CONTENT

4 TOPIC. COLLABORATION AND COMMUNICATION IN ECOSTEAM PROJECTS

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4.1. SUBTOPIC. COLLABORATION AND COMMUNICATION IN ECOSTEAM PROJECT

4.1.1. ACTIVITY PLAN: CANDLE MAKING FROM WAX LEFTOVERS	
Introduction part (or activity overview)	Students will collect wax remnants, old candle containers, and look for information on how to make a candle from wax leftovers; they will learn the basic steps of candle making; they will become acquainted with the main principles of economic activity that can be applied in this activity. The activity will encourage students to conserve the environment. By recycling wax remnants into candles, they will reduce waste and promote environmental awareness.
Setting	A classroom equipped with a hot plate. Educational context: teamwork and learning.
Materials Needed	Wax scraps, wick, wick holder (may be from an old candle), candle jars (may be left over from old candles), container (for melting the wax), scissors, bowl (for heating the water and placing the container of melted wax into), wooden sticks (for holding the wick in place), hotplate, computer (tablet or phone), paper, pens.
Learning Outcomes	• Collaborate with others to achieve a common goal - create candles. This encourages communication, leadership, and teamwork. • Learn to collect and prepare materials for candle making; calculate production costs; understand how to set the price of a candle based on production costs; understand what profit is. • Prepare a description of candle making, make conclusions
Activity Contents	**Activity 1: Introduction to Economic Activity.** Preparation for the candle-making process. **Theoretical part (Duration: 15 minutes):** Discussion on what production means and how it is related to the economy, how reducing waste can conserve resources. Production is: • the use of production resources (labor, capital, natural resources, etc.) to create goods and services. (https://zodynas.vz.lt/Production). • the process of creating goods and services. Production activity is a sequence of technologies through which other objects are obtained from some objects. In production activity, it is necessary to distinguish work tools, work objects (they constitute the means of production), labor force, work products (results of production activity), and technical-organizational relations linking these elements into a production system. (https://e-terminai.lt/economics/production). Students are introduced to economic concepts such as: • production costs (The monetary sum of resources consumed for the production of goods), • price (The monetary valuation of a unit of a product. It is the sum of money paid for a product or service that consumers exchange for the right to own or use the product or to use the service), • profit (The difference between revenues received and costs incurred). (https://e-terminai.lt/economics/costs) Students will apply this knowledge to evaluate how much their produced candle costs, how it can be sold, and how this relates to economic concepts. **Task 1 (Duration: 10 minutes):** students are divided into groups of 4-5; they distribute and plan the work among themselves.

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	Task 2 (Duration: 20 minutes): Students discuss/find out how to collect wax remnants and other materials, and how to prepare them for production; they look online for information on how to make candles; what tools and materials will be needed for candle making. **Videos:** DIY: How to Make a Candle from Candle Leftovers https://www.youtube.com/watch?v=9qrVVwmRSpY Overview: Video showing how I make new candles from old candle leftovers. Duration: Approx. 4:19 minutes How to Melt Old Candle Wax into New Candles to REUSE Candle Wax! https://www.youtube.com/watch?v=cUYYDZ4LFEs Overview: This video will show our process for melting all the wax out of old candle jars, how to make a guide for your candle wick placement, and how to pour the wax into your new reused jar. Duration: Approx. 5:28 minutes **Task 3 (Duration: several days):** Collection of wax and other materials (Can be a homework assignment). Students collect wax remnants (from their homes, acquaintances, the gymnasium community). For example, prepare announcements asking the gymnasium or local community to bring in wax remnants. **Activity 2: Candle Making from Wax Leftovers, Economic Concepts in Candle Production.** **Task 1 (Duration: 2 hours):** Candle Making. Step 1: Each group selects their candle design, makes candles, decorates them (1.5 hours) Step 2: Students calculate the cost of candle production. (15 min.) Step 3: Set the selling price of the candle. (5 min.) Step 4: Compare the cost price of the produced candle with the prices of candles sold in their living environment. (10 min.) **Video:** How to Set the Price of a Product or Service? https://www.youtube.com/watch?v=XnL9xN_8UrA Overview: this video is about what goes into the price of a product. Duration: Approx. 2:51 minutes **Task 2 (Duration: 30 minutes):** Final Work. Reflection. Students prepare a description of candle making, present conclusions on how economic principles were applied in the candle-making process, how this activity contributes to environmental conservation.
Assessments	The final result is assessed with a grade. (Evaluation Table No.1) All students in the class can be included in the evaluation.

