D3.5 REPORT ON THE OTTER OUTDOOR LABS

Project acronym: OTTER

Project title: Outdoor Science Education for a Sustainable Future

Call: H2020-SwafS-2018-2020

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History			
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OTTER project

OTTER is a H2020 funded project that aims to **enhance the understanding of Education Outside the Classroom** (EOC) **methods and pedagogies** and how they can help **improve the acquisition of scientific knowledge and transferable skills in students**, **specifically in the field of environmental sustainability and the reduction of plastic waste**. It aims to increase interest in scientific topics among young people, while also contributing to the range of innovative educational projects and the increase of scientific citizenship within the EU.

OTTER aims to strengthen educational outside-the-classroom (EOC) **networks within Europe**, connecting experts from four different regions within the continent (**Finland, Hungary, Ireland and Spain**). The strengthening of these networks will be utilized to conduct a program of EOC pilot schemes and analysis of the effect they have on the performance of participating students, including their levels of sophisticated consumption and scientific citizenship, to increase understanding of the effects of education outside the classroom on EU students and citizens. The pilot schemes will share a common theme revolving around issues of plastic waste and recycling to build upon recent momentum in tackling related global educational, social, and environmental issues and due to the close relationship between reducing plastic waste and the need for more sophisticated consumers.

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Project Consortium

Geonardo Environmental Technologies **(GEO)**

European Science Foundation **(ESF)**

University of Groningen **(RUG)**

University of Limerick **(UL)**

Learning Scoop - oppimisen osuuskunta **(LS)**

The Big Van Theory **(TBVT)**

Center for the Advancement of Research & Development in Educational Technology **(CARDET)**

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1 INTRODUCTION

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1.1 Report on the OTTER Outdoor Labs implementation

This report includes the implementation of the OTTER Labs in the four countries where the study was carried out: Finland, Hungary, Spain, and Ireland. It shows the number of participating students and teachers and provides a summary of the main actions that have been carried out.

1.2 Objectives

The main objective of this report is to collect in a single document the most relevant information related to the implementation of the OTTER Labs so that they can serve as a testing ground for the methodology developed in OTTER, the evaluation that is being conducted in WP4, the final protocol of OTTER Labs that is being prepared in WP5 as well as for the dissemination being carried out in WP6.

1.3 Age groups and Countries

The OTTER Labs are developed to be adaptable to a wide age range of pupils: between 6 to 18, from early grades to the end of high school, and the protocol designed will have to accommodate all of them. Thus, we implemented **one final methodological protocol with adaptations divided to fit 4 age groups in the four selected countries as follows**:

- Students from 6 to 8 years old from country A & country B
- Students from 9 to 11 years old from country C & country D
- Students from 12 to 15 years old from country C & country B
- Students from 16 to 18 years old from country D & country A

1.4 OTTER Lab Implementation

OTTER Lab is a ready-made model to build an educational activity to suit different classes and curricula. In OTTER Labs, students and teachers apply student-centered EOC methodology to face environmental and sustainability problems

Thus, in short, OTTER:

- Is an educational hands-on activity that aims to promote sustainable development through education outside the classroom, and is directly linked to the established curriculum;
- Adopts a student-centered pedagogical approach - the Student Focus Approach, that is based on socio-constructivist approach: students' own activity, their prior knowledge, peer-collaboration and learning together;
- Can be incorporated into STEAM or other multidisciplinary science lessons or projects;

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- Is developed especially for educating students about plastic waste and solutions to reduce it, but can be applied to other environmental sustainability topics as well.

OTTER Lab doesn't offer ready-made contents and methods on how to implement it. It is the teacher who decides the contents and methods within the OTTER Lab methodology and framework. However, OTTER Lab *methodological protocol* gives guidance on how to develop an OTTER Lab to fit one's own school and curriculum.

OTTER Labs consists of five different steps: 1. Prepare, 2. Orientate, 3. Discover, 4. Make an impact and 5. Reflect.

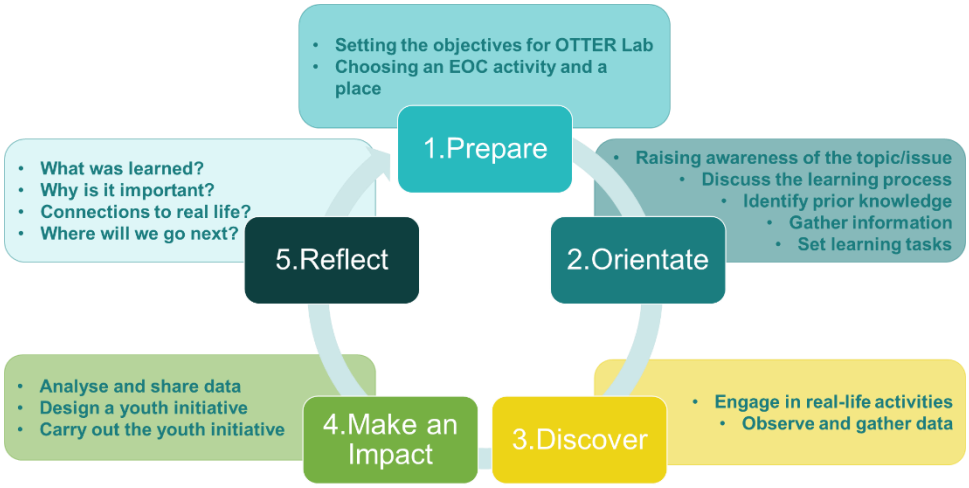

Image 1: Five steps of OTTER Lab

Distributed expertise and peer-collaboration is a part of all the steps. The students work together and share their perceptions and knowledge throughout the process.

TBVT (in Spain), UL (in Ireland), GEO (in Hungary), and LS (in Finland) have selected nine schools to participate in the project (due to Ethical guidelines within the project, all the data in this public deliverable have been anonymized and there will be no names of schools or references to countries where described activities took place).

In each of these schools, the aforementioned partners have carried out training with the teachers in charge of implementing the OTTER Lab and have shared a guide so that the teachers, independently, could design and implement their own OTTER Lab. The guide provided to the teachers can be seen in Annex I.

Each of the aforementioned partners has received a report template to fill out, with the necessary data they had to collect during the implementation of the OTTER Outdoor Labs. This report template complements the evaluation materials developed in WP4, and the information collected in it has been used to complete this deliverable.

The reports are presented below, organized according to the age groups for which the methodology for the implementation of the OTTER Outdoor Labs has been designed.

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2 OTTER Labs in numbers

The extent of the implementation of the OTTER Labs in the four piloting countries:

Number of participating students: **219** (92 male / 127 female)

Number of participating teachers: **15** (1 male / 14 female)

Number of participating schools: **9**

By country:

SPAIN

Number of participating students: 39 (10 male / 29 female)

Number of participating teachers: 4 (1 male / 3 female)

Number of participating schools: 2

IRELAND

Number of participating students: 90 (41 male / 49 female)

Number of participating teachers: 4 (0 male / 4 female)

Number of participating schools: 3

HUNGARY

Number of participating students: 49 (28 male / 21 female)

Number of participating teachers: 3 (0 male / 3 female)

Number of participating schools: 2

FINLAND

Number of participating students: 41 (13 male / 28 female)

Number of participating teachers: 4 (0 male / 4 female)

Number of participating schools: 2

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3 OTTER Labs from 6 to 8 years old

Image 2: School students A during the OTTER Lab

3.1 From 6 to 8 years old in School A

AGE OF THE PARTICIPATING STUDENTS
6-8yrs (and additional 9-11yrs extra)
NUMBER OF PARTICIPATING STUDENTS (BY GENDER)
57, 33 boys, 24 girls
SHORT DESCRIPTION OF THE OTTER LAB
The OTTER Labs made their debut in March, with primary school students taking part in three workshops revolving around **water in in my life.** Not only did students become familiar with working in a scientific lab, but they also had the chance to interact with real scientists, enquire about how they might be similar to their role models and explore their own interests in STEAM subjects. The goal of these connections between students and scientists was to create an awareness of the stereotypes surrounding people who do science and emphasize its relevance in our day-to-day lives. Students also engaged in a nature walk to a local famous architectural bridge where they could be surrounded by the many different functions of water around us. Students visited a local historical amenity as well and investigated how they could contribute to the economic and recreational value of the area.

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3.1.1 SCHEDULE OF THE OTTER LAB ACTIVITIES

STEP/STAGE	DATE	DURATION
Step 1- PREPARE	2nd Feb, 28th Feb, 27th April, 23rd May,	6-8yrs (& 9-11yrs): 6hrs with partner (teachers did independent preparation outside of partner workshops – 3hr approx). Total: 9hrs
Step 2 - ORIENTATE	March 30th - June	Difficult to tell as this was part of every subject for a full term – all pre-and post-learning happened throughout the term, there was no beginning and end
Step 3 - DISCOVER	18th April, approx. 2nd May, 25th May	1 full day and 2 half days
Step 4 – MAKE AN IMPACT	May/June	1 full day approx.
Step 5 - REFLECT	May - 28th June	Happened throughout each step (also reinforced during the focus group – 30mins)

3.1.2 DESCRIPTION AND ADAPTATIONS OF THE OTTER LAB PROTOCOL

STEP 1 – PREPARE
The teachers met with the OTTER team online and in-person for planning meetings. Here, the OTTER representative helped to guide the teachers to possible ideas for OTTER Labs and ways that it could link to the current school curriculum. Possible sites to visit for EOC activities were also discussed and reviewed for relevance to the topics being addressed. • Clean Water and Sanitation • Life Below Water • Creativity and Innovation • Critical Thinking, Problem Solving, Decision Making • Communication • Information Literacy • Scientific Literacy • Citizenship • Life and Career Skills • Personal and Social Responsibility • Interacting Considerately • Creating Awareness • Acting with Respect

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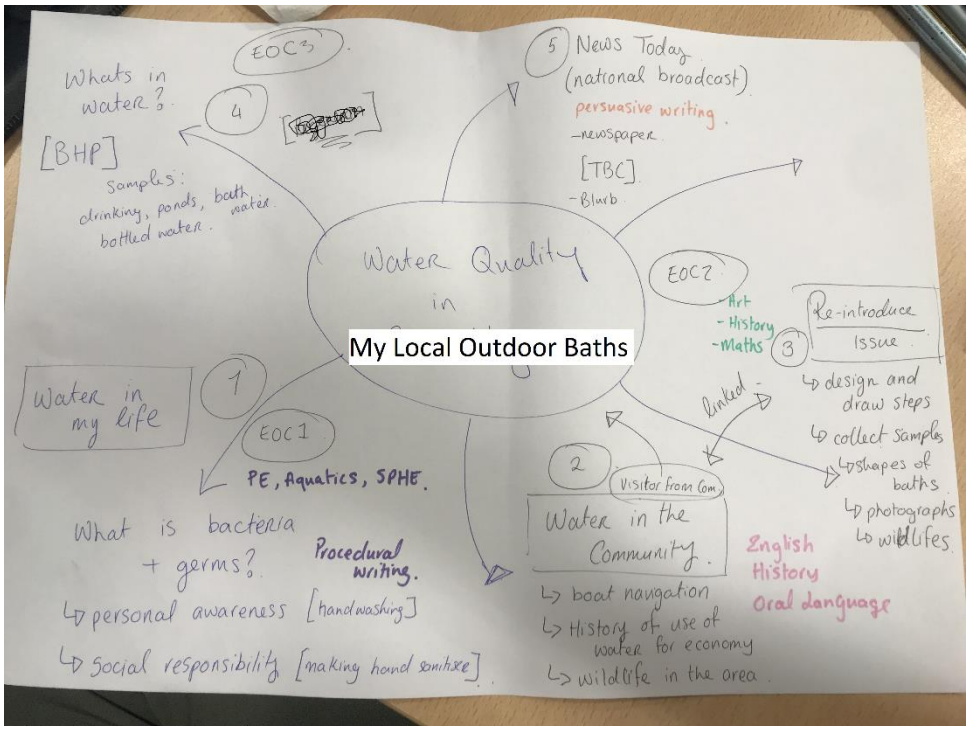
STEP 1 ADAPTATIONS AND ISSUES

Teachers were completely supported by senior management of the school and class cover was easily provided for classes throughout each step. Teachers were relieved for planning and preparation as well as EOC trips.



This school took on OTTER across all subjects for a complete term of school. This was a huge adaptation, but the teachers felt that the OTTER Learning Objectives were relevant to all of their teaching and could be completely embedded in the curriculum across all of the subjects taught.

The 2nd class teacher and 6th class teacher connected for the OTTER project so that students from both classes could buddy up and engage in OTTER together. This was an extra layer of collaboration as well as knowledge creation for an extra group of students.

