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| ACTIVITY PLAN | | | | |
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| **Theme** | **Subtopic** | **Activity Title** |
| 3. Creative and Critical Thinking in EcoSTEAM Education | 3.1. Problem-solving in Environmental Contexts | Organic fertilizers |

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| Introduction part (or activity overview) |
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| **Introduction part (or activity overview)** | Students will conduct experiments to illustrate pollution sources and effects, develop a model for describing the motion of matter among plants, animals, decomposers and the environment. They will collect dried plant material, sand, small stones and will connect with food and nutrition chains networks talking about decomposers and their roles in the environment. Their production and use in monitoring test plants, and the application of organic fertilizers in "friendly" agriculture or horticulture, source of potassium, magnesium, phosphorus, vitamins for use organic fertilizers and minimize the negative impact on the environment. |
| **SETTING** | The activity takes place in a park or in another natural space, classroom to demonstrate the experimental activity.  The educational context - group work. |

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| Materials Needed |
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| **Materials Needed** | Clear compost container  • Soil  • Rocks • Gravel/pebbles  • Sand  • Gloves • Safety glasses  • Dried plant material • Samples to place in landfills: Styrofoam, apple cores or bread, and small paper plates |

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| **Learning Outcomes** | * Developing skills and abilities for critical thinking about the negative consequences of any type of waste impact and different types of waste on the environment. * Design a method for monitoring and minimizing a human impact on the environment. * Encourage collaboration and consensus-building as students develop a waste reduction plan and to advocate for sustainable practices in their communities. * Fostering creativity and collaboration skills with a comprehensive understanding of pollution and waste management. * Examine different types of pollution (air, water, soil, noise) and their sources, effects, and potential solutions. * Teach about the principles of reduce, reuse, recycle and strategies for waste reduction and proper disposal. * Conduct experiments or projects to illustrate pollution sources and effects. * Analyze the possibilities of implementing waste reduction strategies for profitability model. |  |
| **Activity Contents**  **Notes** | **Activity 1: Generation of possible solutions**  Introduction discussion : Students synthesize the obtained information in order to generate more possible solutions.  **Theoretical Part (Duration: 45 minutes): Waste and its impact of the environment**  Students review definitions of organic waste, inorganic waste, full-loop life cycle, linear life cycle**,** compost, decompose**.**  **Videos:**  <https://www.youtube.com/watch?v=XfuJJNGuS0Q> (composing with anaerobic process, duration: 6min 37 sec )  <https://www.youtube.com/watch?v=u8MQwOR2og8> (a variety of ways through which students can reduce waste, reuse household items and recycle materials, duration: 3min )  <https://www.youtube.com/watch?v=DmFGsxLcT6k> (waste generation management - finding opportunities how to remove plastic from food waste compost, duration: 4min 22 sec)  <https://www.youtube.com/watch?v=GwiiWWEQyQQ>(removing plastic at small food waste compost facilities, duration: 3 min 04sec)  <https://www.youtube.com/watch?v=mcsf3Lj7xxo> (how to start a fertilizer business, duration: 5min 29 sec)  **Task (Duration: 20 minutes):** **Тesting the plants**  Students form groups of 4-5, testing the plants and the application of organic fertilizers in "friendly" agriculture or horticulture.  **Activity 2: Research and conduct laboratory analysis with the specified chemicals and laboratory equipment.**  **Theoretical Part (Duration: 15 minutes): Group discussion about waste reduction strategies**  Students discuss about implementation of waste reduction strategies in their school or community.  They encourage collaboration and consensus-building as students develop a waste reduction plan, Assign specific roles and responsibilities to each student group (e.g., organizing recycling bins, promoting waste reduction initiatives), develop a timeline and action plan for implementing the waste reduction plan.  **Task 1 (Duration: 2 hours): Create an organic fertilizer**  Students create a model of natural fertilizer with materials collected in our homes or in nature.  Step 1: Students walk in natural spaces and collect various materials, e.g. dried plant materials, rocks, apple cores or breads, which they will use to create an natural fertilizer (1 hour)  Step 2: Group members use the collected materials to create a natural fertilizer with all the necessary elements. (30 minutes)  Step 3: Each group creates and presents their benefits for soil fertility and plant growth. Discuss the environmental advantages of using natural fertilizers over synthetic ones, such as reduced chemical run off and improved soil health ( 30 minutes)  **Task 2 (Duration: 45 minutes): Preparation of laboratory equipment and reagents**  Step 1: Prepare a lab station for each group that includes a compost container, organic soil, gravel, sand, dried plant material, a styrofoam cup, an apple core or piece of bread, a small paper plate, safety glasses, and gloves. Step 2: Assemble the composting chambers, each chamber with the same layers and amounts of soil. We recommend 2–3 inches of rocks and/or gravel for a foundation, 3–5 inches of sand to help with drainage, and 4–6 inches of soil with organic materials. If room allows, you can repeat these layers. Avoid direct sunlight and make sure to water the compost pile to keep it moist (not soaking wet). Make sure gloves are worn when investigating if there are odors or signs of pests.  Step 3: Control the experiment, all three chambers should be filled with the same materials and layering. The only thing that needs to change is sample material. Students use the same amounts of material to fill each chamber. 1-2 ounces of water can also be added to each chamber after all layers in the chambers, to keep the soil moist. Аpply a process of observation, partly obtaining appropriate experimental results.  • Students should demonstrate carefully, to wear safety glasses when pouring sand or stones in case of waste.  • When handling food samples, gloves should be worn during assembly and all samples during cleaning. |  |
| **Assessments** | The final product will be evaluated through the self-evaluation method.  The evaluation segments are contained in the evaluation table.  All students in the class can be included in the evaluation.  After the presentations, students perform an oral reflection. |  |
| **Key Competences** | * Creativity competence * Cognitive competence * Communication competence * Social, emotional and healthy living competences * Digital competence * Cultural competence |  |
| **Connections with Eco STEAM** | **Eco** - understanding the connections between organic fertilizer and production  **S**cience: Students will be able to develop scientific principles for a method to reduce human pollution of the environment  **T**echnology: Implementing Waste Reduction Strategies in production  **E**ngineering: Students can design a model for describe the motion of matter  **A**rt: Students can draw the charts and show the circular cycle of the food chain  **M**ath: students have mathematical calculations for calculating revenue and profitability |  |
| **References** | <https://www.youtube.com/watch?v=XfuJJNGuS0Q>  <https://www.youtube.com/watch?v=u8MQwOR2og8>  <https://www.youtube.com/watch?v=DmFGsxLcT6k>  <https://www.youtube.com/watch?v=GwiiWWEQyQQ>  <https://www.youtube.com/watch?v=mcsf3Lj7xxo> |  |
| **Notes** |  |  |

# Appendix 3. Evaluation Table for Activity 2.

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| Evaluation criteria | Points | Comments |
| Quality of the organic fertilizer | \_\_/5 |  |
| Application of knowledge in the STEAM area | \_\_/5 |  |
| Accuracy of information - the ability to explain profitability | \_\_/5 |  |
| Skills in presenting | \_\_/5 |  |
| Teamwork and Collaboration | \_\_/5 |  |