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	Each student self-assesses their contribution to the work. Students can compete for the best-made candles by voting online and through questionnaires. The evaluation considers: the produced candle (its design, decoration), the description, the calculation of the cost price, and the conclusions.
Key Competences	Communication competence Cognitive competence Creativity competence Digital competence
Connections with Eco STEAM	Eco – choosing environmentally friendly materials for candle making Sience – knowledge of chemistry for candle making; Environmental sciences – encouraging sustainability thinking. Technology – using a computer in the creation process. Engineering – efficient methods for recycling wax remnants and optimizing the production process. Art – producing visually appealing candles. Math – calculating the cost and price of candle production
References	https://zodynas.vz.lt/Gamyba https://e-terminai.lt/ekonomika/gamyba https://e-terminai.lt/ekonomika/kastai https://www.youtube.com/watch?v=9qrVVwmRSpY https://www.youtube.com/watch?v=cUYYDZ4LFEs https://www.youtube.com/watch?v=XnL9xN_8UrA
Notes	The activity spans at least two sessions: during the first session, Activities 1 and 2 are completed; Activity 3 may take some time (for example, a week or a month) and is conducted as homework; during the next session, Activities 4 and 5 are carried out. Wax remnants and other materials can be collected before the session.

Evaluation Table No. 1.

Evaluation Criteria	Points	Comments
Candle design, decoration	_/2	
Calculation of cost price	_/2	
Conclusions	_/2	
Description		

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4.1.2. ACTIVITY PLAN: CREATION OF A MOTIVATIONAL FLYER FOR RAISING AN INITIATIVE FOR A CLEANER ENVIRONMENT	
Introduction part (or activity overview)	This session is designed to deepen students' understanding to create visually impactful flyers that raise awareness about cleaner environment. By following this activity plan, you can empower your students to use their creativity and design skills to advocate for a cleaner environment and inspire positive change in their communities.
Setting	Classroom complemented by digital research.
Materials Needed	• Drawing paper or computer/laptop with design software • Markers, colored pencils, or digital drawing tools • Reference materials or examples of motivational flyers • Information about environmental initiatives or campaigns • Printer or access to printing services (if printing physical flyers) • Projector or screen (if presenting digital flyers)
Learning Outcomes	• Developing deep understanding about the impact of individual action on the environment; • Improving proficiency in expressing an opinion about a certain phenomenon through a drawing; • Enhancing skills in digital research and data analysis; • Improving ability to critically analyse and discuss about the advantages of cleaner environment and its impact on the quality of life;
Activity Contents	Duration:1-2 hours, depending on the complexity of designs and available class time. **Activity1: Creation of a motivational flyer** **Theoretical part: (30 minutes)** The teacher discusses about the importance of environmental aw… of individual actions on the cleanliness of the environment, and exan… yers or environmental campaigns. The students can see examples on the link below: https://www.canva.com/posters/templates/environment/ The teacher brainstorms ideas for their motivational flyers, consid… imagery, and design elements, as well as how to convey their mes…  **Task 2: (60-90 minutes)** The teacher gives the students a task to develop flyer designs. Students start developing their flyer designs, either by hand or using design software, expressing creativity in the use of colors, typography, and imagery to grab attention and ensure clarity and impact. Students write compelling and persuasive text for their flyers, including key messages, calls to action, and information about environmental initiatives or campaigns (encourage them to use clear and concise language.) **Task 3: (45 minutes)**

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	The teacher guides students to prepare presentations. Students prepare their final presentations, practice their presentation skills and how to articulate the messages and intentions behind their designs. Students present their motivational flyers to the class, explaining their design choices, messaging, and intended impact. Then, they provide constructive criticism and suggestions for improving each other's flyers. **Task 4: (30 minutes)** The teacher guides students through discussion. Students discuss their experiences with creating motivational flyers in a reflection activity – they reflect on the power of visual communication in inspiring action and raising awareness about important environmental issues. Students clean up their workspaces and organize their materials. **Additional Tips:** Students should use eye-catching visuals and impactful imagery that resonates with the audience and conveys the urgency of environmental action. They should show simplicity and clarity in design, ensuring that the message of the flyer is easily understood and remembered, additionally consider incorporating real-world examples of successful environmental campaigns or initiatives. The teacher should encourage students to share their motivational flyers with their community, whether by distributing physical copies or sharing digitally on social media platforms.
Assessments	• Assessment of Web Quest reports for depth of research and understanding. • Evaluation of the thoroughness and accuracy of field observation records. • Individual presentations with a focus on a cleaner environment
Key Competences	• Cognitive competence • Creativity competence • Communication competence • Social, emotional and healthy living competences • Citizenship competence • Digital competence • Cultural competence
Connections with Eco STEAM	**Eco** - Using their artistic skills to convey a message about the seriousness of individual impact on nature and environment. Science - Ecological science (study of the impact of individuals for cleaner environment). Technology - Use of digital tools for research and design. Engineering - Thinking in the future to use alternative sources of energy and recyclable materials in order to reduce the impact of man on nature. Arts - Designing flyer by their own . Math - Data analysis about the impact of man and his non-domestic behavior towards nature.
References	• Academic and scientific literature on the impact of climate change, ecosystems, prevention, recycling