STEP 2 – ORIENTATE

This school took on OTTER across all subjects for a complete term of school. This was a huge adaptation, but the teachers felt that the OTTER Learning Objectives were relevant to all of their teaching and could be completely embedded in the curriculum across all of the subjects taught. As a result, the Orientate step was continuously in process. There were particular points of specific input relating to the EOC trips such as:

EOC trip 1 – trip to a University
Teachers pre-taught that there are things in water that we cannot see such as bacteria. They read story books about water.

EOC trip 2 & 3
Students looked at photographs of the local baths in the past. Students heard stories about why there are outdoor baths in the community in the past.

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STEP 2 ADAPTATIONS AND ISSUES

This school took on OTTER across all subjects for a complete term of school. This was a huge adaptation, but the teachers felt that the OTTER Learning Objectives were relevant to all of their teaching and could be completely embedded in the curriculum across all of the subjects taught. As a result, the Orientate step was continuously in process.

The teachers also decided that linking the 6-8yr old students and 9-11yr old students would be an opportunity to enhance collaboration, communication and mentoring students across the whole school instead of just within one class. This manifested in students buddying up with one student from 2nd class (6-8yrs) having a buddy from 6th class (9-11yrs) throughout the OTTER Labs.

STEP 3 – DISCOVER

EOC trip 1 – Trip to University

Students became familiar with working in a scientific lab, but they also had the chance to interact with real scientists, enquire about how they might be similar to their role models and explore their own interests in STEAM subjects. The goal of these connections between students and scientists was to create an awareness of the stereotypes surrounding people who do science and emphasize their relevance in our day-to-day lives. Students also engaged in a nature walk to a famous architectural bridge where they could be surrounded by the many different functions of water around us.

EOC Trip 2 – Trip to local Outdoor Baths
Students visited the local outdoor baths and looked at pictures of what it used to be like versus its current state. Students ate their lunches on the steps and drew pictures of the baths.

EOC Trip 3 – Trip to Local Outdoor Baths
Students talked to a local historian from the area who remembers the baths when they were functioning. They heard about the economic and recreational value of the baths. Students took measurements of the baths such as depth, width and length. Students also took water samples from the baths.

Image 3: EOC Trip 3a – Visit from Secondary School

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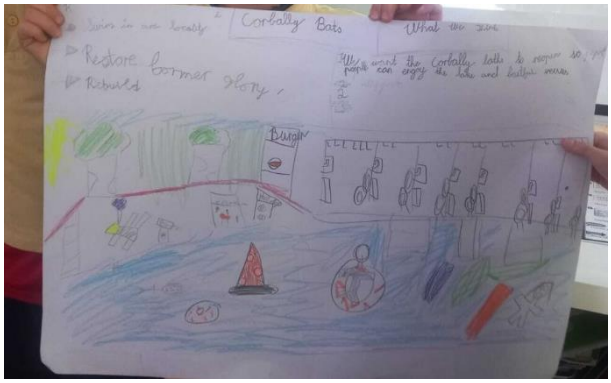
The 9-11yrs students were visited by 5th yr (16-18yrs) students, also involved in OTTER to learn about water treatment. They asked questions and participated in engaging models of different systems to treat water.

STEP 3 ADAPTATIONS AND ISSUES

The primary school linked up with a secondary school also in the OTTER project who were working on topics related to the same SDG. This sharing of knowledge influenced both the older and younger students.

STEP 4 – MAKE AN IMPACT

Students created a social media campaign to try and reopen the baths. In groups (2nd class and 6th class students) designed plans for the baths to be renovated and refurbished. They drew diagrams to scale, considered accessibility, designed keys to highlight important features of the baths. Students shared their ideas with the whole group and posted their posters on social media tagging local authorities and county councils. The also tried to recreate an old photograph from the area on a local bridge at the baths that is still standing today.



STEP 4 ADAPTATIONS AND ISSUES

The main challenge here, was that students did not have much time nearing the end of the school term. It would have been more suitable had the EOC trips happened early in the term.

STEP 5 – REFLECT

Reflecting happened at every stage of the OTTER Labs not just at the end of the cycle in this school. The teacher chose to complete the reflect step as part of one of the EOC visit. The reflect assessment tool also helped students to consolidate learning.

STEP 5 ADAPTATIONS AND ISSUES

Reflect was not a separate step in school. Students were continuously reflecting as part of their learning experiences.

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3.2 From 6 to 8 years old in School B

AGE OF THE PARTICIPATING STUDENTS
6-8 years old
NUMBER OF PARTICIPATING STUDENTS (BY GENDER)
25 total: 11 girls, 14 boys
SHORT DESCRIPTION OF THE OTTER LAB
Learning about rainforest as habitat, its flora and fauna, its role in nature conservation and environmental sustainability through visiting a zoo.

3.2.3 SCHEDULE OF THE OTTER LAB ACTIVITIES

STEP/STAGE	DATE	DURATION
Step 1- PREPARE	9/5/2023	1 class (45 min)
Step 2 - ORIENTATE	15/5/2023	1 class (45 min)
Step 3 - DISCOVER	8/6/2023	1 day program
Step 4 – MAKE AN IMPACT	12/6/2023	1 class (45 min)
Step 5 - REFLECT	14/6/2023	1 class (45 min)

3.2.4 DESCRIPTION AND ADAPTATIONS OF THE OTTER LAB PROTOCOL

STEP 1 – PREPARE
• Clean Water and Sanitation • Climate Action • Life Below Water • Learning to learn, metacognition • Communication • Collaboration • Information Literacy • ICT literacy • Citizenship – local & global • Personal & Social responsibility • Interacting Considerately • Acting with Respect As preparation for the school and the teacher, several online and in person meetings were implemented, and the project objectives were presented.

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The chosen EOC activity was visiting a zoo and observing species from the jungle.
In preparation phase everyone signed the consent forms.

STEP 1 ADAPTATIONS AND ISSUES

As the project was implemented during the last months of the school year, it put some amount of pressure on organization. As a take away, it would be better to implement these kinds of activities at the very beginning of the school year.

As concrete preparation, the topic was treated on other, non-science classes: on literature classes they learnt about the 'Jungle Book', so it was well-embedded in their studies.

Consent forms: it was very dependent on teacher, the age of students, and the parents' community whether the online or paper version worked better.

Understanding logic and reasoning behind the Planning doc for Learning Outcomes took a while in some cases.

As preparation, the teacher pre-visited the zoo to check conditions and opportunities.

STEP 2 – ORIENTATE

As orientation the students had a class on the topic.

The teacher led a mind mapping to establishing the context. For interactivity, students used internet and looked for specific countries to be indicated on printed "blind" maps. Then word searches orientated students in discovering species native to rainforests. Moreover, they used the KWL (Know, Want to know, Learned) method. And finally, a colleague provided first-hand information to the students' questions – as a Living Library method.

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STEP 2 ADAPTATIONS AND ISSUES

There were no major issues to be reported.

STEP 3 – DISCOVER

The students visited a zoo. Specifically, they paid extra attention to the 3 species they had learned about during orientation (gorilla, arrow poison frog, macaw) and filled in related exercise sheets. They spent some time on understanding the connection between minerals mined for mobile phone industry and the habitat of these species.

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STEP 3 ADAPTATIONS AND ISSUES
The teacher planned to work with groups of students that seemed not to be feasible at the end.

STEP 4 – MAKE AN IMPACT
The students made posters and ppt slideshows in order to raise attention to environmental protection issues of the world related to: habitat and species loss in rainforests, stopping overconsumption, rationalizing energy use and waste production. These were presented at the reflection phase.
STEP 4 ADAPTATIONS AND ISSUES
There were no major issues to be reported.

STEP 5 – REFLECT
Reflection phase was organized in a loose way, through discussion on the topics, re-living memories from the zoo, systematizing lessons learnt, brainstorming for the future. The teacher for example decided to integrate SDGs into her teaching curriculum from next year on.

STEP 5 ADAPTATIONS AND ISSUES
There were no major issues to be reported.

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4 OTTER Outdoor Labs from 9 to 11 years old

Image 4: School C students during the EOC activity

4.1 FROM 9 TO 11 YEARS OLD IN SCHOOL C

AGE OF THE PARTICIPATING STUDENTS
10 to 11
NUMBER OF PARTICIPATING STUDENTS (BY GENDER)
24; 7 boys, 17 girls
SHORT DESCRIPTION OF THE OTTER LAB
The school worked with an NGO Habitats to implement the “River Project”. It is based on an EOC activity in the river where a study was carried out on the quality of its water and its environment, specifically looking at the impact of plastics on the ecosystem. With all the information collected, students designed and built models of gadgets, machines, or robots to solve the identified problems and to help to restore biodiversity.

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As a Youth Initiative, the students created a Science Fair open to other schools in the city and to parents. Students prepared prototypes of projects to improve the quality of the water in the river.

4.1.1 SCHEDULE OF THE OTTER LAB ACTIVITIES

STEP/STAGE	DATE	DURATION
Step 1- PREPARE	March – April 2023	10 hours
Step 2 - ORIENTATE	From 8th April to 18th of May	4 hours
Step 3 - DISCOVER	19th of May	8 hours
Step 4 – MAKE AN IMPACT	May – June: building the models 16th of June: Science Fair	10 hours
Step 5 - REFLECT	19th of June	1 hour

4.1.2 DESCRIPTION AND ADAPTATIONS OF THE OTTER LAB PROTOCOL

STEP 1 – PREPARE

A 2-hour meeting was held between the director of the educational center, the teacher in charge of the 4th grade students (who would carry out the OTTER Outdoor Lab), and the person in charge of the center's extracurricular activities with the OTTER partner.

In that meeting, OTTER partner representative presented the OTTER methodology to the teachers and answered their questions. A preliminary design of the OTTER Lab was made, in which it was decided that the students, with the help of the NGO 'Habitats', would visit the city river to understand its health status in terms of biodiversity, and how the presence of plastic waste affected this parameter.

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The time for the visit to the river was scheduled for May 19th, and two other design meetings for the OTTER Lab were scheduled, this time with only the teachers participating.

After these meetings, the OTTER Lab was fully designed. It was decided that, with what they learned during the EOC activity, the students would design a machine or robot capable of removing waste from the river, thus helping to improve biodiversity.

The students would build a model of this machine or robot and prepare a presentation about how it works.

As a Youth Initiative, a science fair would be organized in a civic centre in the city. Invited to this event would be 8 and 9-year-old students from their school, 8 and 9-year-old students from a second school in the city, and the families of the students presenting their models.

STEP 1 ADAPTATIONS AND ISSUES

No adaptations were needed for this action.

STEP 2 – ORIENTATE

In order for the students to understand what was going to be done in step 3 - DISCOVER (i.e., during the EOC activity which in this case was a visit to the river to study the state of its biodiversity), the teacher of the student group spent 2 one-hour classes explaining key concepts such as rivers and their zones, biodiversity in rivers, and the effects of humans on urban rivers. This was supplemented by a participatory workshop implemented by the head of the NGO, who explained to the students how it is possible to measure the health of a river by studying its biodiversity, both animal and plant. She also explained how to measure the health of a river based on physicochemical parameters such as water turbidity, hardness, or pH levels.

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STEP 2 ADAPTATIONS AND ISSUES

No adaptations were needed for this action.

STEP 3 – DISCOVER

The 4th grade students of the school, accompanied by their teacher, two representatives from OTTER partner organization, and the head of the NGO , made a full-day visit to the river.

During this visit, the quality of the river was studied by taking samples of the parameters studied in Step 2 - ORIENTATE. The students experimented and took notes in forms specifically prepared for this outing, which allowed them to consolidate the content learned in the classroom, understand its value and usefulness, and apply it in nature to conduct scientific studies.

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The day ended with some games in nature, photography sessions, and the recording of some videos to be used in the dissemination of the OTTER project.
https://drive.google.com/file/d/1jFN_CuzkMtBh6FYPTEY3POGU-RiRuiu1/view?usp=sharing

STEP 3 ADAPTATIONS AND ISSUES

During the EOC activity, it started to rain. It was a light but steady rain. The teacher asked the students if they preferred to cancel the activity and return to school, or if they preferred to endure the rain. By unanimous decision, the students chose to endure the rain and continue with the activity, as they were very motivated.

STEP 4 – MAKE AN IMPACT

During six 1-hour classes, the students participating in the project analysed the data collected during Step 3 - DISCOVER, concluding that the state of the river was poor and that pollution, particularly from plastic waste, was one of the main causes of this situation.

With this in mind, they organized into small groups and designed robots capable of cleaning the river and thus improving its health. They built models, with recycled materials and the help of their families, that represented the designs they had made. They also made PowerPoint presentations to explain how their machines worked and practiced in class how to present their invention.

Finally, on June 16th, during one entire morning, the OTTER Project Science Fair took place in which the students took their models and their presentations (loaded onto a tablet) to a Civic Centre in the city, where they presented their projects to their schoolmates, classmates from a second school in the city, and also to their families.

