European Commission

NATURE-BASED SOLUTIONS LEARNING SCENARIO

Let’s make our school a Growing place!

Research and Innovation

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European Commission

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Let's make our school a Growing place!

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ABSTRACT

Nature-based solutions have the potential to provide multiple benefits across a range of sustainability challenges faced by cities. They can help to limit the impacts of climate change, enhance biodiversity, and improve environmental quality while contributing to economic activities and social wellbeing. This learning scenario stems from the need to improve the quality of 'Green Solutions' in schools. The aim is to involve students from an early age so, that they would be familiar with the topic of green area diffusion and would contribute towards building a sustainable, healthy, and resilient city, better adapted to climate change. In this context, students will debate on constructing a green wall inside and outside the school using recycled materials. They came up with a design and employed the best solution in collaboration with the city municipality.

Keywords

Vertical green wall; nature-based solutions; photosynthesis; school garden; recycling materials

1. Introduction

> *"Nature-based solutions (NBS) are solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes, and seascapes, through locally adapted, resource-efficient and systemic interventions. Nature-based solutions must therefore benefit biodiversity and support the delivery of a range of ecosystem services."*
> https://ec.europa.eu/info/research-and-innovation/research-area/environment/nature-based-solutions_en

To use this Learning Scenario more effectively, teachers are encouraged to:

- Check out the list of recent EU publications on Nature-Based solutions
- Read about Nature-based solutions: Transforming cities, enhancing well-being (also available as a PDF)
- Contact local NBS practitioners or scientists working in their area (they can be found through Oppla).

Use the "Ask Oppla" service to request help in case of any technical/scientific question on NBS.

2. Overview

Overview	
Subject	Science, Art, ICT, English[1]
Topic	Green spaces and urban regeneration
Age of students	7–8 years old
Preparation time	5 hours
Teaching time	5 sessions of 60 minutes each
Online teaching material	• Learning Apps: https://learningapps.org/display?v=po40uzrga20 • Nature Now: https://www.conservation.org/video/nature-now-video-with-greta-thunberg

[1] This LS can be implemented jointly between different teachers in different subjects or departments, and it would greatly highlight the interdisciplinary character of the LS.

Overview	
Online tools and platforms	• Padlet: https://padlet.com/ • Jitsi https://jitsi.org/jitsi-meet/ • Edu Glogster: http://edu.glogster.com/ • Google Docs: https://www.google.com/docs/about/ • Youtube: https://www.youtube.com/
Offline teaching material	Interactive whiteboard to project, tablet, computer, paper, glue, booklet, scissors, crayon, felt tip pen, bottle of water, wood structure, jars, flashcards
NBS resources used	• The vertical garden • Oppla case study: Green Façade Pilot Project and • Oppla case study: Moss for green infrastructure • Oppla case study: Yerevan-Nature-Based Solution: A Green Wall for Kindergarten'

3. Integration into the curriculum

Goals for skill development found in the curriculum:

Science:

- Have caring and respectful attitudes towards the natural and social environment.
- Observe the significant moments in the life of plants – sowing in terrariums and vegetable gardens.
- Observe and interpret the natural environmental transformations (such as sun, plants, and water) and those prompted by man (urbanisation, cultivation, and industrialisation, etc.).

English:

- Understand the global sense of short texts accompanied by visual support.
- Interact with a partner (to ask and tell).
- Copy and write words and simple sentences.
- Develop an extensive repertoire of vocabulary in context.

Art:

- Observe and reflect.
- Create and design.

ICT:

- Use computer, tablet, and online tools.

4. Aim of the lesson

Contribute to the students' awareness on caring for and respecting the natural environment.

Sensitise students to the importance of green area diffusion to mitigate and prevent climate change. Raise awareness about the potential of nature-based solutions to provide multiple benefits across a range of sustainability challenges cities face, such as: limit the impacts of climate change, enhance biodiversity, improve environmental quality, while contributing to economic activities and social wellbeing.

5. Outcome of the lesson

The students will be able to:

- Identify the benefits of plants in the ecosystem.
- Design green solutions to urban issues.
- Explain the photosynthesis in plants.
- Sow seeds and plants.
- Improve English vocabulary.
- Understand the role of plants and ecosystems in Nature-Based Solutions.

6. Trends

Project-Based Learning: students get fact-based tasks, problems to solve, and they work in groups. This kind of learning usually transcends traditional subjects.

