D3.3 GUIDELINES TO DEVELOP OTTER OUTDOOR LAB

Project acronym: OTTER

Project title: Outdoor Science Education for a Sustainable Future

Call: H2020-SwafS-2018-2020

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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)**

Bridge Budapest **(BB)**

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 to the Guidelines

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1. Guidelines for teachers and practitioners

The present guidelines are developed based on previous deliverables D3.1 – Methodological protocol to develop EOC activities, incorporating learnings from WP2 and discussions between the partners of the project.

The document aims to serve as a guide for teachers and practitioners to develop an **OTTER Lab**, a competency-based learning experience to raise awareness about enhance the understanding of Education Outside the Classroom (EOC) methods and pedagogies, specifically in the field of environmental sustainability and the reduction of plastic waste.

2. Objectives

The objective of the OTTER Lab is to generate an educational project around an EOC (education outside the classroom) activity in which students and teachers use the *Design Thinking* methodology to face environmental and sustainability problems. This will raise awareness on environmental sustainability and the reduction of plastic waste from a scientific perspective, while generating a youth initiative (in the context of a classroom, school or community) to promote a more sustainable planet. This process will provide students with basic 21st century skills such as collaboration, citizenship competencies and intellectual curiosity[1].

3. Age groups

The OTTER Labs are developed to be adaptable to a wide age-range: between 6 to 18, from school children to college students, and the protocol designed will have to accommodate all of them. Thus, we present **one final methodological protocol with adaptations divided to fit 4 age groups**:

- Students from 6 to 8 (that act as Adventurers);
- Students from 9 to 11 (that act as Explorers);
- Students from 12 to 15 (that act as Creators);
- Students from 16 to 18 (that act as Changemakers in society and around themselves).

4. Steps

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 *Design Thinking* methodology to face environmental and sustainability problems.

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.

[1]Assessment and Teaching of 21st-Century Skills (ATC21S)
https://executiveinsight.typepad.com/executive_insight/2012/01/new-initiative-strives-to-crack-the-code-on-how-to-assess-and-develop-21st-century-skills.html

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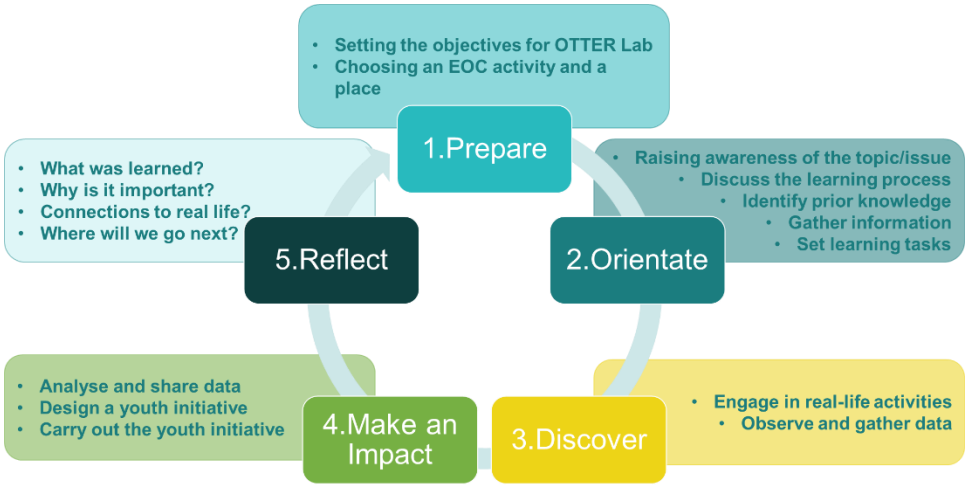
OTTER Labs consists of five different steps: 1. Prepare, 2. Orientate, 3. Discover, 4. Make an impact and 5. Reflect.



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.

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2. Guidelines to Deliver OTTER Lab at School

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Hi, teacher! Hi practitioner!
Good to see you interested on OTTER Labs. This document compiles some guidelines to develop and deliver an OTTER Lab with a group of students. The guidelines include some practical examples and are divided into 4 age groups:

- Adventurers: from 6 to 8 years old;
- Explorers: from 9 to 11 years old;
- Creators: from 12 to 15 years old;
- Changemakers: from 16 to 18 years old.

Select the one that applies to you and your students, follow the steps, and enjoy!

1. WHAT?

What is an OTTER Lab?

- An educational hands-on activity that aims to *promote sustainable development through education outside classroom*, and is directly linked to the established curriculum
- Adopts a student-centered pedagogical model, 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 (biology, chemistry, physics and other subjects) lessons or projects
- 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

What is education outside classroom (EOC)?