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Science Fair at the Civic Centre:
https://drive.google.com/file/d/1H5b4EQll7vANMCxGc-VJ5NuTWucNUdmm/view?usp=sharing

Example of students presenting their PowerPoint presentation:
https://drive.google.com/file/d/1Gxe1YhTr7BekLn9q4FEUGqAiFLFHdx3A/view?usp=sharing

Example of students presenting their model:
https://drive.google.com/file/d/1G_Vmy8VexpR7rYQco5HqS_ydmdBTxCm8/view?usp=sharing

The project had such an impact on the local community that the local radio came to the Science Fair and conducted interviews with teachers and students, which they later broadcast live and uploaded to their website as a podcast:
https://www.radiocornella.cat/news/id/radiocornella_news_985

STEP 4 ADAPTATIONS AND ISSUES

No adaptations were needed for this action.

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STEP 5 – REFLECT
For one hour, the students reflected with their teacher on what had impacted them the most about the OTTER project, what they liked the most, and what they had learned, through an open discussion. Finally, the students concluded the reflection by filling out the form prepared in WP4.
STEP 5 ADAPTATIONS AND ISSUES
No adaptations were needed for this action.

4.2 From 9 to 11 years old in School D

AGE OF THE PARTICIPATING STUDENTS
9-11
NUMBER OF PARTICIPATING STUDENTS (BY GENDER)
18 (14 girls, 4 boys)
SHORT DESCRIPTION OF THE OTTER LAB
Theme of OTTER Lab: Plastic waste (reuse, reduction and recycling) The main objective of the OTTER Lab in this school was to investigate plastic waste in students' nearby environment. The students brought their household plastic waste to the school and collected plastic waste from their neighborhood and studied it. In addition, they gathered information about plastic waste, it's impact on nature and possibilities to recycle it. They also explored possibilities to use plastic waste to completely new purposes. Finally, they wanted to raise awareness about plastic waste in their community. The OTTER Lab included following actions: • Collecting waste and garbage, investigating it; • Students bringing their household plastic waste to the school, and collecting garbage from nature and organizing the waste collector in the school's hallway; • Students designing recycling tools made from collected garbage. Designing requires engineering, math (measuring) and science. Target: brainstorming a tool, which has a purpose to pick up objects from a tree or down under structures; • Designing the tools in the classroom, building tools outdoors (school yard) • Testing the tools outdoors at the school yard • Making a poster of their tool. A poster has: 1. a photo of the tool 2. names of the garbage objects used in tool 3. a little info text: how much of each garbage (or one of the objects) is collected every year in Finland; • Exhibition: students organizing an outdoor exhibition about the tool posters; • Making questions: during a language lesson students make (in pairs) questions about local environment, recycling and sorting. Teachers put questions to Seppo.io-game. Seppo works

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as a mobile game, tasks open with GPS signal. Students play the whole game in pairs or small groups.

4.2.3 SCHEDULE OF THE OTTER LAB ACTIVITIES

STEP/STAGE	DATE	DURATION
Step 1- PREPARE	14.4.2023	1 lesson (45 minutes)
Step 2 - ORIENTATE	28.4.2023	1 lesson
Step 3 - DISCOVER	9.5.2023, 10.5.2023, 12.5.2023, 16.5.2023, 25.5.2023	5 lessons (there were several EOC activities -> several cycles of this step)
Step 4 – MAKE AN IMPACT	29.5.2023, 1.6.2023	2 lessons
Step 5 - REFLECT	2.6.2023	1 lesson

4.2.4 DESCRIPTION AND ADAPTATIONS OF THE OTTER LAB PROTOCOL

STEP 1 – PREPARE

The OTTER partner team met with the teachers in-person on January 18th at the school. The teachers were informed about the OTTER project and OTTER Lab. Together we went through the different steps of the Lab and discussed the implementation of the Lab. The teachers asked questions, and they immediately started to come up with ideas for the Lab's theme and contents.

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The teachers of the school set the following objectives for the OTTER Lab:

- Sustainable cities and communities
- Creativity and innovations
- Communication
- Collaboration
- ICT literacy
- Personal and social responsibility
- Interacting considerately

The teachers chose the following EOC activities and places for the OTTER Lab:

- Collecting waste and garbage in nearby neighborhood, investigating them
- Students bring their household waste to the school, and collect garbage from nature and organize the waste collector in the school's hallway
- Students build and test recycle tools made from collected garbage outdoors (in school yard)
- Students make questions for Seppo app about local environment, recycling and sorting. Seppo gamified learning app is then used outdoors.
- Students organize an outdoor exhibition about the tool posters.

The teachers shared information to parents with Wilma (a digital study administration system for students, teachers and guardians). They did it using information sheet in the consent form.

The two teachers had close cooperation during the Prepare step and the implementation of the whole OTTER Lab. They planned the Lab together and also delivered almost all lessons together (co-teaching two classes together).

Teachers decided right away in the Prepare step to integrate several school subjects to the OTTER Lab. They used environmental science lessons for OTTER Lab, but included also mother tongue lessons to do the reporting work of the Lab. The Seppo app (gamified learning application) was used during the PE lesson.

STEP 1 ADAPTATIONS AND ISSUES

A pilot had to apply a research permit from the City Council. The research permit process took a lot of time, and it was granted at the end of March (on March 27th). After that, consents from the students and their guardians were needed. The process of creating and editing the consent forms was very slow and for the school consent forms had to be translated into local language. All this was very time consuming and the whole OTTER Lab process was delayed. This caused some time related problems especially at the end of the OTTER Lab.

The teachers used co-planning and co-teaching during the whole OTTER Lab. They also used multidisciplinary approach to delivering OTTER Labs: they integrated several school subjects (environmental science, mother tongue, PE) in implementing OTTER Lab.

STEP 2 – ORIENTATE

The orientation step included following activities:

- Watching videos (for example: https://www.facebook.com/watch/?v=1407294885979397)
- Discussion about recycling and sorting of waste.

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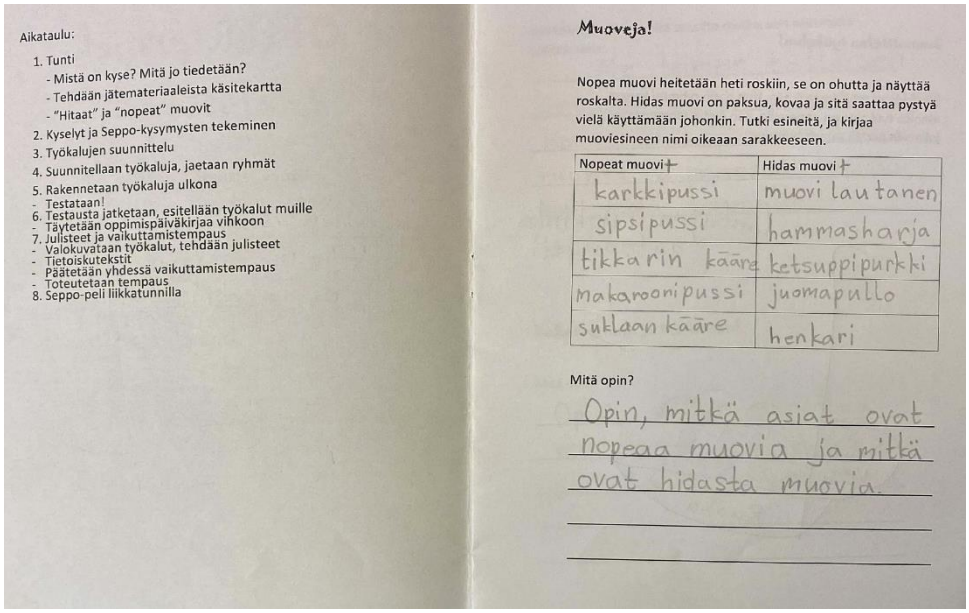
- Discussion about the implementation of OTTER Lab:
  - The theme and learning objectives for the whole OTTER lab
  - EOC activity that will be carried out
  - The location where it will be implemented
  - The whole process includes designing a youth initiative that deals with an environmental problem.
- The teachers had prepared a learning diary template (Annex 2) with basic information, multiple different questions and tasks to support the whole OTTER Lab process. Students filled in the learning diary themselves and continued completing the learning diary during the whole OTTER Lab.
- The students wrote a project plan in their learning diary with their own notes: they had a common basis for the project (e.g. a concept map), to which they first filled in their existing knowledge. Also, the project timeline and the things to be done and learned was explained. The students reviewed all these together.
- Students gathered new information for their EOC activity:
  - Identifying different kind waste (could be done outdoors).
  - Sorting table in notebooks: writing down different objects in each sorting table.
  - Making a list about “fast plastics” and “slow plastics”. What kind of plastic we dump fast just as trash? Where do they go? What happens to them? What are “slow plastics”? Which plastic can be reused in something?
  - Discussion, making lists in pairs.
- The outcome of the orientation step: awareness of sorting waste, understanding of using and amount of plastic, origin of plastic, own design.


Aikataulu:

1. Tunti
   - Mistä on kyse? Mitä jo tiedetään?
   - Tehdään jätemateriaaleista käsitekartta
   - “Hitaat” ja “nopeat” muovit
2. Kyselyt ja Seppo-kysymysten tekeminen
3. Työkalujen suunnittelu
4. Suunnitellaan työkaluja, jaetaan ryhmät
5. Rakennetaan työkaluja ulkona
   - Testataan!
6. Testausta jatketaan, esitellään työkalut muille
   - Täytetään oppimispäiväkirjaa vihkoon
7. Julisteet ja vaikuttamistempaus
   - Valokuvataan työkalut, tehdään julisteet
   - Tietoiskutekstit
   - Päätetään yhdessä vaikuttamistempaus
   - Toteutetaan tempaus
8. Seppo-peli liikkatunnilla

Muoveja!

Nopea muovi heitetään heti roskiin, se on ohutta ja näyttää roskalta. Hidas muovi on paksua, kovaa ja sitä saattaa pystyä vielä käyttämään johonkin. Tutki esineitä, ja kirjaa muoviesineen nimi oikeaan sarakkeeseen.

Nopeat muovi	Hidas muovi
karkkipussi	muovi lautanen
sipsipussi	hammasharja
tikkarin kääre	ketsuppipurkki
makaronipussi	juomapullo
suklaan kääre	henkari

Mitä opin?

Opin, mitkä asiat ovat nopeaa muovia ja mitkä ovat hidasta muovia.

Image 5: A page from the learning diary

STEP 2 ADAPTATIONS AND ISSUES

The teachers prepared a learning diary template (ANNEX 2) with basic information, multiple different questions and tasks to support the whole OTTER Lab process. Students filled in the learning diary themselves and continued completing the learning diary during the whole OTTER Lab.

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STEP 3 – DISCOVER

The Discover step included studying outside the classroom and inside the classroom, alternately. That means that after EOC activity the students continued working in the classroom, which was followed by a new EOC activity etc.

The following activities were carried out during the Discover step:

- Students brought their household plastic (EOC) waste to the school, collected garbage from nearby nature (EOC) and organized the waste collector in the school's hallway.
- They investigated the gathered plastic waste in their classroom.
- Students designed and planned what kind of recycle tools could be made out of recycled plastic (in the classroom). The purpose of the tool was to pick up trash from a tree or from difficult locations.
- Students built and tested recycle tools made from collected garbage in school yard and nearby forest (EOC).
- Students presented their tools to each other in the classroom) They discussed together which elements were most functional.
- Students made questions for Seppo app about local environment, recycling and sorting. Seppo gamified learning app was then used in small groups outdoors (EOC) to strengthen what was learned. Seppo.io-game produced learning data for every group and teachers.

Image 6: Designing a tool

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Image 7: Testing a tool

Image 8: Playing Seppo game on phones outdoors

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STEP 3 ADAPTATIONS AND ISSUES

The Discover step included studying outside the classroom and inside the classroom, alternately. That means that after EOC activity the students continued working in the classroom, which was followed by a new EOC activity etc.

STEP 4 – MAKE AN IMPACT

The Make an impact step included following actions:

- Reviewing the collected waste: what kind of waste did we collect?
- Reviewing results of Seppo.io.game;
- Final discussion, self-assessments;
- Students making a poster of their tool.

A poster had:

1. a photo of the tool
2. names of the garbage objects used in tool
3. a little info text: e.g. How much of each garbage (or one of the object) is collected every year in Finland? How it could be reused? How it should be sorted out?

The planned youth initiative:

- A discussion, what students wanted to do;
- Importance to understand what influencing / making an impact means and what options they have;
- In their plan, teachers had proposals for potential youth initiative, if students did not make any:
    1. An exhibition of the tool posters
        - Students organize an exhibition about the tool posters. Posters are put outdoors and we advertise the exhibition with ads to neighbourhood adults. We invite the pre-primary students to see the exhibition, students present their waste tools. Parent association has a spring event on 6.5. Exhibition could be there too.
    2. An information bulletin to families
    3. A waste sorting guidance
    4. Trying to get the posters in library?
- The plan was to have discussions in pairs and small groups, and hang their proposals on the wall;
- The idea was that the students could vote on how to implement the youth initiative.

