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| Activity plan | | | | |
| ACTIVITY PLAN | | | | |
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| **Theme** | **Subtopic** | **Activity Title** |
| 2. STEAM integration in environmental Education | 2.4. Mathematics in Environmental Modeling and Analysis | Flower and tree pots |

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| Introduction part (or activity overview) |
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| **Introduction part (or activity overview)** | Decoration of the school building with flower pots. Planting trees in the school yard or soil surfaces around the school. We know that trees and plants produce oxygen, but just how much do they? There are actually a few different factors to determine this.  Тhrough this activity the students engage in environmental education and math skills in designing flower pots, create positive relationship with the environment in the school and develop positive attitude toward the school’s surrounding. Also, students are empowered to implement the knowledge they gain in school for good purpose. |
| **SETTING** | Classroom and outdoor work in a school yard (depending on the weather conditions) |

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| Materials Needed |
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| **Materials Needed** | * Computer (phone or tablet can be used to collect information, to do some calculations), projector (to present works), recycling materials for the pots which can be reused, tools like hoes and spades for the planting, nails, pins and ropes for hanging the pots on the walls for using more space and to use the space rationally, water, and soil for the planting, natural fertilizers. |

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| **Learning Outcomes** | * Gain a deeper understanding of different plant oxygen production * Develop critical thinking and selfcare * Learn to search, investigate and calculate for the amount of oxyden that will be produced through the years * Acquire interdisciplinary knowledge * Increase the ecological awareness * Learn how to organize the space |  |
| **Activity Contents** | **Activity: Flower and tree pots**  **Theoretical Part** **(Duration: 45 minutes)**: Discuss the importance of photosynthesis for the life on the planet. Analyze how flower pots are mostly made of. Present how certain resources can be used for unique designs. Discuss the math behind the creation of the pots using derivatives of functions and Geogebra applications.  **Task 1 (Duration: 20 minutes)** Students research about production of the oxygen and connect it with biology and process of photosynthesis. Students research about scientific facts for the process and come up with interesting facts for the other listeners of this activity. Students calculate the usage of CO2 and production of oxygen.  Short videos about the process:  [Oxygen is liberated during Photosynthesis Practical Experiment (youtube.com)](https://www.youtube.com/watch?v=3RBl3xqnCrc) (Duratrion: 3:38)  Overview: Explanation of the main concepts of photosynthesis and the release of oxygen from that process in exchange for carbon dioxide.  **Task 2 (Duration: 90-120 minutes)** Collect information about the techniques and types of materials used for the pot’s creation. Students start developing the pots design, either by hand or using design software, aiming to ensure stable construction of pots.  Schoolchildren, working in larger groups, make plant pots for the hall of the school or the school yard. (If the pots are made for the school’s yard the students will have to take in account all the weather condition through the year):   * Each group examines one type of material used for the pots (e.g. wood, bamboo, coconut husks, natural fabrics etc.) * Each student in the group has an assigned role (e.g., group leader and supervisor, data collector, data analyst, environmental impact predictor, speaker and presenter, everyone works on the product etc.).   Students make plans about planting trees in specific areas around the school, it’s good if this is a place where students spend time during break between classes. They choose the shape of the soil, research the types of flowers and trees that produce more oxygen than others and should be aware of the adaptation of the trees (climate changes in the country).  For the choice of trees and flowers:  [www.fnp.com/article/top-9-plants-that-provide-oxygen](http://www.fnp.com/article/top-9-plants-that-provide-oxygen)  <https://www.ugaoo.com/blogs/gardening-basics/how-many-plants-provide-oxygen-to-one-person> (Suggestion, the type of trees and flowers depend on the funds needed to provide them, so give the freedom to students to choose the type of plants they can provide or have it in the school yard and they can multiply them with some interesting botanical techniques and skills.)  For the choice of materials for pots:  <https://ecofriendlyguides.com/>  <https://www.gardenersworld.com/>  **Task 3 (Duration: 30 minutes)** Presentation of methods used for the minimum materials and volume of the pots and the hall space.  - Students practice their presentation skills and prepare to articulate the intentions and merits behind their pot’s design. Then they present their designs to the class, explaining their design choices, math objectives, and intended benefits from the idea.  - Students provide constructive criticism and suggestions for improvement on each other's designs.  - Students discuss what they learned from the process and reflect on the potential impact of their design of pots.  - Students clean up their workspaces and organize their materials, and discuss what will do with the waste and excess materials.  **Additional Tips**  Questions that will help students with their research:   1. Evaluate the area of the field necessary for the planting actions, also to make calculations about the quantity of produced oxygen in the upcoming period. 2. Analyze the ways of supply of young tree seedlings (types of trees) and transportation to the school, types of soil and natural fertilizers necessary for the plants, analysis of eco systems and their cohesion. 3. Analyze the impact on the environment and the people who spend time in the surroundings. 4. Evaluate the best generated area for planting the trees. 5. Prepare presentations (poster) and present them to classmates (or between classes). |  |
| **Assessments** | The teacher evaluates the students' work and achievements through:   * Verbal feedback during class; * Conversation with/among students; * Monitoring of students during individual and group work. * Observation the individual contribution of each student when working in groups * Evaluation of students' presentations * Highlighting the most   The final score is evaluated with a grade. It is possible to involve all students in the class in the assessment. Each student self-assesses his contribution to the work. After the presentations, students can make a competition about best made pots design with online voting and questionnaires. |  |
| **Key Competences** | * Cognitive competence * Cultural competence |  |
| **Connections with Eco STEAM** | **Eco:** Ecological awareness about the need of forestation of fields and more green areas around us.  **S**cience: Knowledge of biology, geography about different types of plants and soil  **T**echnology: The use of special mobile applications or computer software to create the pots and to generate the area for green plants and flowers.  **E**ngineering: Through creativity the students have to create the best area with best options of trees and they will have to design the space in and out of the school building.  **A**rt: From a bird’s eye view or oblique perspective, the planted area should be interesting and beautiful for the human eye.  **M**ath: Calculation of the area for planting, volume of used soil for the flowers and choosing the best shape for this, assessment of cost-effectiveness, mathematical models about oxygen production, perform mathematical calculations to find out about the enormous emission of carbon dioxide and the need of oxygen on the planet Earth. |  |
| **References** | •Academic and scientific literature on botany, types of soil and care for the flowers.  •Literature for the bilogical processes througout the implemented activities. |  |
| **Notes** | •The activity should be adaptable to different local ecosystems and weather conditions.  • Encouraging students to think about their future role in designing and shaping the space in which they live and work. |  |

**Assessment Table for Web Quest Reports:**

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| Assessment Criteria | Points | Comments |
| Depth of Research | \_\_/5 |  |
| Understanding of different plants or flower role | \_\_/5 |  |
| Understanding of different soil role | \_\_/5 |  |
| Quality of Presentation | \_\_/5 |  |
| Use of types of materials | \_\_/5 |  |

**Assessment Table for Group Presentations:**

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| Assessment Criteria | Points | Comments |
| Comprehensiveness of Findings | \_\_/5 |  |
| Clarity in Presentation of Data (Calculations) | \_\_/5 |  |
| Understanding of pots design | \_\_/5 |  |
| Ecological Interpretations and Insights | \_\_/5 |  |
| Teamwork and Collaboration | \_\_/5 |  |