EOC is characterized by curriculum-based educational activities practiced outside the classroom, in natural (e.g., a park or forest), cultural or scientific (e.g., museum, library or science centre) setting.

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2. WHY?

Objectives of an OTTER Lab

The objective of the OTTER Lab is to generate an educational project connected to STEAM subjects using an education outside the classroom (EOC) activity. OTTER Lab will raise awareness of environmental sustainability and the reduction of plastic waste from a scientific perspective. The aim is to increase scientific citizenship among students.

During the process students will create a youth initiative (in the context of a classroom, school or community) to promote a more sustainable way of living. This process will provide students with 21st century skills such as collaboration, citizenship competencies and intellectual curiosity. It will also improve students' acquisition of scientific knowledge specifically in the field of environmental sustainability and the reduction of plastic waste.

Furthermore, OTTER Labs aim to enhance the engagement of both girls and boys in STEAM subjects and professions. Therefore, it is important to take into account gender aspects in all OTTER Lab activities.

Benefits of education outside the classroom

- Builds on student interest and integrates everyday experience in nature with learning
- Authentic learning environments help learners to understand real-life phenomena
- Information is readily applied and put into practice when learning outdoors, investigation and contemplation occur naturally
- Teaching becomes more holistic, part of a larger whole, and linking to phenomena comes easily
- Helps to promote positive attitude towards nature and sustainability in one's own life
- Positive outcomes and impact on students' learning, knowledge, motivation, interest and enjoyment
- Students' hands-on learning enhances their experience of learning
- Nature supports social interaction, learners' emotional skills develop in the natural environment, and there are fewer social conflicts compared to regular indoor teaching
- In the outdoor classroom, different strengths are revealed, and students with special-educational need may find it easier to study
- Immigrant students get to know the surroundings in a safe way and get familiar with the local culture in a real context
- Students find a connection to themselves through nature and in nature
- Outdoor classroom teaching is active; it develops motor skills and enhances physical activity.

(Laine, Elonheimo & Kettunen 2018; McCormack & al. 2022.)

Scientific background of an OTTER Lab

Modern educational research has revealed many factors that promote learning: learner's own activity, motivation, participation, collaborative learning (learning with and from each other), reflection, connections to prior knowledge, physical activity, and using versatile methods. This contemporary learning theory is called the socio-constructivist approach. (Lonka 2018, 28–48.) OTTER Labs methodology is based on this.

The socio-constructivist view of learning rests on the following principles:

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- Learning is perceived as an active, not passive, process through which knowledge is constructed by the learner.
- Knowledge is mutually built and constructed in the social contexts of learning.
- Prior knowledge, understanding and experiences are relevant to learning new things.
- The teacher's role is to support and nurture the learning process: teachers are facilitators who enable students' development and learning (Lonka 2018, 28).

3. HOW?

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 *Design Thinking* methodology to face environmental and sustainability problems.

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.

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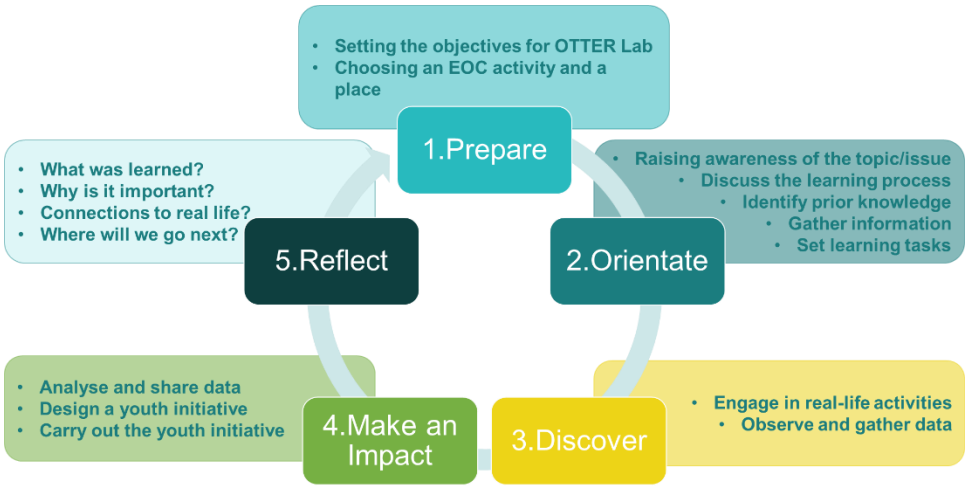

Distributed expertise and peer-collaboration is a part of all the steps. The students work together and share their perceptions and knowledge throughout the process.