The youth initiative that was actually carried out:

- Students did the posters of the recycling tools they had decided;
- Students planned their posters and gathered information for them on Internet. For example: How many tons of plastic ends up in landfill every year? Why plastic waste has to be reduced? How many hangers are thrown away every year? etc.
- With the posters, the students wanted to wake people up to notice the amount of plastic waste, and that plastic can be reused;
- Students decided where they wanted to hang and showcase the posters: in neighbourhood nearby, in the local grocery store, around the school premises.

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- The results of the OTTER Lab were also published in school's Instagram account.

Image 9: Students gathered information for their posters

Image 10: A poster

Translation: "Let's reduce plastic waste together! A hanger, plastic cup 2x, cotton thread and hot glue. We built it with teamwork and enthusiasm. First, we used the hot glue to stick a plastic cup and the hanger together. Then we put the cotton thread and hanger together. After that we put the red plastic cup at the top of the hanger. It is used to collect trash from the ground and from water. Every year 32 million hangers end up in landfill."

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STEP 4 ADAPTATIONS AND ISSUES
The teachers had initially planned to make the Make the impact step in a very student-centered way and involve students in deciding and planning the youth initiative themselves. The pilot started late in the spring because of the issues in getting the research permit, consents, and delays in evaluation tools. This created challenges in the last steps of the Lab to get them implemented as planned. The teachers had to speed up the process and the last step of the OTTER Lab was carried out during the last school day of the semester. That is why the teachers had to compromise and speed up the implementation of the OTTER Lab at the very end.

STEP 5 – REFLECT
The students wrote a learning diary throughout the Lab process. In addition, the students frequently discussed and reflected together and with the teachers what they had already learned and what kind of questions they still had.
STEP 5 ADAPTATIONS AND ISSUES
Learning diary and reflective discussions were used throughout the OTTER Lab. See above.

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5 OTTER Labs from 12 to 15 years old

Image 11: Students at the EOC Activity

5.1 From 12 to 15 years old in School E

AGE OF THE PARTICIPATING STUDENTS
12-15y
NUMBER OF PARTICIPATING STUDENTS (BY GENDER)
24 total, 10 female, 14 male
SHORT DESCRIPTION OF THE OTTER LAB
Analyzing and assessing water quality on samples taken from the neighboring city river.

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5.1.1 SCHEDULE OF THE OTTER LAB ACTIVITIES

STEP/STAGE	DATE	DURATION
Step 1- PREPARE	15/5/2023	1 class (45 min)
Step 2 - ORIENTATE	23/5/2023	1 double class (90 min)
Step 3 - DISCOVER	25/5/2023	1 double class (90 min)
Step 4 – MAKE AN IMPACT	30/5/2023	1 double class (90 min)
Step 5 - REFLECT	5/6/2023	1 class (45 min)

5.1.2 DESCRIPTION AND ADAPTATIONS OF THE OTTER LAB PROTOCOL

STEP 1 – PREPARE
The learning objectives chosen by the teachers at this school were: • Clean Water and Sanitation • Responsible Consumption and Production • Life Below Water • Learning to learn, metacognition • Communication • Collaboration • Information Literacy • Life & Career skills • Interacting Considerately • Acting with Respect As preparation for the school and the teacher, several online and in person meetings were implemented, where the project objectives were presented. The chosen EOC activity was to go to the city riverbank and take water samples. Analysing them with a VISOCOLOR kit and assessing water quality. In preparation phase everyone signed the consent forms.

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STEP 1 ADAPTATIONS AND ISSUES

Intros were short, as teachers wanted to focus on the very next steps and on the very logistics of the project.

STEP 2 – ORIENTATE

The critical concept of sustainability was discussed, accompanied by an introduction to the United Nations Sustainable Development Goals (SDGs). An invitation for collective brainstorming on the subject of water had been extended to participants. Conducted on a blackboard, this exercise aimed to explore water's role in supporting living organisms, its geographical and ecological significance, its utilization in households and everyday life, and its impact on both economy and society.

Frontal communication techniques were employed in a dedicated segment concerning International Water Day. Pressing issues associated with water, such as contamination primarily resulting from human activities and extreme water events attributable to ongoing climate change, were also addressed.

The concepts of 'virtual water' and 'water footprint' were introduced, aiming to raise awareness about unseen water consumption through various products and services. Emphasis on individual responsibility was placed, and potential leverage points for meaningful action were discussed.

A live demonstration on the utilization of the VISOCOLOR kit for water analysis was also featured. The kit's components and its capabilities for measuring various water quality parameters such as temperature, pH levels, and electrical conductivity were walked through. Specific ion concentrations, including nitrite (NO_2^-), nitrate (NO_3^-), ammonium (NH_4^+), and phosphate (PO_4^{3-}), were measured. Additionally, methods for assessing water hardness by detecting levels of dissolved calcium (Ca^{2+}) and magnesium (Mg^{2+}) ions were explained.

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STEP 2 ADAPTATIONS AND ISSUES
There were no major issues to be reported.

STEP 3 – DISCOVER
As the school was located near the river, the class went out to the neighborhood and took samples from the water. Then they moved to the park next to it, where there was suitable outdoor furniture to execute the measurements. The students formed groups of 3-4 and each did the experiment with a different parameter. After that, the groups shared the results with one another, which was registered. There was room for questions and answers.

STEP 3 ADAPTATIONS AND ISSUES
There were no major issues to be reported.

STEP 4 – MAKE AN IMPACT
The invitation was to create awareness raising videos as part of an imaginary communication campaign, to make an impact on peers/society. The theme was water, pollution and human behavior. The group of students got some time to record a video inside the school building. They were prompted to share different roles among them: cameraman, light assistant, interviewer, interviewee, etc. The recorded videos were then shared in class, with the opportunity to post them on tiktok/social media.

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STEP 4 ADAPTATIONS AND ISSUES
Students were not at all used to this kind of task, nor the teachers. It took some time for the latter to understand and imagine how it could look like in class. They had serious doubts – more findings related to this will be revealed in the findings of the pilots, in WP4. Students reported lessons learnt in terms of understanding better the roles and responsibilities of the diverse tasks (manage to have enough light, speak up so it can be heard on the recording, write the mini storyline, etc.).

STEP 5 – REFLECT
Students and the teacher filled in the reflection surveys and spent some time to recall the overall lessons learnt from the OTTER Lab classes.
STEP 5 ADAPTATIONS AND ISSUES
This happened on one of the last classes of the school year, therefore energies and capacities were slightly running out.

5.2 From 12 to 15 years old in School F

AGE OF THE PARTICIPATING STUDENTS
12-15
NUMBER OF PARTICIPATING STUDENTS (BY GENDER)
23 (14 girls and 9 boys)
SHORT DESCRIPTION OF THE OTTER LAB
Theme of OTTER Lab: Waste management and organic materials Two chemistry groups visited local waste management plant

5.2.3 SCHEDULE OF THE OTTER LAB ACTIVITIES

STEP/STAGE	DATE	DURATION
Step 1- PREPARE	13.4.2023	1 lesson
Step 2 - ORIENTATE	11.-17.5.2023	3 lessons
Step 3 - DISCOVER	16.5.2023	2 hours
Step 4 – MAKE AN IMPACT	19.-26.5.2023	2-3 hours
Step 5 - REFLECT	24.-26.5.2023	1 hour

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5.2.4 DESCRIPTION AND ADAPTATIONS OF THE OTTER LAB PROTOCOL

STEP 1 – PREPARE

The OTTER partner team met with the teachers in-person on March 8th at the school. Teachers were told about the OTTER project and OTTER Lab. Together they went through various steps of the Lab and discussed the implementation of the Lab. The teachers asked questions, and they immediately started to come up with ideas for the Lab's theme and contents. The teachers commented that the OTTER Lab's pedagogical model felt very clear and feasible right from the start.

The teachers set the following objectives for the OTTER Lab:

- Sustainable cities and communities
- Responsible consumption and production
- Creativity and innovation
- Critical thinking, problem solving and decision making
- Communication
- Collaboration
- ICT literacy
- Citizenship - local and global
- Life and career skills
- Creating awareness

The teachers decided to visit the local waste management plant.

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The two teachers had close cooperation during the Prepare step and the implementation of the OTTER Lab. They planned the Lab together and also did the visit to the local waste management plant (EOC activity) together.

The teachers shared information to parents with Wilma (a digital study administration system for students, teachers and guardians). They did it using information sheet in the consent form.

STEP 1 ADAPTATIONS AND ISSUES

The two teachers had close cooperation during the Prepare step and the implementation of the OTTER Lab. They planned the Lab together and also did the visit to the local waste management plant (EOC activity) together.

STEP 2 – ORIENTATE

The Orientate step included following activities:

- The teacher delivered a presentation about OTTER project and Lab;
- Class discussion:
  - The theme and learning objectives for the whole OTTER lab
  - EOC activity that will be carried out
  - The location where it will be implemented
  - That the whole process includes designing a youth initiative that deals with an environmental problem
- Students made a mind map based on the presentation and class discussion. Students also gathered their previous knowledge about this topic in the form of a mind map;
- The students were divided into small groups, in which they worked throughout the Lab;
- Each group of students chose a topic prior to the visit to the waste management plant, and thought of questions to ask or processes to observe related to their topic. Chosen topics: plastic waste and how it is managed, end-of-life textiles, twigs and garden waste, biowaste, plastic packaging and cardboard waste;
- Instructions were given to students during orientation.

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Image 12: Orientation to the Lab

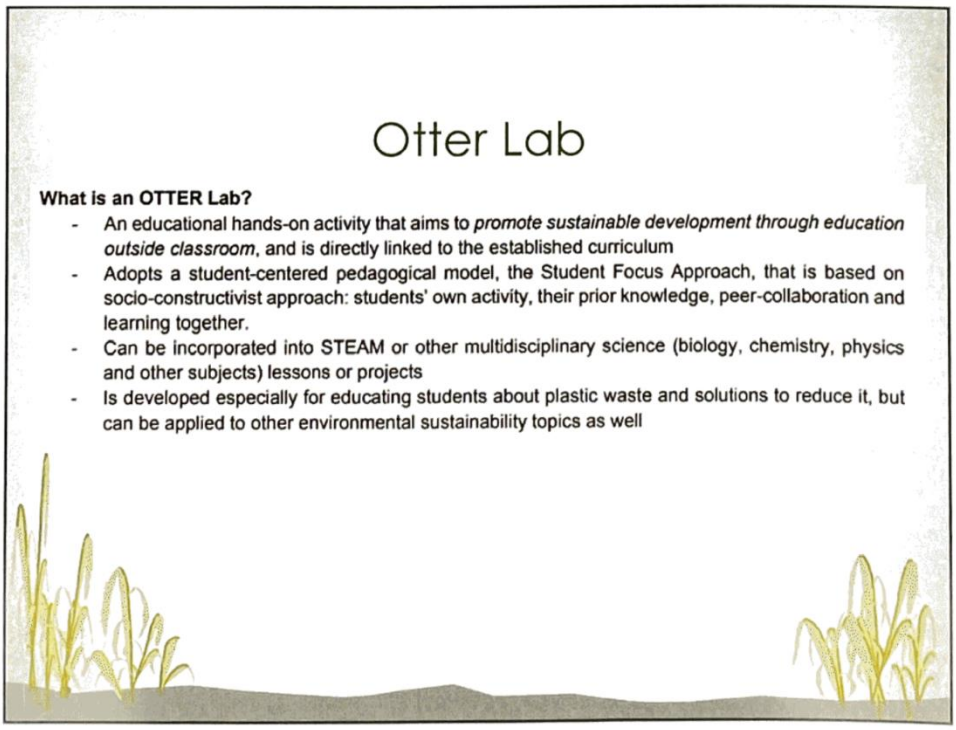

Image 13: A slide from the teacher's presentation

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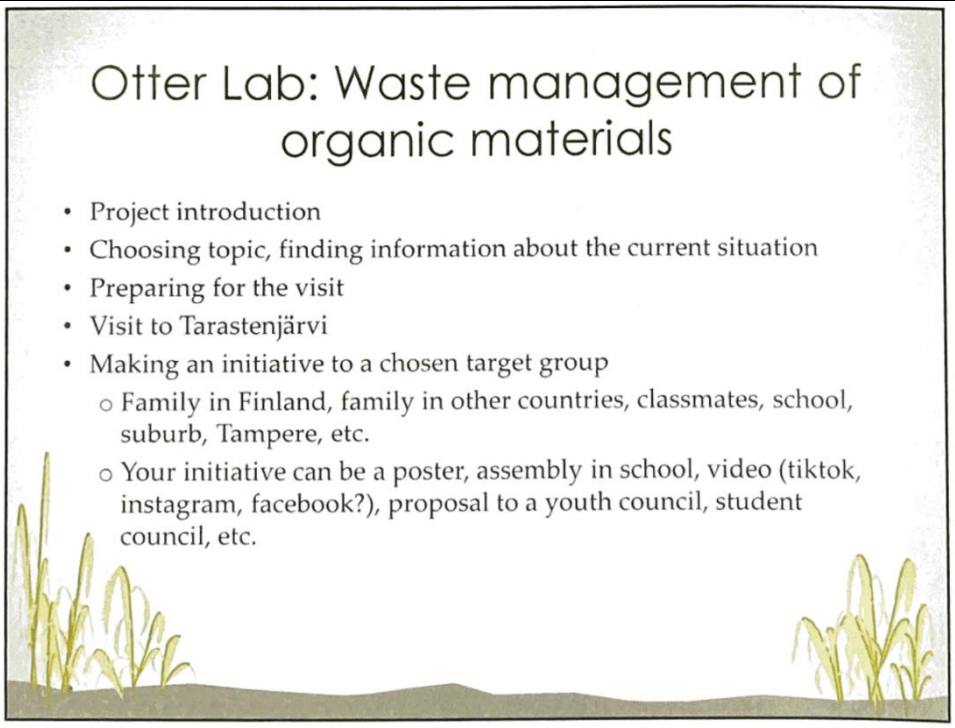

Image 14: A slide from the teacher's presentation

STEP 2 ADAPTATIONS AND ISSUES

A pilot had to apply a research permit from the City Council. The research permit process took a lot of time, and it was granted at the end of March (on March 27th). After that, consents from the students and their guardians were needed. The process of creating and editing the consent forms was very slow. All this was very time consuming and the whole OTTER Lab process was delayed. This caused minor issues especially at the end of the OTTER Lab.