Peer Learning: students learn from peers and give each other feedback.

Edutainment: students learn while having fun.

7. 21st century skills

Learning and innovation skills: students are asked to provide a solution by means of collaborating.

Critical thinking: students conduct their own research to interpret the meaning of the chosen sources.

Creativity and innovation: the learning scenario encourages creativity and innovation by engaging students in several activities.

Collaboration: students will have to work as a team, decide upon the best way of presenting the information, take responsibility and contribute to finding the best results.

8. Activities

Name of activity	Procedure	Time
Lesson 1: presentation of the topic	The teacher presents the topic through the video by Greta Thunberg and George Monbiot and asks the students their opinions. A brief discussion about the importance of trees and nature follows to determine the students' prior knowledge about the subject. In groups, they discuss what happened in the video. They will be able to compare and hypothesise about their understanding. At the end, the leaders of each group share the conclusions with the rest of the class. The teacher writes the key phrases on a chart. Students draw Greta's message and show their drawings to the classmates.	60'
Lesson 2: **Discovering the Green power**	Lesson title: Why the plants help to prevent the climate change and improve our cities? Brief discussion to check for students' prior knowledge of the role of trees in preventing climate change and improving livelihoods of everyone in cities. Trees provide habitat to support biodiversity, absorb carbon dioxide and reduce GHG emission (climate adaptation and mitigation), improve air quality, cool our cities during summers, provide shade and recreational space that is, often, free and easily accessible for all, thereby contributing to social cohesion and happiness. Trees planted deliberately to provide any of these services are considered nature-based solutions. Explain children what wild pollinators are (such as bees, moths, butterflies and beetles), and explain their fundamental roles in our environment. Afterwards, students will go through: • a presentation on plants prepared for this learning scenario (see here) • a quick test on what they know (see Annex 1) to discover how the trees and plants help the climate, and how they can be used as nature-based solutions.	60'

Name of activity	Procedure	Time
	They can also learn about and understand Photosynthesis by watching this video and singing *the Photosynthesis song* (example of the song in this video). Students fill in Annex 2 with the correct word about the Photosynthesis process. This memory game can be used to check for the comprehension of the learned science terms.	
Lesson 3: **Projecting the Vertical** **Garden**	This lesson will be guided by the following questions: • How can we improve our healthy life at school? How can we find a green solution for our garden? How can we explore the indoor space? Brainstorming: how to create solutions to the urban and space-related issues? For this, students will: • Discuss the possible school vertical garden solutions shown in Annex 3 (in the case of online teaching, this debate can be carried out using a Padlet or other online tools). • See the video "The vertical garden" and discuss what they think about the vertical garden impact on citizens" • Visit some other websites with examples of vertical garden designs like https://www.verticalgardendesign.com/ or https://www.stefanoboeriarchitetti.net/en/project/vertical-forest/ To better understand the video on Nature Based Solutions, see photo about 'vertical forests' (Milan, Green Façade Pilot Project and Moss for green infrastructure) and slideshow pictures of 'Yerevan-Nature-Based Solution: A Green Wall for Kindergarten'. Students are divided into 4 groups to come up with and draw the design of the vertical green wall using recycled materials (such as Plastic jars and wood bases). Finally, all the projects are collected and formed into a poster.	60'
Lesson 4: **Creating our indoor and outdoor vertical wall**	This lesson will start with students discussing the characteristics of the different ecosystems (indoor/outdoor). They choose between the different kinds of plants and their relative needs. The students vote on the best solution and they participate in the creation of the school vertical green wall. The creation of the vertical garden requires collaboration with the city municipality.	60'
Lesson 5: Which plants can we plant?	During this lesson, students will discuss the choice of plants to plant or sow. They must consider the plants that attract the most pollinators. Plants are examined to help this small insect with the spread of pollen and, therefore, the pollination process. The pollination process as well as the relevance of bees are highlighted and covered.	60'

9. Assessment

The assessment is to help students take greater responsibility for content and language learning. The main assessment will concern students' contribution during teamwork which reveals their level of participation and understanding.

The memory game and the matching Photosynthesis test are used to verify the acquisition of new scientific knowledge and of the other disciplines involved in the project.

A questionnaire can also be used to assess students' knowledge.

The design of the vertical garden, corresponding to the defined requests, represents a verification and concretisation of the planned objectives.