Preconditions for OTTER Lab

- Lasts a minimum of 6 hours
- Includes at least four different sessions
- Requires some pre-arrangements by the teacher
- Needs a suitable learning environment outside classroom and a possibility to use it

Youth Initiative

Part of the OTTER Labs is a youth initiative which aims to develop students' active participation and citizenship skills. The youth initiative is a student-led activity that enables students to participate, makes them active agents of their own learning and actions, and gives them the opportunity to influence their own environment and current environmental issues.

The youth initiative helps the students to incorporate the curricular objectives and use the competencies they have learned to solve an environmental challenge. They will understand the reasons why the EOC activity has been carried out and realize that everything learned during the EOC activity is useful to face environmental problems. While students are carrying out the youth initiative, they train and practice skills and competencies to become active agents of change and to act as ambassadors that raise awareness among the people around them.

4. WHAT FOR?

Learning Outcomes of OTTER Lab

OTTER Lab aims to improve both students' acquisition of scientific knowledge and their transferable skills, specifically in the field of environmental sustainability and the reduction of plastic waste. Therefore, the learning outcomes of OTTER Labs should cover:

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- Students' will develop a greater understanding of topics/scientific knowledge, specifically in the field of environmental sustainability and the reduction of plastic waste
- Students will develop scientific literacy concerning global environmental issues surrounding plastic waste and recycling
- Students will develop their scientific citizenship and enhance their capacity to become citizens who have a sufficient level of scientific knowledge to enable them to make informed decisions and consume sustainably
- Students' will develop 21st century skills specifically in the field of environmental sustainability and the reduction of plastic waste:
    - ways of thinking: creativity, critical thinking, problem-solving;
    - ways of working: communication, collaboration;
    - tools for working: ICT and information literacy;
    - skills for living in the world: citizenship, personal and social responsibility.

(ATC21S / Griffin & Care 2015).

5. LET'S GO!

Step 1. Prepare

Preparing for an OTTER Lab means getting ready for the actual activities and preparing what is needed. It includes setting specific objectives for an OTTER Lab and choosing an EOC activity and a location for it.

1.1 Set the objectives for OTTER Lab

The process begins with *setting the objectives for OTTER Lab*. Learning objectives need to be derived from and be aligned with the curriculum.

Questions to consider:

- Is there a big, current topic that could be a good overall theme for OTTER Lab?
- What curricular objectives could be addressed in OTTER Lab?
- What contents and concepts from the curriculum could be covered in OTTER Lab?
- What skills mentioned in the curriculum could be practiced and learned in OTTER Lab?
- What locations do you have access to? What is feasible and possible?

Bear in mind the general learning outcomes that OTTER Lab should achieve. Furthermore, think about the plausible connections *with real environmental problems*.

The goals and learning outcomes of EOC need to be explicit and made clear to students. If possible, describe the objectives telling what *students should be able to do* after OTTER Labs (competence-based approach).

OTTER Lab is designed for a multidisciplinary approach. When you have decided the overall topic and set objectives for your OTTER Lab, consider which subjects could be naturally linked to learning about this topic and achieving the learning objectives.

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OTTER Labs are an excellent forum for teacher collaboration. Discuss with your colleagues if you can collaborate with them, and plan and implement the OTTER Lab together.

Some advice on writing learning objectives

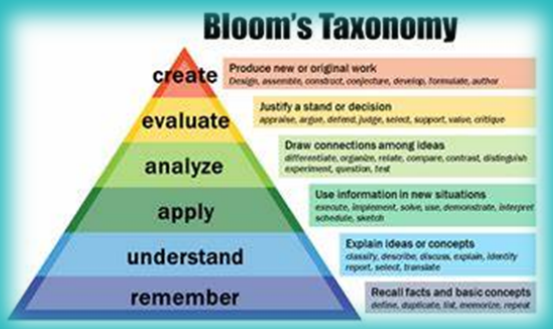
1. Consider a range of learning objectives to ensure the holistic development of students. You can draw on cognitive, affective and psychomotor objectives.

Cognitive
- Knowledge of facts or processes, processes that result in learning, understanding knowledge through our thoughts, experiences, and senses.

Affective
- Addresses interests, opinions, emotions, attitudes, and values. They focus on the development of attitudes and behaviour rather than on the intellectual abilities upon which the cognitive domain is based.
- Related to social, moral and ethical values

Psychomotor
- Learning in the psychomotor domain is associated with physical skills such as speed, dexterity, grace, use of instruments, expressive movement, and use of the body in dance or athletics

2. Consider the inclusion of higher order learning objectives that move beyond recall of facts. You may wish to consider Blooms Taxonomy in considering what you want students to learn/gain from the EOC



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1.2 Choose an EOC activity and a place

Choose an EOC activity and a place that allows you to work on the objectives that are defined in 1.1.