STEP 3 – DISCOVER

Students observed the operation of waste management plant. The employee of the plant gave a presentation to the students how the plant operates. The plan was that the students would have had the opportunity to ask questions related to their topics. Unfortunately, since the trip was suddenly moved to a new date (by the waste management plant), the visit was not organized according to the original plan and the students did not have much possibilities to ask questions. Students made notes during the visit, and at school computers were used to find more information.

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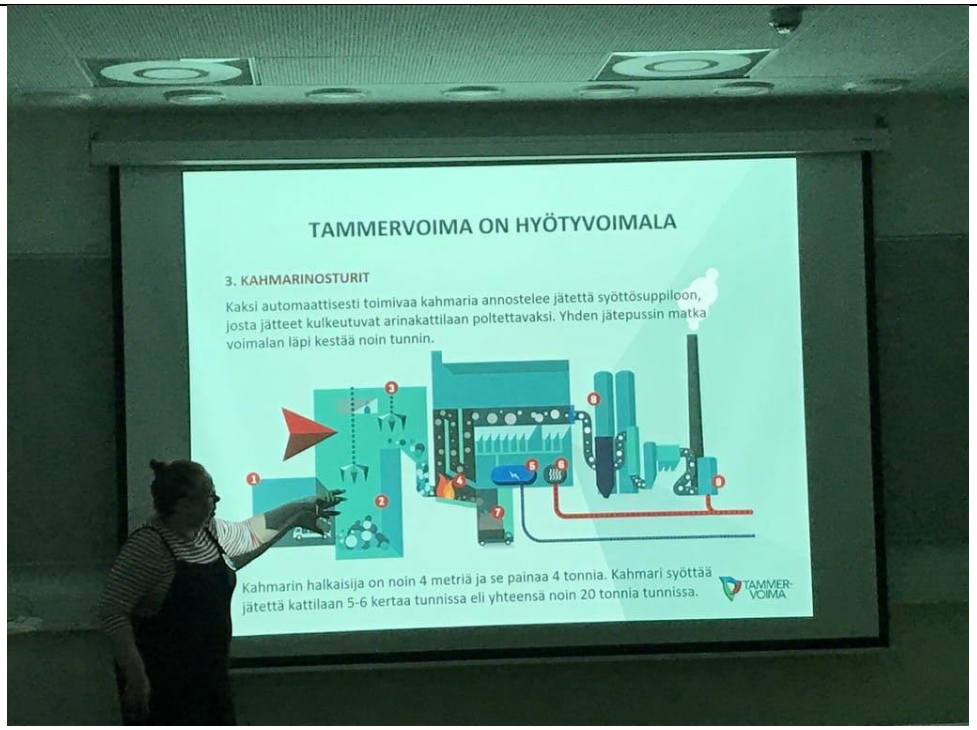

Image 15: A presentation in the waste management plant

STEP 3 ADAPTATIONS AND ISSUES

A couple of days before the visit to the waste management plant, the visit was cancelled by the plant and the teachers had to reschedule the visit quickly. Eventually, the visit was carried out two days before the planned time. This led to a situation that the students didn't have time to prepare questions for the visit properly. Therefore, both the teachers and the students felt that the orientation and especially preparation time for the visit was inadequate.

The student groups had two hours for the visit. Half of the time was spent on bus trips. The visit to the plant lasted only an hour and was too short for questions and discussion. Because of the short time spent onsite, the visit was not properly connected to the research topics the students had set in the beginning of the OTTER Lab. Students also commented that it would have been nice to do some hands-on-activity on the waste management plant. Even though the teachers had hoped it to happen, the changes in waste management plant led to the situation that the visit was not conducted as planned.

STEP 4 – MAKE AN IMPACT

Students had group discussions of their findings, and they chose the method of sharing their project work.

Each group decided the focus of their initiative, and how they will carry it out.

Most of the small groups ended up making a poster. They thought that a poster is a concise way to reach a large amount of audience. One group implemented a social media post, because they saw that the target demographic for this kind of topic is mostly young people and young adults.

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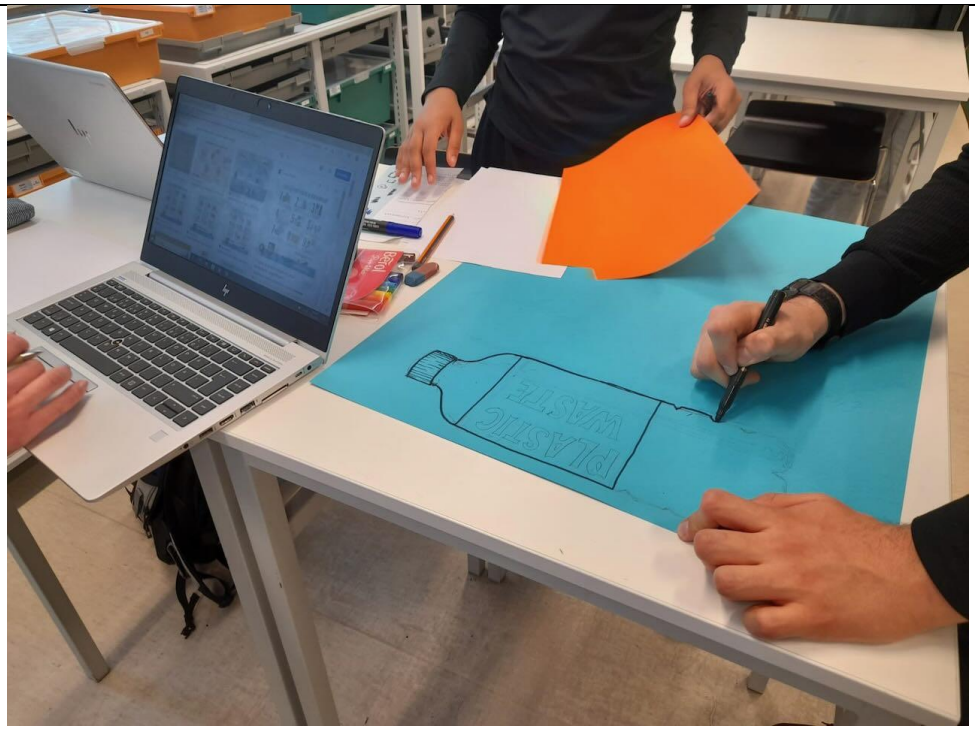

Image 16: Making a poster

Image 17: A poster about plastic packaging

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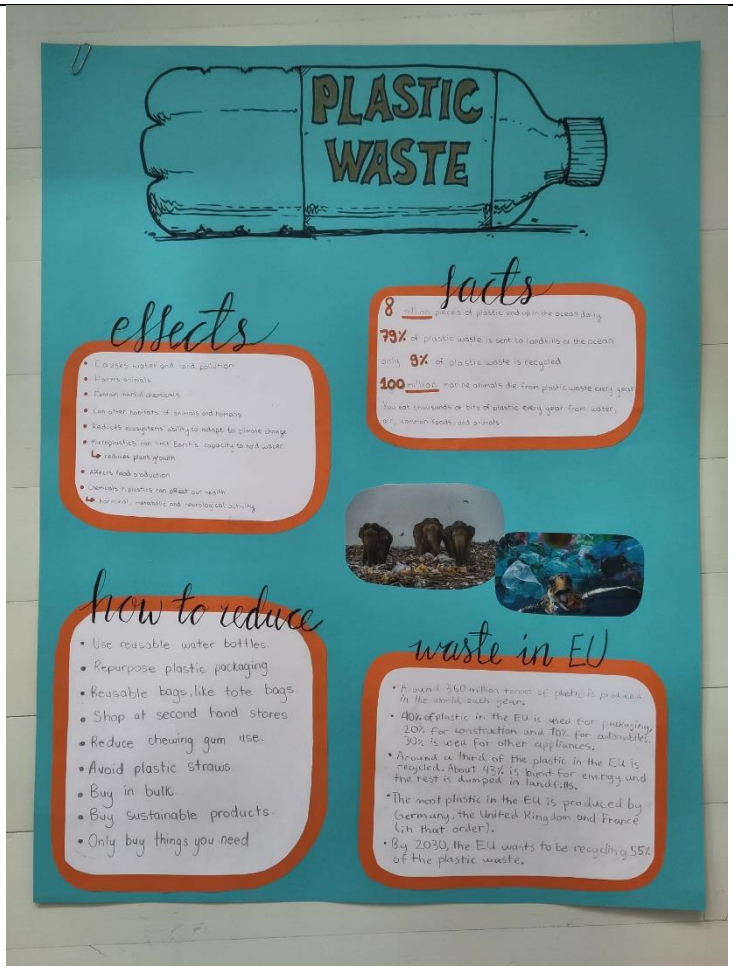

Image 18: A poster about plastic waste

STEP 4 ADAPTATIONS AND ISSUES

Due to the time issues, almost all small groups made a poster. Making posters was a familiar way of working for the students.

The pilot in Finland started too late in the spring because of the issues in getting the research permit, consents, and delays in evaluation tools. This created challenges in the last steps of the Lab (Make an impact and Reflect) to get them implemented with sufficient quality. The teachers had to speed up the process and the last step of the OTTER Lab was carried out during the last two school days of the semester.

STEP 5 – REFLECT

The Reflect step consisted of group discussion, self-evaluation, and conducting the needed research tools (focus group discussion, exit tickets).

STEP 5 ADAPTATIONS AND ISSUES

See above.

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6 OTTER Labs from 16 to 18 years old

Image 19: school students during the EOC activity

6.1 From 16 to 18 years old in School G

AGE OF THE PARTICIPATING STUDENTS
16 - 17
NUMBER OF PARTICIPATING STUDENTS (BY GENDER)
15: 3 boys, 12 girls.
SHORT DESCRIPTION OF THE OTTER LAB
The school worked with the NGO to implement the “River Project”. It is based on an EOC activity in the city river where a study will be carried out on the quality of its water and its environment, specifically looking at the impact of plastics on the ecosystem. The design and implementation of Step 4 - MAKE AN IMPACT has been left in the hands of the students, who have ultimately decided to create an initiative on Change.org to collect signatures

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from citizens. Their aim is to ask the city council to take measures to improve the quality of the urban space of the river, considering its fauna and flora, with the goal of improving the quality of the entire space and allowing biodiversity to increase.