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	• Online databases and resources for the impact of climate change on animals, plants, human health and methods to reduce pollution of nature
Notes	• In different areas or countries in the world, the impact of climate change and the level of pollution is different, students should use examples from their immediate environment • Encourage students to reflect on their role in reducing the human impact on climate change and pollution by using renewable energy sources and taking care of the immediate environment

Assessment Table for Web Quest Reports:

Assessment Criteria	Points	Comments
Depth of Research	_/5	
Understanding of climate change impact and local pollution	_/5	
Accuracy of Information	_/5	
Quality of Presentation	_/5	
Use of Visuals	_/5	

Assessment Table for Individual Presentation:

Assessment Criteria	Points	Comments
Comprehensiveness of Findings	_/5	
Clarity in Presentation of Data	_/5	
Understanding of human impact on nature	_/5	
Ecological Interpretations and Insights	_/5	
Clarity of design in expressing the problems caused by human negligence	_/5	
Use of Visual Aids in Presentation	_/5	

4.1.3. ACTIVITY PLAN: BUILDING EFFECTIVE TEAMS FOR ENVIRONMENTAL ACTION

Introduction part (or activity overview)	This activity is designed to enhance students' understanding and skills in teamwork and leadership within the context of environmental initiatives. Through interactive exercises and real-world scenarios, students will explore the dynamics of effective team-building, leadership styles, and their impact on successful environmental projects.

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Setting	Location: Classroom or outdoor setting suitable for group activities and discussions. Educational Context: Collaborative group work (4-5 students per group).
Materials Needed	Flip charts or whiteboards Markers and pens Projector for presentations Handouts with instructions for activities Digital device (tablet or laptop) for research and presentations
Learning Outcomes	• Understand the principles of effective teamwork and leadership within environmental projects. • Develop skills in conflict resolution, communication, and collaborative decision-making. • Apply leadership theories in planning and executing a small-scale environmental project.
Activity Contents	Theoretical Part (Duration: 60 minutes): This session delves deeper into the crucial aspects of leadership and teamwork within the context of environmental sustainability projects. It emphasizes understanding the dynamics of effective teams and the various leadership styles that can drive successful environmental initiatives. • Introduction to Team Dynamics: Start by exploring the foundational elements that contribute to building effective teams. Discuss the importance of clear communication, role clarity, trust, and collective problem-solving capabilities. Highlight how these elements contribute to the efficiency and success of teams working on environmental projects. • Leadership Styles and Their Impact: o Transformational Leadership: Discuss how transformational leaders can inspire and motivate team members by aligning the team's goals with a larger purpose, which is crucial in environmental advocacy. o Transactional Leadership: Explore the mechanisms of transactional leadership, including structured tasks and systems of rewards and penalties, and when this style might be effective in managing environmental projects. o Servant Leadership: Introduce servant leadership, focusing on the leader's role as a supporter rather than a commander, facilitating team operations and empowering members to achieve their potential, especially in community-based projects. o Situational Leadership: Explain the concept of situational leadership, where leaders adjust their style based on the team's needs and project phase, which can be particularly useful in dynamic project environments like those found in sustainability projects. • Cultural and Ethical Considerations in Leadership: Discuss how cultural contexts can influence leadership styles and team dynamics. Consider the ethical implications of environmental leadership, such as inclusivity, fairness, and responsibility towards community and ecological well-being. • Case Studies: Review real-world examples of successful environmental projects led by diverse leadership styles. Analyze what made these projects successful, considering the leadership styles applied and the teamwork strategies implemented. • Engaging with Stakeholders: Emphasize the role of leaders in engaging with various stakeholders, including community members, government bodies, and private sectors. Discuss strategies for effective negotiation, conflict resolution, and