Questions to consider:

- What kind of EOC activity would give possibilities to achieve the defined learning objectives?
- What should the students do during the EOC activity? Should they search for information or some kind of data? Should they make observations and take notes? Should they participate in some hands-on activity etc.?
- Where could students learn about the defined topic and participate in a desired EOC activity?
- What place is available and reachable for this purpose? Do you have resources (time, money, permission) to go there?
- What kind of arrangements are needed to organize an EOC activity in that location?

Note: You can also first choose a suitable location and then decide what kind of EOC activity can be implemented there.

Examples of possible EOC activities and locations: Students can get involved in hands-on efforts to reduce plastic waste in the local area or in their own schools. Students can also participate in beach clean-ups, other local waste initiatives, up-cycling workshops etc. EOC activities can also include visits to relevant places (museums, science centers, companies, public facilities etc.) and participating in activities there, e.g. laboratory experiments in science centers, sorting waste, recycling, reducing waste, observing reprocessing of plastic waste into new products etc.

OTTER Lab is a great chance to collaborate with different stakeholders outside the school community. Consider which experts, organizations, NGOs, educational institutions, companies, factories etc. that deal with sustainability and plastic waste could help you in planning and implementing the desired activity. For example: the local science museum offers workshops or guided tours, NGOs or non-profit entities offer educational activities, companies or facilities, such as treatment plants or renewable energy production centers, offer guided tours on their facilities etc.

There are many options for the location for the EOC activity:

- parks and gardens
- natural environments: forests, mountains, rivers, lakes, beaches, etc.
- museums: botanical, science, technology etc.
- science centers
- public facilities (waste sorting stations, treatment plants etc.)
- companies, factories etc.

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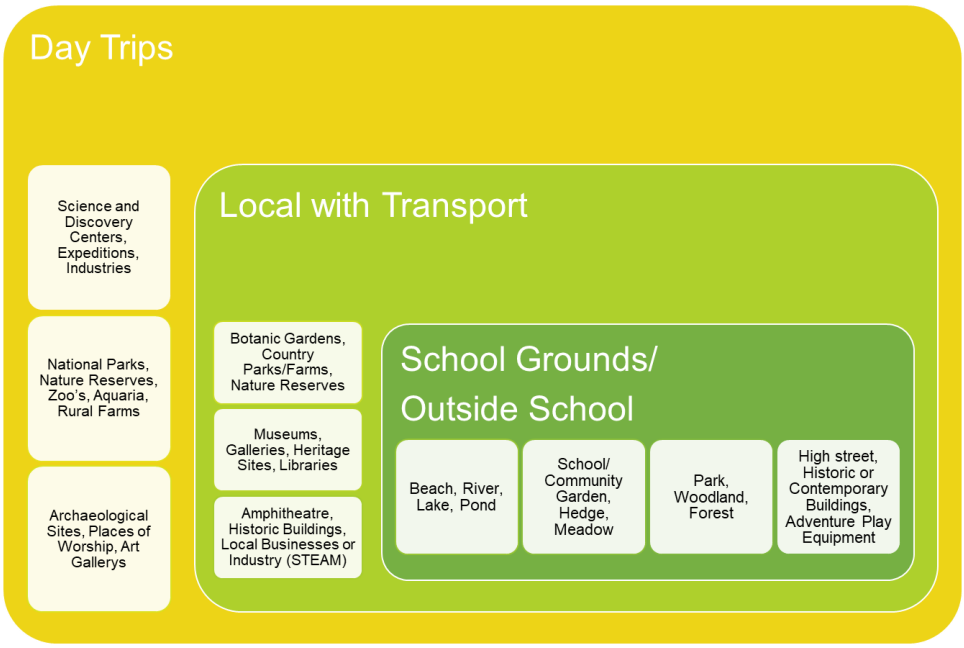

Option: Student-initiated approach

Step 1. Prepare can also be implemented in a way that emphasizes student involvement and participation. Involving students in all the stages of the learning process strengthens their ownership of their own learning, increases their intrinsic motivation, and helps them to be more engaged.

In a student-initiated approach it is wise to give a broad framework or topic to the students to work with. For example, the teacher can introduce a topic – environmental issues or plastic waste – to the students. After that the students can together discuss what they think about this issue and what kind of questions they raise regarding it. Students can then collaboratively decide what questions or subtopics they find most interesting and would like to explore closer.

Teacher needs to link these questions and topics that students have raised to curricular objectives as well as to broader learning outcomes to be achieved. However, students can also set their own learning goals for the whole process. In addition, students can be involved when ideating and deciding what kind of EOC activity would be best to achieve the learning objectives and which location would suit this purpose best.

Teacher can use several different activating methods for students' ideation and discussion, like build-up group, inside-outside circles, learning cafe, pair or small group discussion etc.

