

# **UNDERSTANDING THE GREENHOUSE EFFECT**

[Stage 1: CRAFTING A  
GREENHOUSE]

## About PARADIGM



PARADIGM is a European co-funded project that aims to use the appropriate technological infrastructure (devices, data platforms and tools) to empower the active engagement of citizens in taking action against climate change and for sustainable development through better monitoring and observing the environment and its environmental impacts.

Generally, PARADIGM aims at:

- ✓ raising environmental awareness and active engagement in green initiatives
- ✓ developing innovative STEM based curricula that cultivate transversal skills
- ✓ upskilling teaching staff with novel educational methodology and tools
- ✓ creating a European Community of Citizen Science.

PARADIGM promotes innovative practices based on designing and developing the appropriate technological infrastructure coupled with selected learning scenarios or challenges that will be piloted by the network of European Schools of the PARADIGM community. In specific, the purpose of the project is to train, lead and motivate learners to gain environmental knowledge and propose solutions via an educational process based on three different learning dimensions-objectives:

- a) The cognitive dimension: Learners will gain environmental knowledge through Problem Based Learning and IoT-STEM based activities and platforms.
- b) The scientific dimension: Learners will act as scientists. They will acquire knowledge through an empirical process based on the scientific method (e.g. observation, scepticism, cognitive assumptions, hypotheses, inductive thinking, etc.).
- c) The pedagogical dimension: Educators will receive the appropriate pedagogical directions to implement a teaching approach based on the principles of inclusive education through an e-learning course and open content repositories.



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## Author(s)

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## Summary

*The students should research and create a greenhouse. This construction is needed for later challenges that address the subject of greenhouse effect.*

## General information

### Overview

Subject(s)	<i>Extending grow season, isolated ecosystem, greenhouse effect, greenhouse gases</i>
Objective and scope	<i>This challenge makes the students aware of how the growing season can be artificially extended, in an isolated, controlled ecosystem for producing healthy plants, protected from harmful, extreme natural phenomena which can be connected to the problem of climate change. It is also useful for teaching the greenhouse effect, it's role in climate change and health issues like respiratory disease from produced gases.</i>
Level of studies	<i>K-12</i>
Teaching materials	<ul style="list-style-type: none"> <li>● <i>Large (eg. 19lt) plastic bottles of water OR plastic bin (simplest) OR nylon sheets and wooden planks (depending on selected instructable)</i></li> <li>● <i>Scissors and razor paper cutter</i></li> <li>● <i>Pins (if nylon sheets and planks are used)</i></li> <li>● <i>Small plants OR seeds and dirt</i></li> <li>● <i>Small pots or cups (preferably from recycled material, e.g., paper cups)</i></li> <li>● <i>An instrument for making holes (e.g. hammer with nails, a knife or an electric screwdriver) if you intend to add ventilation.</i></li> <li>● <i>A saw (if using large water bottle)</i></li> <li>● <i>Computers with internet access</i></li> </ul>
Resources	<ul style="list-style-type: none"> <li>● <i>Instructables e.g. greenHouseV3.pdf or others from <a href="http://www.instructables.com">www.instructables.com</a></i></li> <li>● <i>Youtube videos, e.g.</i> <ul style="list-style-type: none"> <li>○ <i>Plastic bin greenhouse - <a href="https://www.youtube.com/watch?v=5Jlr8kRnxDg">https://www.youtube.com/watch?v=5Jlr8kRnxDg</a></i></li> <li>○ <i>Plastic bin greenhouse - <a href="https://www.youtube.com/watch?v=Y35PVCHVQcM">https://www.youtube.com/watch?v=Y35PVCHVQcM</a></i></li> <li>○ <i>19lt water bottle greenhouse - <a href="https://www.youtube.com/watch?v=-uY7FVCPvbU">https://www.youtube.com/watch?v=-uY7FVCPvbU</a></i></li> </ul> </li> </ul>

## Learning Outcomes

*Please address the number of LOs and state a short description of each one.*



LO number	Description
1	Growing season extension: while global famine is a serious problem for years, the use of greenhouses can extend the growing seasons by protecting the plants from extreme or unfavourable weather conditions. Extreme weather conditions come together with the problem of climate change.
2	Greenhouse effect: The so-called greenhouse gases produced by human activity are responsible for the planet's climate change by trapping heat, and they also contribute to respiratory disease from smog and air pollution. In a small greenhouse this can be observed by measuring the temperature and produced gases difference in and out of the greenhouse by using appropriate sensors.
3	Graph making: new scientists should be able to create basic graph/charts to present their scientific data and draw conclusions.

## Lesson plan



Please describe in detail the activities during the lesson and the number of teaching hours they require

Activity number	Description	Duration
1	Teacher makes small groups in the classroom and assign each of them to find information on the Internet or their books about one of the following: <ul style="list-style-type: none"> <li>• Grow season extension</li> <li>• The global famine problem</li> <li>• Greenhouse gases and the green house effect</li> <li>• Climate change.</li> </ul>	15min
2	Each team presents it's results for 5 minutes	20min
3	The teacher connects the four subjects to show to the students why it is important to construct and study a small greenhouse.	5min
4	Some instructables are briefly presented and videos (or maybe parts of them) from YouTube are viewed inside the classroom with easy DIY small greenhouse construction	20min
5	The teacher along with the students discuss and decide which of the presented solutions is suitable/affordable for their case, based on the available resources.	10min
6	The students with the aid of the teacher and following instructions from instructable and/or video, construct their own greenhouse	45min
7	The students regularly take temperature measurements (e.g. after each school hour) from inside and outside the greenhouse. They prepare a graph.	1 school day

## Presentation of results



*A short video taken during the greenhouse construction by the students is one thing. Along with a presentation that summarizes the students' findings and measurements*

## Evaluation criteria



*The assessment criteria for evaluating the students' work are:*

- Degree of involvement to the team's work
- Cooperation with the other members of the team
- Initiative



## Feedback

*Add the feedback gathered from your students after the presentation of results and your own personal feedback.*