10. Teacher's remarks

I took the decision to use videos, photos, and pictures to support the understanding process of students that have difficulties with a second language (in this case: English).

Due to the lockdown, I changed the planning: the activities that the children were supposed to carry out at school were assigned at home through distance learning. It was a variation linked to the need to continue the realisation of the initial idea: the design and construction of the vertical garden. Every child has experienced sowing of some "bee-friendly" plants, recycling plastic bottles. this was also an opportunity to reflect on the importance of recycling the various materials. Some families, most involved in the project, decided to build the vertical garden designed by the child at home

During the implementation: all lessons were conducted remotely. The discussions between the children took place through the Jitsi social platform used by the school. The planned objectives have been achieved. One of the results were the posters with students' vertical garden projects that took place through the use of digital applications such as Edu Glogster. Finally, students also planted seeds in pots made from plastic bottles. Some families carried out the vertical garden projects individually.

A recommendation for all implementations: information should be broken up and teachers should go over the topics covered previously to allow children to retrieve the information learned.

Annex 1: Test their knowledge.

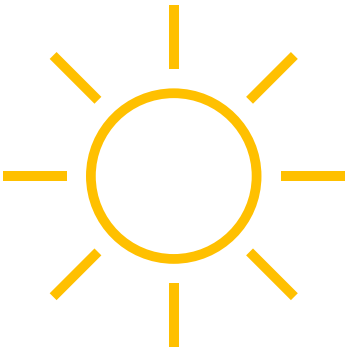
Note from author: all pictures are Creative Commons

LOOK THE PICTURE AND TICK THE RIGHT ANSWER

1) WHAT IS IT?

☐ IT'S BASIL
☐ IT'S LAVANDER

2) WHAT IS IT?



☐ IT'S WATER
☐ IT'S THE SUN

3) **WHAT IS IT?**

- ☐ IT'S A BEE
- ☐ IT'S A TREE

4) WHAT IS IT?

- ☐ IT'S WATER
- ☐ IT'S LAVANDER

5) WHAT IS IT?

- ☐ IT'S A TULIP
- ☐ IT'S A LEAF

6) WHAT IS IT?

- ☐ IT'S OXIGEN
- ☐ IT'S THE SUN

7) WHAT IS IT?

- ☐ IT'S LAVANDER
- ☐ IT'S SAGE

8) WHAT IS IT?

- ☐ IT'S A TULIP
- ☐ IT'S A LEAF

9) WHAT IS IT?