Step 2. Orientate

During the step 2 (pre-learning) students will start working with a defined topic related to sustainability / plastic waste, and linked to their academic curriculum. This step has five main goals:

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2.1. Help students feel the importance of the chosen environmental topic/issue (*empathize*)

- According to the age group this can be done by telling students a story, watching a video / documentary, inviting a person / expert to the classroom to share their story / experiences, interviewing people who are involved, reading an article and so on.
- The aim is that students will personally understand why this topic is relevant and why it needs to be tackled and raise their intrinsic motivation towards the topic.

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

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

2.3. Map students' prior knowledge about the topic

- The objective of mapping pre-existing notions and knowledge is to activate prior knowledge and to focus the student's thoughts on the subject being taught
- It is important for learning that students become aware what they already know about the topic in order to link new information to the existing knowledge
- Teacher helps students evaluate their knowledge critically: 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.
- Students can collaboratively map everything they already know (or think they know) about the topic
- This can be done using the following methods: advanced organizer, build-up group, building the knowledge base

2.4. Help students gather relevant information for the EOC activity

- In order to make the EOC activity meaningful to the students they need to understand the core things they are going to do and see during the EOC activity
- This new information will serve as an introduction for the topic related to the outdoors activities
- This pre-learning and the subsequent outdoor activity will be focused on sustainability and initiatives to reducing plastic waste, and the concepts acquired will be linked with the academic curriculum
- This acquiring necessary information can be facilitated by teachers or local experts in environmental sciences and smes, inside or outside the classroom

2.5. Set learning tasks for the EOC activity

- Students should be aware what they are expected to do, find out, observe etc. During the EOC activity and what kind of information they will need in the up-coming phases of the OTTER lab (*define* learning tasks)
- You can ask e.g., Following questions:
    - What kind of information do we need to find out in order to develop the youth initiative?
    - What kind of key concepts or methodologies should we try to understand during the EOC activity?
- Students can work in small groups and each group can have their own learning task for EOC; this way all the groups can bring something unique to the work done after EOC

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Step 3. Discover

Time to go out!

During this step the actual EOC activity will be carried out. Students will visit a chosen location and engage in an EOC activity that is determined in Step 1.

This step has two main tasks:

3.1 Get students engaged in real-life activities

- Peer-collaboration is essential, working in pairs or in small groups (different tasks for different groups)

3.2 Give students opportunities to observe and gather data

- Provide students with opportunities and tools to collect data which they can bring back into the classroom for analyzing and drawing conclusions
- Collecting data can be done by observation, taking notes, answering pre-determined questions, taking photos or videos, interviewing experts etc.
- You can also use supportive technology in a supplementary way to support and guide students learning during EOC; this may consist of, for example, a mobile app that students can use while visiting a site

This step is all about experiencing things first hand yourself. Authentic, hands-on activities and environments enable real experiences to occur. Students will experience the emotions and senses attached to real-life scenarios, cultivating understanding, empathy and compassion, love and respect for nature, and healthy habits with the environment, and confidence that solutions will be found.

The teacher facilitates the learning during the EOC activity. It is vital to let students experience and explore things themselves, but the teacher is there to help if needed. Teacher can, for example, guide the students on where and how essential information from various sources can be found.

Step 4. Make an impact

After the EOC activity it is time to analyse what new is learned, and what could be done based on this new knowledge. During this step students design a hands-on project to address real environmental problems, especially plastic waste.

This step has three main tasks:

4.1. Analyse and share collected data

- Students analyse observations and collected data
- They share information with each other
- They summarize what was learned
- Students can process the new information by preparing a presentation, a poster, an exhibition, a play or a fair or by writing a report or by having a discussion.
- Examples of the methods that can be used at this phase: the rounds technique and gallery walk

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4.2. Design a youth initiative

- Students draw conclusions, what could they do to have an impact in these environmental issues
- You can ask questions like
    - How can we apply the new information?
    - How can we make an impact?
    - What kind of initiative could we propose to have an impact on these environmental issues?
- students *ideate* and develop proposals for solutions (*prototype*)
    - For older students you can, for example, use instructions like this (Design for Change 2017):
        - All ideas are good ideas: don't shy away from the wild ones.
        - Build on the ideas of others – use the word 'and' instead of 'but'.
        - Illustrate your ideas for better clarity.
        - Is your solution:
            - bold in nature
            - easy to replicate
            - long lasting
            - impacting maximum number of people
        - Try to think beyond the first or 'obvious' solution and collect as many ideas as possible.
- Students can collaboratively decide which one or ones of the solutions they want to actually implement
- According to the age of the students they can propose different initiatives on different levels:
    - 6–8 years: home or classroom level
    - 9–11 years: classroom or school level
    - 12–15 years: school or community level
    - 16–19 years: community or societal level
- Students make a concrete plan how they will implement their initiative
    - concrete plans can be made in small groups
    - for making concrete plans students can apply, for example, a table in Annex 2

4.3. Carry out the youth initiative (test)

- Students implement the youth initiative they have designed and evaluate how it works.
- When implementing the youth initiative, please keep in mind:
    - Encourage students to practise different ways of thinking (creativity, critical thinking, problem-solving) and ways of working (communication, collaboration).
    - Let students do as much as possible themselves, for example contacting different stakeholders. This develops their important 21st century and life skills.
    - Be there to help if and when needed.
    - Consider with your students how they could get publicity to their important initiative.

