Survey (CLES) and What is Happening in this Class? (WIHIC), Constructivist-Oriented Learning Environment Survey (COLES), Technology-Rich Outcomes-focussed Learning Environment Inventory (TROFLEI) and Science Motivation Questionnaire II (SMQ-II).

Seventeen scales consisting of five questions per scale were used, meaning that the questionnaire has a total of eighty-five items. The scales are categorised into four areas:

Class, Science (Intrinsic Motivation, Self-determination, Level of Motivation), Subject (Personal Relevance, Academic Efficacy and Attitude towards a Subject) and Project (Interest in the Scenario, Contact and Knowledge of the Scenario, Skills in light of the Scenario). The Class category has two subcategories: Relationships (Student Cohesion, Teacher Support, Fairness, Young Adult Ethics and Dedication (Implication, Orientation Tasks, Differentiation and Cooperation). The Class category consists of 40 questions and the Science, Subject and Project categories consist of 15. The students answer each question in relation to two different scenarios, what they know and what they expect to happen in the classes throughout the project. A frequency scale is used with four levels: Almost always, Often, Sometimes, Almost never (detailed information in Annex).

Final considerations

All kinds of teachers can get involved in such projects, even if they are not in the field of science, because the project must be totally multidisciplinary in nature.
All kinds of students can get involved, even if they aren't motivated by science.

We need to encourage teachers to have confidence in their students. Young people's ideas are to be listened to, and we need to let students' creativity flow!

Important challenges to overcome for a successful project:

- Resolve the local community's real problems, selected by young people.
- Involve the school's management team.
- Involve teachers from a range of subjects.
- Involve families.
- Involve one or more stakeholders.
- Share the project with others: students from the same school or city.

Essential conditions to get the project off to a good start:

- Break the rules of education, but not the law.
- It's not about changing what, it's about changing how.
- Have a team of involved teachers who are highly motivated.
- The project must be a school project and cannot be headed by an individual teacher, or a team of teachers that does not have the backing of the school's management team.

You can find more information about the project in the project's website:

https://opensciencesschooling.eu/

The thoughts and opinions of the teachers and students who participated in the project are reflected in the project's official movie:

OPEN
SCIENCE SCHOOLING

Erasmus+

Annex Questionaires

		ACTUAL				PREFERRED			
CLASS (40 questions)									
	Student cohesiveness	Almost Never	Seldom	Often	Almost Always	Almost Never	Seldom	Often	Almost Always
1	Members of this class are my friends.	1	2	3	4	1	2	3	4
2	I know other students in this class.	1	2	3	4	1	2	3	4
3	I make new friends among students in this class.	1	2	3	4	1	2	3	4
4	I am friendly to members of this class.	1	2	3	4	1	2	3	4
5	I work well with other class members.	1	2	3	4	1	2	3	4
	Teacher Support	Almost Never	Seldom	Often	Almost Always	Almost Never	Seldom	Often	Almost Always
6	The teacher considers my feelings.	1	2	3	4	1	2	3	4
7	The teacher helps me when I have trouble with the work.	1	2	3	4	1	2	3	4
8	The teacher talks with me.	1	2	3	4	1	2	3	4
9	The teacher takes an interest in my progress.	1	2	3	4	1	2	3	4
10	The teacher's questions help me to understand.	1	2	3	4	1	2	3	4
	Equity	Almost Never	Seldom	Often	Almost Always	Almost Never	Seldom	Often	Almost Always
11	The teacher gives as much attention to my question as to other students' questions.	1	2	3	4	1	2	3	4
12	I get the same amount of help from the teacher as do other students.	1	2	3	4	1	2	3	4
13	I have the same amount of say in this class as other students.	1	2	3	4	1	2	3	4
14	I receive the same encouragement from the teacher as other students do.	1	2	3	4	1	2	3	4
15	I get the same opportunity to contribute to class discussions as other students.	1	2	3	4	1	2	3	4
	Young Adult Ethos	Almost Never	Seldom	Often	Almost Always	Almost Never	Seldom	Often	Almost Always
16	I am given responsibility.	1	2	3	4	1	2	3	4
17	I am expected to think for myself.	1	2	3	4	1	2	3	4
18	I am regarded as reliable.	1	2	3	4	1	2	3	4
19	I am considered mature.	1	2	3	4	1	2	3	4
20	I am encouraged to take control of my learning	1	2	3	4	1	2	3	4

Actual: environment currently present in the classroom. Preferred: the learning environment where you would like to be present.