- ☐ IT'S A FLOWER
- ☐ IT'S A TREE

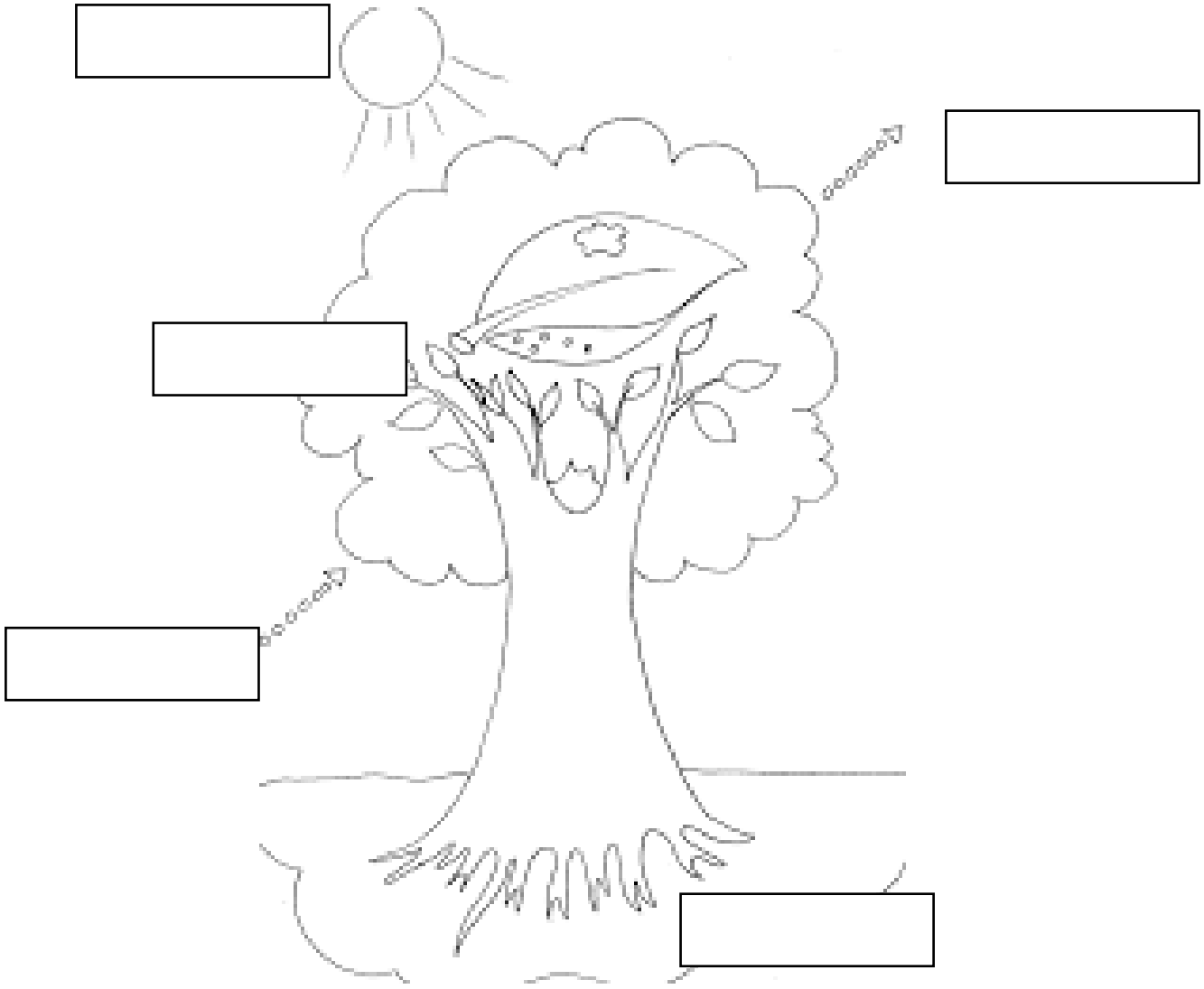
10) WHAT IS IT?

- ☐ IT'S A TREE
- ☐ IT'S A FLOWER

Annex 2: The photosynthesis

THE PHOTOSYNTHESIS

COMPLETE THE PICTURE WITH THE CORRECT WORD



OXYGEN - WATER - SUN - LEAF - CARBON DIOXIDE

Annex 3: Possible school vertical garden solutions

Figure 1: CC licence

Annex 4: Post questionnaire

1) ARE TREES IMPORTANT TO PEOPLE?
    a. Yes
    b. No
    c. I don’t know
2) DO TREES GIVE US OXYGEN?
    a. Yes
    b. No
    c. I don’t know
3) IS IT IMPORTANT TOHAVE PLANTS AROUND US?
    a. Yes
    b. No
    c. I don’t know
4) IS IT IMPORTANT TO HAVE PLANTS IN THE SCHOOL GARDEN?
    a. Yes
    b. No
    c. I don’t know
5) DO SOME PLANTS ATTRACT INSECTS?
    a. Yes
    b. No
    c. I don’t know
6) DO PLANTS NEED INSECTS TO REPRODUCE?
    a. Yes
    b. No
    c. I don’t know
7) DO FRUIT AND VEGETABLES COME FROM PLANTS?
    a. Yes
    b. No
    c. I don’t know
8) ACCORDING TO YOU, CAN WE HELP NATURE?
    a. Yes
    b. No
    c. I don’t know
9) DO YOU KNOW WHAT IS IT A VERTICAL GARDEN?
    a. Yes
    b. No
    c. I don’t know

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About the NBS project

The NBS project is initiated and funded by the European Commission Directorate-General for Research and Innovation and coordinated by PPMI, in collaboration with European Schoolnet (EUN). PPMI (www.ppmi.lt/en) is a leading European research and policy analysis centre, aiming to help public sector and civil society leaders from around the world, presenting evidence in a way that is simple, clear and ready to use. European Schoolnet (www.eun.org) is the network of 34 European Ministries of Education, based in Brussels. EUN aims to bring innovation in teaching and learning to its key stakeholders: Ministries of Education, schools, teachers, researchers, and industry partners. Find out more about nature-based solutions: https://ec.europa.eu/research/environment/index.cfm?pg=nbs and all the NBS Learning Scenarios created in this project as well as the overall reports can be found at http://www.scientix.eu/pilots/nbs-project

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Studies and reports

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