Step 5. Reflect

This step is time to reflect on the whole process. The post-learning includes deepening the learning from the new topics, reflecting and analyzing what has been learned and what we still want to learn, and setting new learning goals for the future.

Reflection is about students becoming aware of their own thinking processes and being able to make those transparent to others. It enables assessment of the "why" and "how" of the learning, and what needs to be done as a result.

Reflection means asking:

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- What have we learned?
- What has been intended to be learned?
- Why is that important?
- How is the learning connected to real life?
- How is the learning connected to previous knowledge and skills?
- Where will we go next?

Furthermore, reflection should also include student's self-assessment about their own work and learning: What did I learn?, How did I succeed in working with others?, What would I still like to learn more about?

Examples of the methods that can be used for reflection: 3-2-1, fishbowl, inside-outside circles, symbol work.

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3. How to Implement the Model for Different Age Groups

The OTTER Labs are developed to be adaptable to a wide age-range: between 6 to 18, from school children to college students, and the protocol designed can accommodate all of them. The OTTER Lab methodological protocol is presented above. Below you will find adaptations to fit 4 age groups:

- Students from 6 to 8 (Adventurers)
- Students from 9 to 11 (Explorers)
- Students from 12 to 15 (Creators)
- Students from 16 to 18 (Changemakers).

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	Students from 6 to 8 (Adventurers)
Step 1 Prepare	This age group are called Adventures because they like discovering, solving riddles and finding new things. When setting the learning objectives, consider how you can nurture students' natural curiosity and playful minds. It is important to have a multi-disciplinary approach, combining environmental science or STEAM subjects and other relevant subjects. For this age group learning by playing and learning by real phenomena by observing are inherent ways to learn. This age group is naturally interested in things that affect them directly. Utilize this when setting the learning objectives and choosing the EOC activity. For students of this age, a learning environment nearby the school works well. What could be learned in the close surroundings of the school? When deciding the EOC activity, hands-on activities are recommended.
Step 2 Orientate	When orienting students, you can use stories to get them interested. With stories you can feed their imagination and help them get emotionally involved. In addition, students' own experiences are a good way to orientate to the upcoming topic. Orientation should help students to empathize how the environmental issues affect human beings, animals and nature. When preparing students for the EOC activity it is important to make clear how they should behave during the activity and what kind of safety issues need to be considered. It is important to find out what kind of thoughts and questions students have about this topic. This can be done through play, discussion, drawing etc. When setting learning tasks for the EOC activity, make sure that everyone knows what they are supposed to do during the activity.
Step 3 Discover	For this age group it is essential to make the EOC activity very tangible and concrete. Let students do, engage, touch and feel things themselves. Encourage students to work together because this type of activity naturally allows them to develop their collaboration skills. Collection of data can mean, e.g. collecting real items, taking photographs or taking notes of their observations.
Step 4 Make an impact	It is important to discuss together all the findings and new information that students learned during the EOC activity. When designing the youth initiative, it is important to ask, what can we do and what do we want to change. The initiative should be something concrete and easy to understand. For this age group the youth initiative can be related, for example, to their own class or home and daily practices. The most important thing is to raise the idea that everybody can do something and make a difference.
Step 5 Reflect	As a post-learning activity, it is important to reflect on what we learned, how we learned and what we want to do next. For reflection, you can use playful activities, symbol work, discussion, drawing and visual work etc.