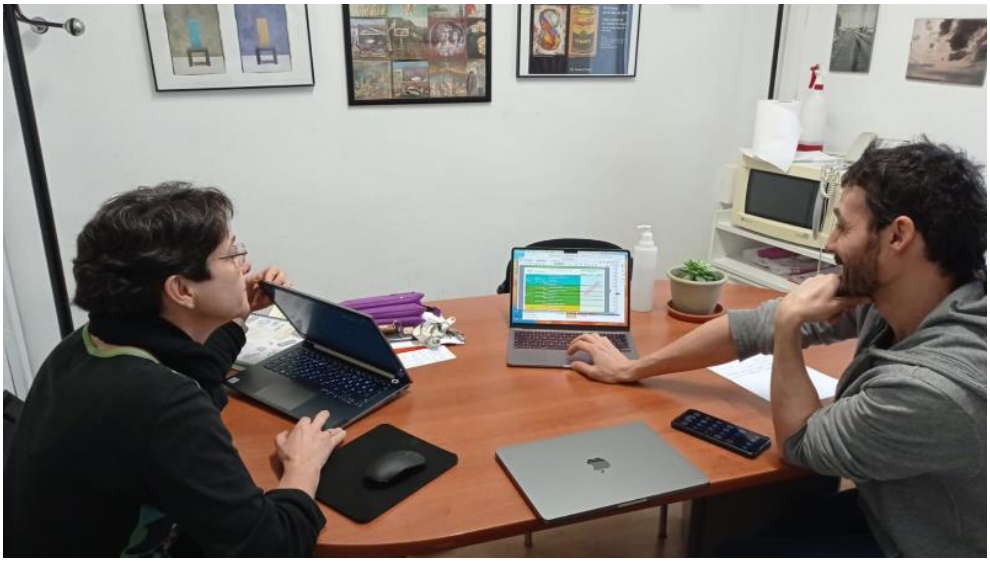
6.2 SCHEDULE OF THE OTTER LAB ACTIVITIES

STEP/STAGE	DATE	DURATION
Step 1- PREPARE	During March	About 5 hours
Step 2 - ORIENTATE	30/03/2023	1 hour
Step 3 - DISCOVER	12/04/2023	5 hours
Step 4 – MAKE AN IMPACT	From 17 to 26, April 2023	4 to 6 hours
Step 5 - REFLECT	29th April 2023	1 hour

6.3 DESCRIPTION AND ADAPTATIONS OF THE OTTER LAB PROTOCOL

STEP 1 – PREPARE

A two-hour meeting had been held with the teacher responsible for implementing the OTTER Outdoor Lab. During this meeting, the OTTER methodology was presented, and a preliminary design of the OTTER Outdoor Lab was created.



It had been decided that the first-year high school students would carry out a scientific study on the quality of the river as it passed through the city. This study was to consider physicochemical parameters such as the hardness or pH of the water, as well as biological aspects such as the presence of both plant and animal bioindicators. Special emphasis was to be placed on the effect of plastic pollutants on the quality of the river.

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To execute this OTTER Outdoor Lab, the involvement of the NGO was secured. This organization was responsible for energizing Steps 2 - ORIENTATE and Step 3 - DISCOVER.

Three additional online meetings had been held, each lasting one hour. In these meetings, the teacher, a representative from OTTER partner, and a representative from the NGO participated to coordinate the dates for implementing various activities and the content that would be passed on to the students in the subsequent activities.

During these meetings, it was also decided that the students would be permitted to choose the type of youth initiative they wished to undertake in Step 4 - MAKE AN IMPACT. For this purpose, it was agreed that a representative from TBVT would conduct a participatory workshop with the students to design the Youth Initiative.

STEP 1 ADAPTATIONS AND ISSUES

There were no major issues to be reported.

STEP 2 – ORIENTATE

A participatory workshop was implemented by a member of the NGO, who explained to the students how it is possible to measure the health of a river by studying its biodiversity, both animal and plant. She also explained how to measure the health of a river based on physicochemical parameters such as water turbidity, hardness, or pH.

During this workshop, we also delved into the concept of "being a scientist", what it means to pursue a scientific career, and what its job prospects are. It was also shown that the study to be carried out on the river during Step 3 - DISCOVER would be scientific in nature, and that the data collected would be sent to the ecology group of the Faculty of Biology at the University to be used in real studies.

In this way, the students were motivated and engaged with the OTTER Outdoor Lab, realizing that the results of their actions during the EOC activity would influence real scientific studies.

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STEP 2 ADAPTATIONS AND ISSUES
There were no major issues to be reported.

STEP 3 – DISCOVER
The students performed their activities directly at the river. Once everyone was gathered, a representative from TBVT reminded them that all the data they were going to collect during the day would be used in real scientific studies, and also, they should use it to reach their own conclusions about the state of the river and from there, generate a Youth Initiative to impact society and achieve some improvement related to environmental sustainability.

Subsequently, the students moved to the sampling point where, with the help of a representative of the NGO, the necessary sampling was carried out in terms of physio-chemical and biological parameters of the water. The students carried out all the experiments and collected the specific data using forms specifically generated for this task.

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STEP 3 ADAPTATIONS AND ISSUES

There were no major issues to be reported.

STEP 4 – MAKE AN IMPACT

During a one-hour class, the teacher in charge of the project analyzed with her students the data collected (which, through the NGO has been sent to the ecology group of the Faculty of Biology of the University). The main conclusions that the health status of the River as it passes through the city is very poor, and that urgent actions are needed to eliminate both chemical and physical contaminants (mainly plastics) to improve the quality of the river and increase its biodiversity.

After this action, in a participatory one-hour workshop led by the OTTER partner representative, the students presented on post-its what their main concerns were as a result of the activities carried out in the EOC activity and after analyzing the results and what possible actions they can take to address these issues.

As a result of this activity, the group decided that they want to call on the local authorities of the city to invest resources in cleaning the river and improving it. In order to have a greater impact, they decided to collect signatures from citizens through a campaign on Change.org.

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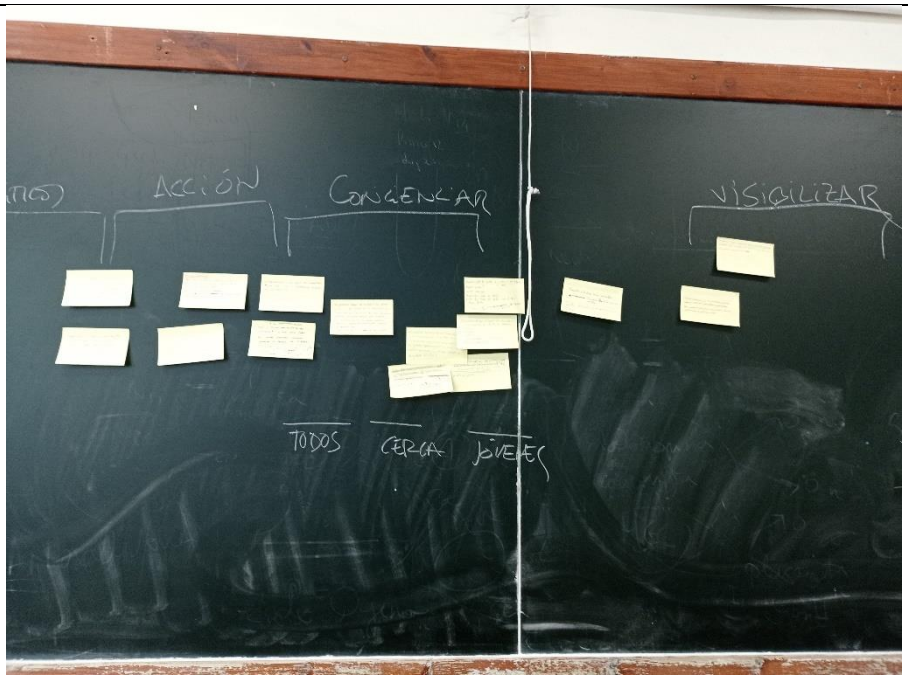
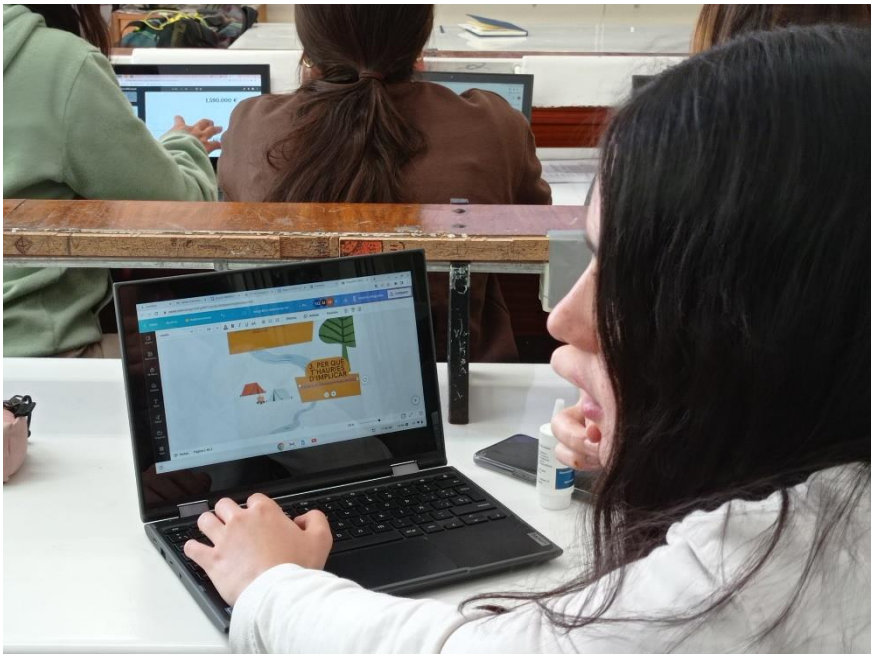


The class group was divided into two groups, one of them is responsible for preparing the campaign on Change.org, while the other designed some campaign dissemination materials, to make it known and thus get more signatures.



Once the campaign on Change.org had been created (which can be visited here: https://www.change.org/p/salvem-el-riu-bes%C3%B2s-fem-lo-un-pulm%C3%B3-verd) the students created a PowerPoint presentation about the campaign and presented it to the 3rd year students of the ESO of the school. They also created bookmarks with a QR code that directed directly to the campaign and distributed them throughout the school and their neighborhood.

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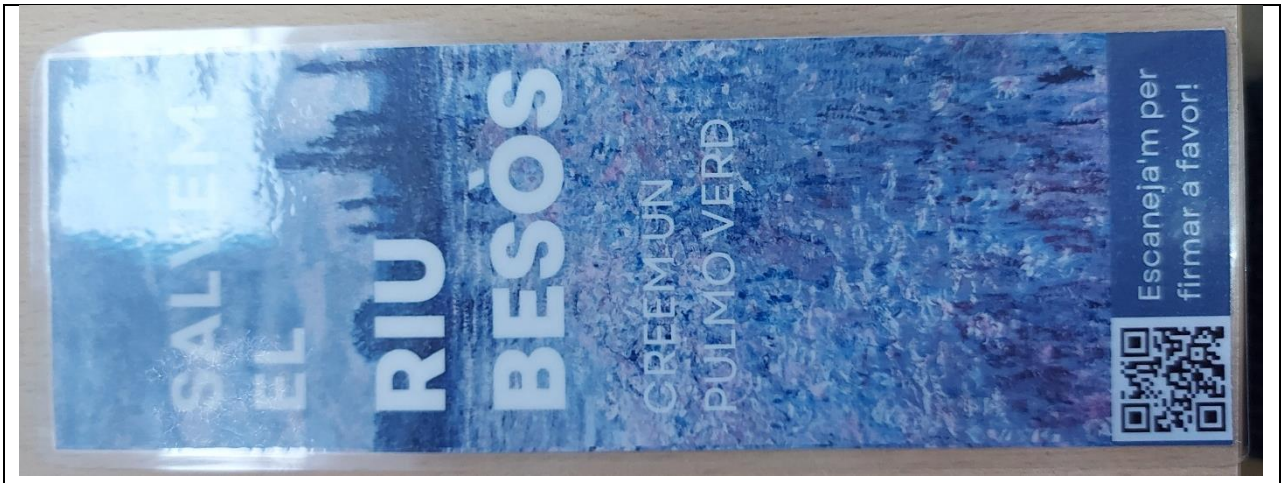

STEP 4 ADAPTATIONS AND ISSUES

There were no major issues to be reported.

STEP 5 – REFLECT

The students carried out the reflection activity designed by WP4.

They also had a one-hour reflection session with a TBVT member, in which the students reflected on:

- What is the most relevant thing they have learned;
- What they liked the most;
- What they would change about the project.

STEP 5 ADAPTATIONS AND ISSUES

There were no major issues to be reported.

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6.4 From 16 to 18 years old in School H

AGE OF THE PARTICIPATING STUDENTS
16-17yrs
NUMBER OF PARTICIPATING STUDENTS (BY GENDER)
21 Female
SHORT DESCRIPTION OF THE OTTER LAB
The school has connected with 2 potential sites; University and Industry. Transition year students are interested in energy efficiency in their school. Under the guidance of their teacher, they hoped to understand Responsible Consumption and Production & Affordable and Clean Energy.

6.4.1 SCHEDULE OF THE OTTER LAB ACTIVITIES

STEP/STAGE	DATE	DURATION
Step 1- PREPARE	2nd Feb, 6th March	16-18yrs: 3hrs with partner (teachers also did independent preparation outside of partner workshops – 3hr approx) Total; 6hrs
Step 2 - ORIENTATE	March 30th - May	approx 2 double classes (160mins)
Step 3 - DISCOVER	April 19th	1 full day
Step 4 – MAKE AN IMPACT	May/June	1 class approx. (80mins)
Step 5 - REFLECT	N/A	Happened throughout each step (also reinforced during the focus group – 30mins)

6.4.2 DESCRIPTION AND ADAPTATIONS OF THE OTTER LAB PROTOCOL

STEP 1 – PREPARE
The teachers met with the OTTER team online and in-person for planning meetings. Here, the OTTER representative helped to guide the teachers to possible ideas for OTTER Labs and ways that it could link to the current school curriculum. Possible sites to visit for EOC activities were also discussed and reviewed for relevance to the topics being addressed.