		ACTUAL				PREFERRED			
	Involvement	Almost Never	Seldom	Often	Almost Always	Almost Never	Seldom	Often	Almost Always
21	I give my opinions during class discussions.	1	2	3	4	1	2	3	4
22	My ideas and suggestions are used during classroom discussions.	1	2	3	4	1	2	3	4
23	The teacher asks me questions.	1	2	3	4	1	2	3	4
24	I explain my ideas to other students.	1	2	3	4	1	2	3	4
25	I am asked to explain how I solve problems.	1	2	3	4	1	2	3	4
	Task Orientation	Almost Never	Seldom	Often	Almost Always	Almost Never	Seldom	Often	Almost Always
26	I am ready to start this class on time.	1	2	3	4	1	2	3	4
27	I set my own goals for this class.	1	2	3	4	1	2	3	4
28	I pay attention during this class.	1	2	3	4	1	2	3	4
29	I try to understand the work in this class.	1	2	3	4	1	2	3	4
30	I know how much work i have to do.	1	2	3	4	1	2	3	4
	Differentiation	Almost Never	Seldom	Often	Almost Always	Almost Never	Seldom	Often	Almost Always
31	I am able to work at the speed which suits my ability.	1	2	3	4	1	2	3	4
32	Students who work faster than others are able to move on to the next topic.	1	2	3	4	1	2	3	4
33	I can choose topic I wish to study.	1	2	3	4	1	2	3	4
34	Tasks are suited to my interests.	1	2	3	4	1	2	3	4
35	Tasks are suited to my ability.	1	2	3	4	1	2	3	4
	Cooperation	Almost Never	Seldom	Often	Almost Always	Almost Never	Seldom	Often	Almost Always
36	When I work in groups in this class, there is teamwork.	1	2	3	4	1	2	3	4
37	I work with other students on assignments in this class.	1	2	3	4	1	2	3	4
38	I share my books and resources with other students when doing class work.	1	2	3	4	1	2	3	4
39	I cooperate with other students on class activities.	1	2	3	4	1	2	3	4
40	I learn from other students in this class.	1	2	3	4	1	2	3	4

		ACTUAL				PREFERRED			
SCIENCE (15 questions)									
	Intrinsic Motivation	Almost Never	Seldom	Often	Almost Always	Almost Never	Seldom	Often	Almost Always
41	The science I learn is relevant to my life.	1	2	3	4	1	2	3	4
42	Learning science is interesting.	1	2	3	4	1	2	3	4
43	Learning science makes my life more meaningful.	1	2	3	4	1	2	3	4
44	I am curious about discoveries in science.	1	2	3	4	1	2	3	4
45	I enjoy learning science.	1	2	3	4	1	2	3	4
	Self-Determination	Almost Never	Seldom	Often	Almost Always	Almost Never	Seldom	Often	Almost Always
46	I put enough effort into learning science.	1	2	3	4	1	2	3	4
47	I use strategies to learn science well.	1	2	3	4	1	2	3	4
48	I spend a lot of time learning science.	1	2	3	4	1	2	3	4
49	I prepare well for science tests and labs.	1	2	3	4	1	2	3	4
50	I study hard to learn science.	1	2	3	4	1	2	3	4
	Grade Motivation	Almost Never	Seldom	Often	Almost Always	Almost Never	Seldom	Often	Almost Always
51	I like to do better than other students on science tests.	1	2	3	4	1	2	3	4
52	Getting a good science grade is important to me.	1	2	3	4	1	2	3	4
53	It is important that I get an "A" in science.	1	2	3	4	1	2	3	4
54	I think about the grade I will get in science.	1	2	3	4	1	2	3	4
55	Scoring high on science test and labs matters to me.	1	2	3	4	1	2	3	4