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	Students from 9 to 11 (Explorers)
Step 1 Prepare	This age group is called Explorers because their relationship with the surrounding world is very active: they want to explore, understand and take over new things. When setting the learning objectives, it is important to take into account what the students of this age are naturally interested in. Bear in mind the multidisciplinary approach to help students to understand real-life phenomena. Moreover, this is a great age to introduce some core concepts of STEAM subjects. Students of this age are eager to explore the world outside school and they are old enough to go further than the younger ones. An EOC activity that would allow them to experience something new and a location where they have not been before would be ideal. This age group loves to be physically active, so choosing an activity and location to suit that works well.
Step 2 Orientate	When orienting the students, it is a good idea to use examples they can relate to. Videos are a great way to both inform students about the topic and also help them to empathize with it. When mapping their prior knowledge about the topic, different co-operational methods work well. When gathering relevant background information about the topic, students can, for example, interview experts that are easy to reach (parents, grandparents, neighbors, other teachers at school etc. When setting learning tasks, make sure that each group and each student is aware of what is expected from them. If your students are not very familiar with working outside the school area, make sure they know what kind of behavior is expected and what are the safety regulations.
Step 3 Discover	Students of this age like to be involved and engage themselves in the activities! Make sure that they can actively participate in the activity outside the classroom. This is also the age when it is a good time to practice making observations and note taking. It is important that students have both chances to experience things themselves as well as collect relevant data for further analysis.
Step 4 Make an impact	It is important to discuss, analyze and share the collected data properly together after the EOC activity. Groups can present their key findings to the others. While discussing the observations, ask students what really touched or surprised them and what would they like to change. Based on these discussions, help students to identify what could be their youth initiative. The youth initiative of this age group can be, e.g. something related to their own class or the whole school. Encourage them to see what they can do themselves and how they can change things.
Step 5 Reflect	This age group is usually eager to discuss. Utilize it when reflecting what has been learned. Different co-operational as well as creative methods, like drama or visual methods, work well for reflection.
	Students from 12 to 15 (Creators)

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Step 1 Prepare	Students of this age can be called creators because they notice things around them that they don't necessarily agree with, they have ideas how to change them, and create something new. These teenage years are not always the easiest from the school work point of view, so therefore it is important to give students possibilities to experience something new, learn in different ways and give them the experience that they can make a difference. It is also important to note that in this age group developmental differences can be very big and the development of boys and girls can differ significantly. At this age students usually study different subjects separately so creating a multi-disciplinary learning process demands an extra effort from the teachers. Collaboration with your colleagues is essential to find a project that naturally combines the perspectives and contents of different school subjects and for example merge science and artistic disciplines. It would be ideal, if students could be involved to choose the EOC activity and a suitable location for it. It is vital to take students' interests into account (even though finding consensus among students is not always easy).
Step 2 Orientate	The teenage students often feel strongly about different matters and if you can utilize that emotional engagement, it would be a great start for the process. This age group is very familiar with visual material like videos and documentaries so using them in orientation works well. These students have already studied and learned a lot so it is essential to base the acquiring of new information on what they already know about this matter. Mapping pre-existing knowledge can be done collaboratively (e.g. using build-up group, building the knowledge base, concept maps etc.). Students can acquire necessary background information regarding the intended EOC activity and location before they go there. Students of this age are usually very familiar with technology so they can use that when searching for information. However, they often need guidance on how to make sure that the source of information is reliable. Teenage students very often enjoy external visitors so inviting an expert to be interviewed for background information in the classroom can be a good idea. Students can be divided into small groups for the EOC activity and different learning tasks can be assigned for each group.
Step 3 Discover	Students of this age can travel a bit further for the EOC activity if the resources allow it. Offering them an opportunity that they have never experienced before would be interesting and motivating. While students of this age group can just visit and observe, many of them enjoy engaging themselves in hands-on activities as well. Remind your students that they need to collect relevant data for further analysis and provide them with suitable tools for it. If there is an app that they can use for this, it would certainly raise their interest.

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Step 4 Make an impact	Ask groups to present their key findings to the others. Examine together the differences, similarities and possible gaps and contradictions in the information gathered by the students. Ask students to make summaries and conclusions based on the information everyone has shared. To design the youth initiative, you can use different co-operative and ideating methods like brainstorming. It is important that everyone has a say when deciding what kind of youth initiative to implement. The initiative could be targeted on a local level: in their own school or community. It is also possible to vote (an important citizenship skill) and choose a couple of different initiatives to work with. It is important that youth initiative is also carried out and, if possible, its impacts are evaluated. At this age it is vital to understand how a democratic society works and how people can affect different matters.
Step 5 Reflect	Reflection should cover the whole learning process as well how the youth initiative was carried out, what kind of impact it had, and what we learned about it. For reflection you can use a variety of methods, including creative and co-operative methods.