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- SDG 7 | Affordable and Clean Energy
- Sustainable Cities and Communities
- SDG 9 | Industry, Innovation and Infrastructure
- Responsible Consumption and Production
- Creativity and innovation
- Critical thinking, Problem Solving, Decision Making
- Learning to learn, metacognition
- Communication
- Collaboration
- Information Literacy
- ICT literacy
- Scientific Literacy
- Citizenship – local & global
- Life & Career skills
- Personal & Social responsibility

STEP 1 ADAPTATIONS AND ISSUES

The main concerns raised for EOC trips were related to having supervision cover for the teacher's other classes and also to relieve students from other subjects that they might have at the time of the EOC trip. This was overcome by replacement teachers and scheduling visits during the teacher's own timetabled classes as much as possible. Selecting a site that was close to the school also meant that there were less barriers to facilitating the trip.

With this school, access to resources was also flagged by the teacher as a barrier for teachers and students. This is a disadvantaged urban school with students from a variety of lower socioeconomic backgrounds who have little exposure to role models in particular high paid career paths.

There were some instances where there was more overlap with the OTTER Lab objectives and curriculum objectives than the teacher identified in the tool. Here, it was important for the facilitator (familiar with the OTTER tool and curriculum) to review the tool and suggest to the teacher further opportunities and value in the OTTER Labs that could be documented in the planning.

STEP 2 – ORIENTATE

This step was mostly teacher led and it was difficult to get an insight into exactly what the teachers did before their site visit. It was evident that teachers engaged in pre-learning as part of their normal classroom practice. Students were learning about energy in the classroom. Particularly

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they were introduced to energy types, sources, dissipation and efficiency. This was completed using worksheets and PowerPoints.

STEP 2 ADAPTATIONS AND ISSUES

As this group of students were in Transition Year, their timetabled science classes (80mins a week) was often disrupted with other activities. These students were exposed to many different types of activities and projects anyways as part of this year and so it was difficult for them to get completely immersed in the OTTER project. If carrying this out in future with Transition Year students, it would be better to start earlier in the year and make it a yearlong project so as to fit in the different steps more effectively.

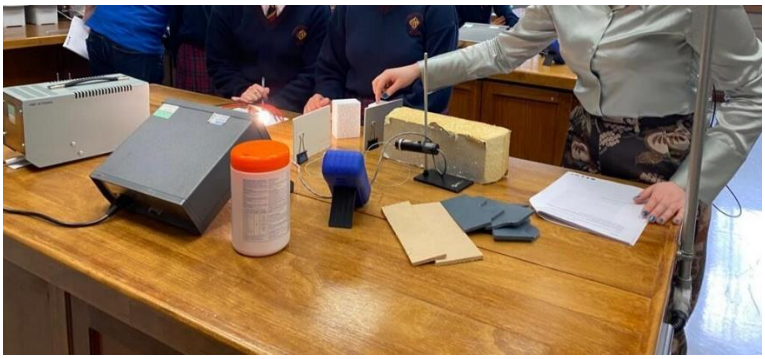
STEP 3 – DISCOVER

The students engaged in 1 full day EOC trip with two site visits.

EOC trip 1a – Visit to Industry Students attended a guided tour, observed the company's energy generation with their on-site wind turbine, and learned about the company's policies regarding sustainable packaging and the many solutions available to us to reduce plastic waste.

EOC trip 1b – University Physics Lab

The students were then hosted by the School of Physics in the University, where they took part in several activities to audit the energy efficiency of a building and come up with solutions to reduce energy usage in their school.



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STEP 3 ADAPTATIONS AND ISSUES

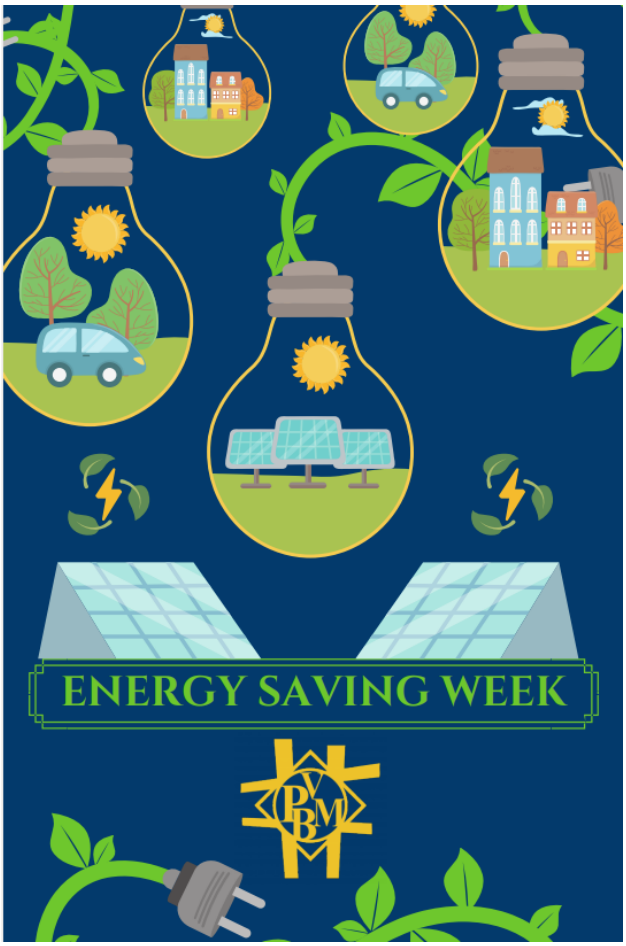
One challenge that arose in organising the industry visit is it was difficult for them to facilitate the collection of evidence or students hands-on experience. Here, students were more listening to a guide. It was also felt that they industry representative did not have much experience working with young people and sometimes the focus of their information was not at a level comprehendible. Next time, it would be useful for students to send a list of pre-prepared questions to the guide. It might also help if the teacher first visits the site to see how they might link the learning better and perhaps create a worksheet for students to complete on site.

This was particularly evident because for the second trip the facilitator knew exactly how to link the curriculum and tailor the workshops to the students. The students also completed worksheets as part of the trip which the teacher later used to create similar experiments in the school.

STEP 4 – MAKE AN IMPACT

Students were involved in creating awareness for Energy Saving week in their school. They created posters and thought of ways to reduce energy consumption in their school.

Students also created PowerPoint presentations on their learning of energy and what it means to have an energy efficient building.



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STEP 4 ADAPTATIONS AND ISSUES
This step was sped up as it happened towards the end of the year.

STEP 5 – REFLECT
Reflecting happened at every stage of the OTTER Labs not just at the end of the cycle in this school. The teacher chose to complete the reflect step as part of one of the EOC visit. The reflect assessment tool also helped students to consolidate learning.
STEP 5 ADAPTATIONS AND ISSUES
Reflect was not a separate step in this school. Students were continuously reflecting as part of their learning experiences.

6.5 From 16 to 18 years old in School I

AGE OF THE PARTICIPATING STUDENTS
16-17yrs
NUMBER OF PARTICIPATING STUDENTS (BY GENDER)
12: 8 Male, 4 Female
SHORT DESCRIPTION OF THE OTTER LAB
The 5th year Chemistry teacher, investigated with her students the biochemical oxygen demand of samples of water using various techniques (experimental and technological) from different sites in their locality, related to Life Below Water Sustainable Development Goal. They visit their local lake, a wastewater treatment plant and a primary school pond.

6.5.3 SCHEDULE OF THE OTTER LAB ACTIVITIES

STEP/STAGE	DATE	DURATION
Step 1- PREPARE	2nd Feb, 28th Feb	16-18yrs: 3hrs with partner (teachers also did independent preparation outside of partner workshops – 3hr approx.) Total 6hrs
Step 2 - ORIENTATE	March 30th - May	At least 3 classes (class before each EOC visit) approx. 2hrs total
Step 3 - DISCOVER	15th May, 18th May, 24th May	1 full day, 2 half days

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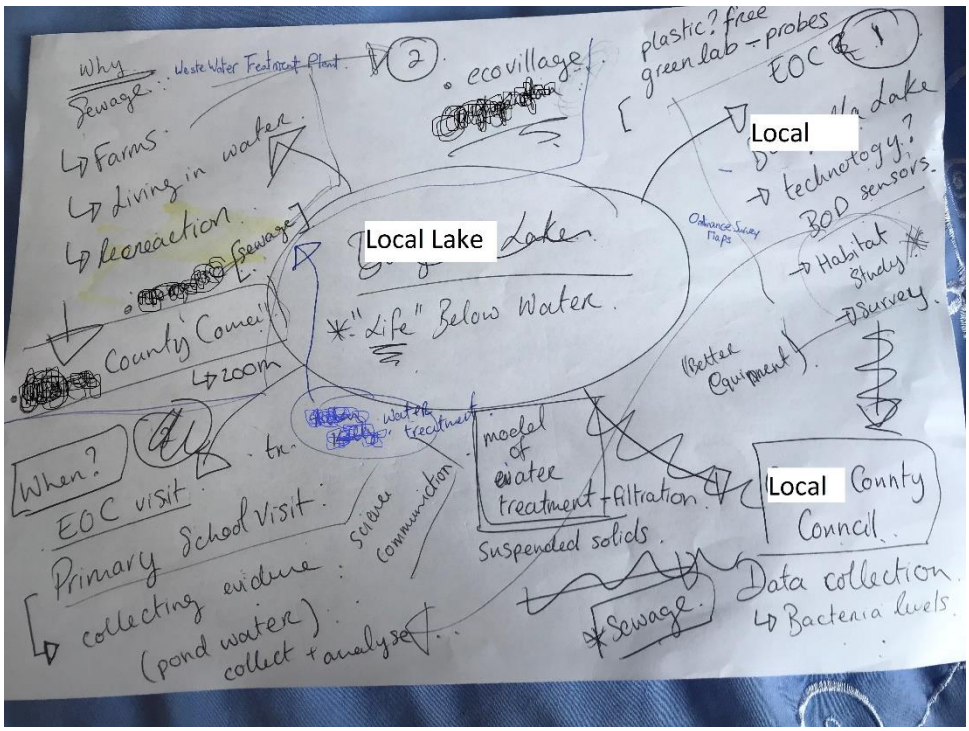
Step 4 – MAKE AN IMPACT	May/June	2 classes approx.
Step 5 - REFLECT	30th May	Happened throughout each step (also reinforced during the focus group – 30mins)

6.5.4 DESCRIPTION AND ADAPTATIONS OF THE OTTER LAB PROTOCOL

STEP 1 – PREPARE

The teachers met with the OTTER team online and in-person for planning meetings. Here, the OTTER representative helped to guide the teachers to possible ideas for OTTER Labs and ways that it could link to the current school curriculum. Possible sites to visit for EOC activities were also discussed and reviewed for relevance to the topics being addressed.

- Responsible Consumption and Production
- Life Below Water
- Critical thinking, Problem Solving, Decision Making
- Communication
- Collaboration
- Information Literacy
- ICT literacy
- Scientific Literacy
- Citizenship – local & global
- Life & Career skills



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STEP 1 ADAPTATIONS AND ISSUES
The main concerns raised for EOC trips were related to having supervision cover for the teacher's other classes and also to relieve students from other subjects that they might have at the time of the EOC trip. This was somewhat overcome by teachers' replacements and scheduling visits during the teacher's own timetabled classes as much as possible. Selecting a site that was close to the school also meant that there were less barriers to facilitating the trip. There were some instances where there was more overlap with the OTTER Lab objectives and curriculum objectives than the teacher identified in the tool. Here, it was important for the facilitator (familiar with the OTTER tool and curriculum) to review the tool and suggest to the teacher further opportunity and value in the OTTER Labs that could be documented in the planning.

STEP 2 – ORIENTATE
This step was mostly teacher led and it was difficult to get an insight into exactly what the teachers did before their site visit. It was evident that teachers engaged in pre-learning as part of their normal classroom practice. The teacher reported putting more effort into group work activities and allowing students time to discuss, plan and collaborate on what they would need to prepare their site visit. There were different preparations and pre-learning depending on the site visit that was occurring. Orientate 1 - Students had to decide how they would collect water samples and the equipment needed to test them at the lake. The teacher had to gather equipment and find a way of transporting it to the site. Orientate 2 - Group work and collaboration was particularly evident as part of the primary school visit where students had to gather equipment for their models and write a script on how they would explain water and sewage treatments to a younger audience. Orientate 3 - Students had already familiarised themselves with the steps of water and sewage treatment as part of their school curriculum.
STEP 2 ADAPTATIONS AND ISSUES
The orientate step happened more than once and occurred before each of the site visits. It was important to teachers that students were prepared for the visit in order to get the most of their time. In most cases the students were already completing learning related to the visit so it was not extra work for teachers to engage in "specific" pre-learning. It was mostly the planning of equipment needed or organisation of permission from teachers and management that became extra work in this step. The teacher reported that allowing for group work and discussion in this step took the most time that would not normally be accounted for in normal classroom scenarios.

