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| ACTIVITY PLAN | | | | |
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| **Theme** | **Subtopic** | **Activity Title** |
| Collaboration and Communication in EcoSTEAM Projects | Community Engagement and Partnerships | Research on the technical components of a car with an internal combustion engine and its impact on the environment. |

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| Introduction part (or activity overview) |
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| **Introduction part (or activity overview)** | In this activity, students, having examined the structure, operation, and pollution of internal combustion engines, actively participate in practical training. Collaborating with community members, they thoroughly investigate and photograph the technical components of a car that help reduce pollution. |
| **SETTING** | Classroom  Outdoor and home environment, where individually with parents or other close people, they inspect the car and prepare slides. |

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| Materials Needed |
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| **Materials Needed** | Computer.  Phone / camera.  Projector.  Car with an internal combustion engine.  Person, assisting in getting acquainted with the technical part of the car, pollution. |

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| **Learning Outcomes** | * Gain a comprehensive understanding of the main engine components, including the engine itself, battery, oil tank, windshield washer fluid reservoir, coolant reservoir, generator, and components that help reduce pollution. * Acquire practical knowledge about the operation of these parts in the car by actively investigating and documenting the car's technical parts, * Apply theoretical knowledge in real life, develop a deeper understanding of the subject. * Improve your skills in effectively organizing and conveying technical information by creating presentation slides, * Encourage a sense of collaboration and connection between students and the community by involving community members in the learning process. |  |
| **Activity Contents** | **Activity1: Research on the Technical Components of a Car with an Internal Combustion Engine and Its Impact on the Environment**  **Theoretical Part (Duration: 30 minutes):**  Introduction to the internal combustion engine, its structure, and operation.  Internal combustion engines power more than 250 million vehicles using conventional or renewable fuels. They operate by initially mixing fuel with air and then igniting it. During this process, the energy from fuel combustion is converted into motion energy. Various types of engines – from gasoline to diesel – use different strategies for fuel supply and combustion. Over the last 30 years, internal combustion engines have become more efficient, emitting 99% less pollutants and improving operational characteristics.  **Videos:**  Animation of a four-stroke engine's operation <https://www.youtube.com/watch?v=Pu7g3uIG6Zo>  Overview: In this video, viewers are thoroughly introduced to the main parts of the engine, and the engine's operation process is explained.  Duration: 3 min.  Animation of the Car Engine Mechanism https://www.youtube.com/watch?v=ezBSD68NV9U  Overview: This video provides a detailed explanation of how a car works, focusing on the simultaneous operation of four engine cylinders, and revisits the engine's operation process.  Duration: 2.32 min.   1. Introduction to the impact of car pollution, ways to reduce pollution, and car components that reduce pollution.   **Videos:**  <https://www.youtube.com/watch?v=8FSh6pIuRXo>  Overview: This video provides a detailed explanation of the dangers of car pollution and how the European Union is addressing the issue.  Duration: 2.16 min.  [https://www.youtube.com/watch?v=0gjnhBfvnZs](https://www.youtube.com/watch?v=0gjnhBfvnZs%20%20)  Overview: This video shows six ways to reduce air pollution.  Duration: 1.18 min.  [https://www.youtube.com/watch?v=PG7NI-bAt-8](https://www.youtube.com/watch?v=PG7NI-bAt-8%20%20)  Overview: This video provides a detailed explanation of how a catalytic converter works.  Duration: 1.47 min.  <https://www.youtube.com/watch?v=EPIfI9aZHt4>  Overview: This video provides a detailed explanation of the operation of the PCV (Positive Crankcase Ventilation) valve.  Duration: 2.36 min.  <https://www.youtube.com/watch?v=E2_I0DSxsqI>  Overview: This video provides a detailed explanation of simple Exhaust Gas Recirculation (EGR).  Duration: 4.16 min.  <https://www.youtube.com/watch?v=sZALEA7wDWM> (Trukmė:5 min.)  Overview: This video provides a detailed explanation of how EVAP (Evaporative Emission Control System) systems work.  Duration: 5 min.  **Task:** Duration: 15 minutes (for task explanation), about 2 hours (for presentation of works)  Students perform individual research works: "Research on the technical components of a car with an internal combustion engine and its impact on the environment." Each of them finds a person (mother, father, neighbor, older friend, teacher...) who shows and introduces them to the car's technical and pollution-reducing components. Following the requirements, they organize the material, create slides, and present them to their classmates.  Requirements for task completion:   1. Photograph the engine (as much as visible) and find out the engine's volume, power, fuel, and number of cylinders. 2. Photograph the oil dipstick, its location under the hood, and explain how to measure the oil level with it. 3. Photograph the battery, windshield washer fluid reservoir, coolant reservoir, generator, and explain their purpose. 4. Find out about the car's pollution, what components in the car reduce pollution, and how they work. 5. Research car pollution and pollution-reducing measures. 6. In the last slide, write what you liked about this work and the difficulties you encountered. 7. Organize the material, create slides, and present them in class. |  |
| **Assessments** | Individual presentations are graded with a score: Research Work Grading Table.  All class students are included in the assessment: Classmates' Presentations Grading Table. |  |
| **Key Competences** | * Cognitive competence * Communication competence * Social, emotional and healthy living competences * Citizenship competence * Digital competence |  |
| **Connections with Eco STEAM** | Eco – car pollution and environmental impact.  Science - knowledge of physics, chemistry, and environmental sciences.  Technology – technical aspects of car pollution.  Engineering - engineering solutions designed to combat pollution.  Art – creativity in creating slides.  Math - mathematics provides a quantitative basis for analyzing data related to internal combustion engines and pollution. |  |
| **References** | <https://www.energy.gov/eere/vehicles/articles/internal-combustion-engine-basics>  <https://www.motortrend.com/how-to/0707-turp-emission-components/>  <https://www.tataaig.com/knowledge-center/car-insurance/things-you-can-do-to-reducing-pollution-from-cars> |  |
| **Notes** | Considering the circumstances, if a student's family does not have a car and cannot find one in their immediate surroundings, the teacher organizes a car inspection or allows the student to gather information online. |  |
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**Research Work Evaluation Table:**

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| Evaluation Criteria | Points | Comments |
| Slide Quality | \_\_/5 | Slide writing requirements, photo quality, visual appearance. |
| Accuracy of Information | \_\_/5 | Correct and comprehensive information |
| Quality of Presentation | \_\_/5 | Maximum points are awarded when the student presents clearly and engagingly. |
| Peers' Evaluation | \_\_/3 | Average of classmates' evaluations |
| Additional Information | \_\_/1 | Evaluated if the student chooses an additional technical component of the car and discusses it. |
| Additional Questions | \_\_/2 | An additional question is provided by the teacher or students. |

**Classmates' Presentations Evaluation Table**

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| Assessment Criteria | Points | Comments |
| Slide Quality | \_\_/1 |  |
| Accuracy and interest of information | \_\_/1 |  |
| Quality of presentation | \_\_/1 |  |