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	Students from 16 to 18 (Changemakers)
Step 1 Prepare	The older students are called changemakers as they practice making an impact in their environment and larger community as well as entering adulthood and active citizenship. Students of this age are usually aware of many societal and environmental problems. It is wise to engage them in setting the learning objectives and choosing the EOC activity and locations. The teacher is still responsible for linking learning outcomes with curricular objectives and contents. Students can together ideate what environmental issue they want to learn more about, what kind of activity they could be involved in and what are the possible locations for that activity. If there are enough resources and curriculum allows it, students of this age can also travel further and stay in the decided location longer.
Step 2 Orientate	Students of this age already have a lot of knowledge and opinions of different topics. However, it is important to get all students involved in this topic. Pay attention to how students could *feel* the importance of the topic and *empathize* with it. Linking environmental issues to students' own lives and interests is one way to do that. It is important to utilize students' prior knowledge in orientation. Mapping previous knowledge about the topic can be done first individually and then in small groups to strengthen peer-collaboration and distributed expertise. You can use different methods to map this prior knowledge like advanced organizer, building the knowledge base, or other collaborative method. For raising interest and intrinsic motivation you can introduce different kinds of background information about the topic: articles, documentaries, videos etc. Students also enjoy discussing with different experts and stakeholders, so inviting them to your class could be a good idea. Often students like to prepare their questions to the experts in advance. You can set learning tasks together with the students. Agree with them what the task of each small group is.
Step 3 Discover	The EOC activities can have various forms: it can be participating in volunteering in environmental projects, visiting places relevant to understand the topic, interviewing different experts etc. Students are encouraged to collaborate with all kinds of pertinent stakeholders to get a comprehensive insight about the topic. Special attention needs to be paid to collecting data. Provide students with appropriate tools and guidelines on what kind of information and how it should be collected.

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Step 4 Make an impact	Reserve time for analyzing the collected data properly. Guide students to concentrate especially on analyzing the data: what are the main points we found out, are there contradictions we should look into more closely, is there something missing that we should still find out etc. Students can prepare small presentations to share their observations and findings with the others. After careful analysis it is important to draw conclusions and think how students could act based on this new knowledge. Students can brainstorm possible solutions to the environmental issues identified. After coming up with their most creative and feasible solution, students propose a set of activities and design the youth initiative. Youth initiative on this level can be implemented on the local/community or even societal level. When designing the youth initiative students can reach out to the local authorities or relevant stakeholders. Implementing the youth initiative is an essential part of the learning process. Whether it is sharing information, raising awareness or making an actual initiative to better things, it is important to evaluate the impact afterwards. The idea is to learn and practice active citizenship skills and promote volunteer attitude in young people. To share their work students can prepare an exhibition, write an article, make a play or a video etc.
Step 5 Reflect	Reflection means not only recognizing what has been learned and how they learned it but how this experience has affected students' understanding about environmental issues and making an impact. The reflection can include both writing one's own thoughts and insights about the matter and discussing and sharing with others. The reflection can also include peer-assessment: assessing one's own small group and how it worked.

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4. Prepare Your Own OTTER Lab!

Boxes are spaces for teachers to write their own OTTER Lab plan. Teachers will be trained to use the OTTER Lab methodological protocol. Words in blue refer to hyperlinks to teachers training sections that will be developed and presented at the platform OTTER will develop in month 18. In teacher training, all the steps of OTTER Labs and several examples of each step will be presented in an interesting and engaging manner.

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Hi, teacher! Hi practitioner!
Now you know what and how OTTER Labs works. It is time to prepare your own activity. Follow the next template, step by step, and your OTTER Lab will make the difference in EOC.

Step 1. Prepare

1.1. Set the objectives for OTTER Lab

Stablish your learning objectives. HOW Practical Example

1.2. Choose an EOC activity and a place

Choose an EOC activity and a place. HOW Practical example.

Step 2. Orientate

2.1. Help students feel the importance of the chosen environmental topic/issue (*empathize*)

Make students personally understand why this topic is relevant and why it needs to be tackled and raise their intrinsic motivation toward the topic HOW Practical Example

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

Make students aware about what is going to happens HOW Practical Example

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2.3. Map students' prior knowledge about the topic

Help your students to critically evaluate their prior knowledge
HOW
Practical Example

2.4. Help students gather relevant information for the EOC activity

Help your students to go one step forward on their knowledge
HOW
Practical Example

2.5. Set learning tasks for the EOC activity

Students should be aware what they are expected to do, find out, observe etc
HOW
Practical Example

Step 3. Discover

3.1. Get students engaged in real-life activities

Promote peer-collaboration among students working in pairs or small groups during the EOC activity
HOW
Practical Example

3.2. Give students opportunities to observe and gather data

Provide students with opportunities and tools to collect data
HOW
Practical Example

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Step 4. Make an impact

4.1. Analyse and share collected data

Promote students analyse and share the observations and the collected data during EOC. HOW Practical Example

4.2. Design a youth initiative

Allow students *ideate* and develop proposals for solutions. HOW Practical Example

4.3. Carry out the youth initiative (*test*)

Promote students implement the youth initiative HOW Practical Example

Step 5. Reflect

Deepening the learning from the new topics, reflecting and analyzing what has been learned and what we still want to learn, and setting new learning goals for the future HOW Practical Example

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