		ACTUAL				PREFERRED			
SUBJECT (15 questions)									
	Personal Relevance	Almost Never	Seldom	Often	Almost Always	Almost Never	Seldom	Often	Almost Always
56	I relate what I learn in this class to my life outside of school.	1	2	3	4	1	2	3	4
57	What I learn in this class is relevant to my day to day life.	1	2	3	4	1	2	3	4
58	I apply my everyday experiences in this class.	1	2	3	4	1	2	3	4
59	This class is relevant to my life outside of school.	1	2	3	4	1	2	3	4
60	In this class, I get an understanding of life outside of school.	1	2	3	4	1	2	3	4
	Attitude to Subject	Almost Never	Seldom	Often	Almost Always	Almost Never	Seldom	Often	Almost Always
61	Lessons in this subject are fun.	1	2	3	4	1	2	3	4
62	Lessons in this subject interest me.	1	2	3	4	1	2	3	4
63	There should be more lessons in this subject.	1	2	3	4	1	2	3	4
64	I enjoy the activities that we do in this subject.	1	2	3	4	1	2	3	4
65	These lessons have increased my interest in this subject.	1	2	3	4	1	2	3	4
	Academic Efficacy	Almost Never	Seldom	Often	Almost Always	Almost Never	Seldom	Often	Almost Always
66	I am good at this subject.	1	2	3	4	1	2	3	4
67	I find easy to get good grades in this subjects.	1	2	3	4	1	2	3	4
68	I outdo most of my classmates in this subject.	1	2	3	4	1	2	3	4
69	I feel that I will achieve a good result in this subject.	1	2	3	4	1	2	3	4
70	I help my friends with their class work in this subject.	1	2	3	4	1	2	3	4

		ACTUAL				PREFERRED			
PROJECT (15 questions)									
	Scenario's attraction	Almost Never	Seldom	Often	Almost Always	Almost Never	Seldom	Often	Almost Always
71	I like the scenario we work.	1	2	3	4	1	2	3	4
72	I think that the scenario is interesting.	1	2	3	4	1	2	3	4
73	I will read a lot about our scenario.	1	2	3	4	1	2	3	4
74	I will enjoy the activities over our scenario.	1	2	3	4	1	2	3	4
75	I think that I can learn a lot about our scenario.	1	2	3	4	1	2	3	4
	Scenario contact and knowledge	Almost Never	Seldom	Often	Almost Always	Almost Never	Seldom	Often	Almost Always
76	I know our scenario.	1	2	3	4	1	2	3	4
77	The scenario is familiar to me.	1	2	3	4	1	2	3	4
78	I know people who have a strength relation with our scenario.	1	2	3	4	1	2	3	4
79	I want to know more about our scenario.	1	2	3	4	1	2	3	4
80	I want to have more personal relation with our scenario.	1	2	3	4	1	2	3	4
	Scenario abilities	Almost Never	Seldom	Often	Almost Always	Almost Never	Seldom	Often	Almost Always
81	I am good working about our scenario.	1	2	3	4	1	2	3	4
82	I find easy to understand how our scenario works.	1	2	3	4	1	2	3	4
83	I help my friends in the activities developed.	1	2	3	4	1	2	3	4
84	I find easy do activities about our scenario.	1	2	3	4	1	2	3	4
85	I feel that I will achieve good results in this project.	1	2	3	4	1	2	3	4

Country

- ☐ Catalonia
- ☐ Greece
- ☐ Israel
- ☐ Lithuania
- ☐ Poland
- ☐ Portugal

Gender

- ☐ Female
- ☐ Male
- ☐ Other

Age .....

Scholar year .....