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STEP 3 – DISCOVER

Discover 1 – Trip to Lake

Here, students identified a local body of water that they could collect water samples to test as part of a mandatory experiment for their State Examinations. Students got a bus to the lake and collected water samples, carried out simple Ph tests and surveys of the resources surrounding the local amenity. Students had free time to walk around the lake and enjoy their lunch break there also.

Discover 2a – Visit from Scientist in local industry

Students invited an Environmental Health and Safety Officer to visit their class. This was not possible in-person, so they hosted them online. They were able to understand the importance of water in a pharmaceutical context and how wastewater was managed on site. Afterwards they engaged in a science communication workshop where they finetuned their communication and collaborative skills for their next EOC visit.

Discover 2b – Trip to local primary school

Students were studying water and sewage treatment as part of their secondary school curriculum. For their second visit they created models of these systems and visited a primary school that was also part of the OTTER project. Here, students organised the best way to share scientific information with a younger audience and worked together on a presentation about their topic.

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Discover 3 – Trip to Wastewater Treatment plant (WWTP)

Students were invited to visit a large Wwtp . Here they could see the real-life application of their study of wastewater and sewage treatment. In particular, students got to see how the measurements in the classrooms are digitalized in industry. Students were also exposed to a day in the life of many careers such as lab technicians, site managers, researchers and technical staff.

Discover 4 – Trip to Local Lake

Students returned to a lake on a recreational visit where they discussed and reflected on their learning.

STEP 3 ADAPTATIONS AND ISSUES

The teacher commented that if the site visit was close to the school, it was easier to organise and more worthwhile for the students as they felt connected to the area. This can be seen when the teacher organized the second visit to the lake in order to reflect on learning.

The teacher also felt that if they had more support from senior management the organisation of these trips would have been easier.

The secondary linked up with a primary school also in the OTTER project who were working on topics related to the same SDG. This sharing of knowledge influenced both the older and younger students.

STEP 4 – MAKE AN IMPACT

Here, students analysed their observations and findings from their EOC visits to inform their Youth Initiative. They felt that students were not informed enough about the damage caused when unsuitable waste was flushed in the toilet. They created a poster campaign for their school.

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As some of the students were also on the student council, they also felt that they could have an influence on their peers and so they helped to promote the campaign.
STEP 4 ADAPTATIONS AND ISSUES
The main challenge here was that students did not have much time nearing the end of the school term. It would have been more suitable had the EOC trips happened early in the term.

STEP 5 – REFLECT
Reflecting happened at every stage of the OTTER Labs not just at the end of the cycle. In this school the teacher chose to complete the reflect step as part of one of the EOC visit. The reflect assessment tool also helped students to consolidate learning.
STEP 5 ADAPTATIONS AND ISSUES
Reflect was not a separate step in the OTTER Labs. Students were continuously reflecting as part of their learning experiences.

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7 OTTER Labs OBSERVATIONS

The OTTER Lab pilots were carried out in four different pilot countries. Implementation of OTTER Lab pilots gave several useful viewpoints and insights that are valuable for further implementation of the OTTER Lab model. Here are some of the key observations:

- In general, the OTTER Lab's pedagogical model was quite easily implemented in fairly different school systems, curricula and pedagogical contexts;
- The OTTER Lab model seemed to be more familiar to some of the piloting countries and quite novel to some of them;
- The OTTER Labs pedagogical model proved to be flexible enough to provide different variations and adaptations to fit to different educational contexts and cultures;
- Some of the issues occurred in the OTTER Lab pilots were due to the external partners and could not have been foreseen by the teachers or the schools involved;
- The lack of time seemed to be an issue for some of the pilots. The successful implementation of OTTER Labs would require enough time;
- In several OTTER Lab pilots the reflection was used throughout the lab process, not just in the end of OTTER Lab.

The more thorough analysis of the results of OTTER Labs will be presented in WP4. The research will provide actual results and findings regarding OTTER Labs and their implementation in this project.

The OTTER Labs represent a pioneering effort in the European educational landscape, reflecting the values and goals of the European Union's strategy for smart, sustainable, and inclusive growth. By integrating real-world experiences, innovative pedagogies, and a strong commitment to sustainability and social responsibility, the project is more than an educational initiative; it's a pathway that fosters civic engagement, environmental stewardship, intergenerational collaboration, and lifelong learning. As part of our concerted effort to enhance education across Europe, we present the following detailed insights into the OTTER Lab implementation, an endeavor that embodies excellence and the forward-thinking approach that Europe needs in the evolving field of education:

1. **Gender & Geographical Differences:** In the implementation of OTTER Labs, a gender imbalance has been observed among the participating teachers, with 14 female teachers compared to just one male teacher. We believe it is appropriate to analyze in future actions whether this could affect the differing levels of motivation that boys and girls have toward topics related to sustainability and climate change.

   It is much easier to incorporate OTTER Labs in places where outdoor activities are already part of the educational curriculum, such as Finland. Whereas in other countries where such activities are not normally conducted, it is more complicated and requires more work and awareness-raising among teachers.

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2. **Innovation in Educational Objectives:** The OTTER Labs represents an innovative initiative, providing students with hands-on educational experiences related to the Sustainable Development Goals, particularly "sustainability and plastic waste". By fostering outdoor education and local environmental investigation, the OTTER Labs encourage an understanding of and advocacy for sustainability, promoting education that is both engaging and socially responsible.

3. **Strategic Preparation and Planning:** Each phase of preparation within the OTTER Labs reveals a meticulously crafted approach that aligns with the core educational curriculum. Teachers and educational actors work in collaboration to identify learning opportunities and overcome logistical challenges, demonstrating an adaptable and responsive model for education.

4. **Orientation and Collaboration:** The project's orientation phase emphasizes group discussions, planning, and strategies for community engagement. It is a testimony to a students' learner-centered pedagogy that fosters (21st Century skills) collaboration and critical thinking, essential for the modern workforce.

5. **Practical Experiences for Enhanced Learning:** Education Outside the Classroom activities provide students with real-world perspectives on theoretical content. These invaluable experiences bridge the gap between theoretical learning and real-world applications, promoting an education that is both relevant and empowering.

6. **Community Impact and Civic Engagement:** Students are not only passive learners but active agents of change. The project's design encourages them to analyse, create, and promote community-centered initiatives (the Youth Initiatives implemented in Step 4 – Make an Impact), such as responsible waste disposal campaigns. This fosters a sense of civic responsibility and leadership, essential traits for tomorrow's European citizens.

7. **Continuous Reflection for Lifelong Learning:** The continuous reflection infused into each step of the OTTER ~~outdoor~~ Labs process encourages students to consolidate their learning and apply knowledge in meaningful ways. This reflective practice cultivates lifelong learning, aligning with Europe's vision for an educated and reflective citizenry.

8. **Adaptations and Resilience:** Despite unique challenges, the flexibility and adaptability of the OTTER Labs model allows for successful implementation. These adaptations demonstrate the project's resilience, making it a robust and adaptable model for educational innovation across all Europe and beyond.

9. **Intergenerational Interaction for Mutual Growth:** Collaborations between schools and external educational actors add an intergenerational dimension, giving students a more realistic and objective view of the situation experienced in their communities. This reciprocal

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relationship enhances community learning, fostering a sense of European solidarity and cultural exchange.

In conclusion, the OTTER Labs offer an essential, innovative, and transformative learning experience. OTTER approach aligns with the core values and strategic goals of the European educational landscape, promoting sustainability, civic engagement, intergenerational collaboration and lifelong learning. It is not so much a project as much as it is a vital pathway towards a more informed, responsible, and united Europe. The OTTER Labs are meant to exemplify the future of education, not just in theory but in practice, making it a step towards European educational excellence.

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8 Annex I

Guide provided to teachers to design and implement the OTTER Labs.

Template for OTTER Lab Design

Teacher(s):

School:

Theme of OTTER Lab:

Step 1. Prepare

1.1 Set the objectives for OTTER Lab (Look at the document: "OTTER_FINAL Learning Objectives_Teacher Training.pdf")

Broad Pilot Aims	OTTER Lab Outcomes		Identifying Suitable Learning Objectives from the Curriculum		
			Knowledge	Skills	Attitudes, Values, Ethics
Sustainable Practices	Sustainable Development Goals (related to OTTER) Choose ≥1	Clean Water and Sanitation			
		Sustainable Cities and Communities			
		Responsible Consumption and Production			
		Climate Action			
		Life Below Water			
		Life on Land			
21st Century Competencies	1. Ways of Thinking Choose ≥1	Creativity and innovation			
		Critical thinking, Problem Solving, Decision Making			
		Learning to learn, metacognition			
	2. Ways of Working Choose ≥1	Communication			
		Collaboration			
	3. Tools for Working Choose ≥1	Information Literacy			
		ICT literacy			
		Scientific Literacy			

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	4. **Living in the World** Choose ≥1	**Citizenship – local & global**			
		Life & Career skills			
		Personal & Social responsibility			
Inclusion & Diversity	**Providing Equal Opportunities for All** Choose ≥1	**Interacting Considerately**			
		Creating Awareness			
		Acting with Respect			

1.2. Choose an EOC activity and a place

What kind of EOC activity will you have and where?

Step 2. Orientate

Date of implementation	How much time is dedicated to this step?

2.1. Help students feel the importance of the chosen environmental topic/issue

How will you help students understand why this topic is relevant? How do you orientate your students for this theme?

2.2. Inform the students about the upcoming EOC activity and the whole learning process

What do you need to tell to the students about:
- The theme and learning objectives for the whole OTTER lab - EOC activity that will be carried out - The location where it will be implemented

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- That the whole process includes designing a youth initiative that deals with an environmental problem

2.3. Map students' prior knowledge about the topic

How will you map what students already know about the topic: what do they know, what do they not know, are there gaps or contradictions in their knowledge, what do they need to find out etc.?

2.4. Help students gather relevant information for the EOC activity

What kind of information would help students to orientate and prepare for the EOC activity? How will they gather that?

2.5. Set learning tasks for the EOC activity

How will you set learning tasks for the students? Students should be aware what they are expected to do, find out, observe etc. during the EOC activity.

Step 3. Discover

Date of implementation	How much time is dedicated to this step?

3.1. Get students engaged in real-life activities

What will students do during the EOC activity? How will you promote peer-collaboration among students?

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3.2. Give students opportunities to observe and gather data

What kind or data will the students gather? What kind of tools they will use?

Step 4. Make an impact

Date of implementation	How much time is dedicated to this step?

4.1. Analyse and share collected data

How will students analyse the collected data? How will they share their observations and conclusions?

4.2. Design a youth initiative

a) Based on the findings of 4.1 how will the students decide to which issue they want to influence? b) How will the students create ideas and develop proposals for youth initiative? How will the students decide which youth initiative will be carried out?

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4.3. Carry out the youth initiative: Students implement the youth initiative they have designed.

Step 5. Reflect

Date of implementation	How much time is dedicated to this step?

How will the students reflect their learning and the whole process?

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ANNEX II

**[Learning diary template for third graders,
created by Atala school pilot teachers, translated into English]**

OTTER project in Atala 2023

Reducing, reusing and recycling plastic waste

Schedule:

1. Lesson
- What is today about? What do we already know?
- Make a mind map about waste materials
- "Slow" and "fast" plastics
2. Questionnaires and creating Seppo questions
3. Design tools
4. Design tools, form groups
5. Build tools outside
- Test them!
6. Continue testing, present tools to the whole group
- Write learning diary in exercise book
7. Posters and campaign
- Photograph tools, make posters
- Factoid texts
- Decide together the campaign
- Implement campaign
8. Seppo game in PE

Design a tool!

Draw a picture of your tool here. You can sketch with your group on a separate paper first. After sketching, everybody should draw the same tool.

Plastics!

Fast plastic is something you would throw away immediately, it is thin and looks like trash. Slow plastic is thick, hard and it may be able to be reused. Examine objects and write down their names in the right

Fast plastic	Slow plastic

column.

What did I learn?

_____

_____

_____

_____

_____

_____

Plan here what you will say when presenting your tool to the group.

_____

_____

_____

_____

_____

_____

_____

_____

Build and test!

What did I learn?

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What kind of attachment worked best with plastic?

What would you do differently?

How did testing go?

Final evaluation

Add items (objects and trash) to the mind map made in the first session.

What was the most fun part of the project?

How did the group project go?

What contributes to plastic waste?

How could we reduce plastic waste?

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