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	stakeholder management. • Challenges in Environmental Leadership: Address common challenges faced by leaders in environmental projects, such as dealing with resistance, overcoming resource limitations, and handling public scrutiny. Offer strategies for navigating these challenges effectively. Discussion Prompts: • What characteristics do you think are most important for a leader in an environmental project? • Can you think of any situation where one leadership style might be more effective than others in an environmental context? • How can leaders ensure that their teams remain motivated and committed to long-term environmental goals? Task 1: Team-building Exercise (Duration: 30 minutes) Step 1: Ice-breaking activity to foster familiarity and trust among team members (e.g., Two Truths and a Lie). Step 2: Engage in problem-solving exercises that simulate environmental challenges (e.g., designing a waste recycling campaign within a limited budget). Step 3: Reflect on the dynamics during the exercise, discussing what worked well and what could be improved in terms of teamwork. Task 2: Leadership Role-play (Duration: 60 minutes) Step 1: Assign different leadership roles to team members based on various leadership styles. Step 2: Present a scenario where the team has to plan and implement a local community clean-up event. Step 3: Execute the plan in a simulated environment, with team members rotating leadership roles. Step 4: Debrief the exercise, focusing on the effectiveness of different leadership styles and the impact on team performance and project outcomes. Task 3: Plan and Pitch an Environmental Project (Duration: 60 minutes) Step 1: Using the skills learned, each group plans a real-world environmental project tailored to their school or community. Step 2: Develop a project proposal including objectives, required resources, timeline, and expected impact. Step 3: Pitch the proposal to the class, mimicking a stakeholder presentation. Step 4: Class votes on the best project based on criteria such as feasibility, creativity, environmental impact, and clarity of communication
Assessments	Team collaboration and dynamics. Leadership effectiveness and adaptability. Quality and feasibility of the environmental project proposal. Clarity and persuasiveness of the project pitch
Key Competences	Leadership and team management Strategic planning and execution Communication and public speaking Critical thinking and problem-solving
Connections with Eco STEAM	Engineering and Science: Applying scientific and engineering principles to solve environmental problems. Arts and Mathematics: Using creativity in project design and numerical skills in project planning.

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Notes	This activity can extend into a long-term project where students implement their proposed environmental initiatives in their school or local community

Evaluation Criteria Table for Teamwork and Leadership in Environmental Initiatives Activity

Evaluation Criteria	Points Available	Comments
1. Understanding of Team Dynamics	10	Evaluate how well students grasp the concepts of effective team dynamics and their importance in environmental projects.
2. Application of Leadership Styles	10	Assess students' ability to identify and apply different leadership styles appropriately in simulated scenarios.
3. Communication Skills	10	Rate the clarity, effectiveness, and adaptability of communication within the team and in presentations.
4. Conflict Resolution	10	Evaluate the strategies used by students to resolve conflicts and maintain team cohesion during the activities.
5. Creativity in Problem Solving	10	Judge the creativity and effectiveness of the solutions proposed for the environmental challenges presented.
6. Stakeholder Engagement	10	Assess how effectively students engage with hypothetical stakeholders during the role- play scenarios.
7. Quality of Project Proposal	20	Evaluate the thoroughness, feasibility, and environmental impact of the project proposal developed by the team.
8. Team Collaboration and Participation	10	Rate the level of collaboration and active participation from all team members throughout the activity.
9. Reflection and Feedback	10	Assess students' ability to reflect on their performance and provide constructive feedback to peers.

Total Points: 100

4.2. SUBTOPIC. CROSS-DISCIPLINARY COLLABORATION FOR SUSTAINABLE SOLUTIONS

4.2.1. ACTIVITY PLAN: CEREAL CROPS

Introduction part (or activity overview)	One of the major scourges of the modern world is the problem of hunger. Even though biotechnologies are advancing rapidly, humanity still suffers from a lack of food. This problem can be addressed by reducing the consumption of animal products. Cultivating and consuming plant-based food is much more efficient in terms of energy and economy. Students will become familiar with the main cereal plants of the country and the structure of the grain; they will investigate the chemical composition of the grain; calculate the energy efficiency of long and short food chains, and explain the advantages and disadvantages of alternative food sources.
Setting	Class and Laboratory
Materials Needed	Computers, phones, interactive whiteboard, microscopes, magnifying glasses, grain slides, soaked wheat grains, plates with wheat, barley, rye, and oat grains, scales, measuring cylinders, funnels, paper filters, glass rods, pipettes, test tubes and their stands, 10% flour solution, 10% NaOH solution, 0.5% $CuSO_4$ solution, distilled water, 5% alcoholic iodine

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	solution.
Learning Outcomes	• Learn to use the identification key and recognize the grains of cereals grown in the country. • Identify the parts of the grain and indicate their nutritional value. • Develop microscopy skills. • Be able to determine the proteins and carbohydrates in grains. • Mathematically prove the energy efficiency of short food chains. • Critically evaluate alternative food sources.
Activity Contents	**Activity 1: Grain Structure** **Theoretical Part (Duration: 10 minutes):** Introductory discussion. Discussion about cereal plants grown in the country for food: wheat, barley, rye, and oats, showing their photos and describing their characteristics. **Task (Duration: 35 minutes):** Step 1: Work individually. Using a grain identification key (Appendix 1), magnifying glasses, and grain samples, identify the grains of wheat, barley, oats, and rye. Fill in the table (Appendix 2). Step 2: Work individually. Using selected information sources, familiarize yourself with the structure of the grain and its parts used for food. Examine a grain slide under a microscope and find the embryo with the seed coat, endosperm (aleurone and starchy layer), and germ. Using a picture of the grain, fill in the table (Appendix 3). **Information for the Teacher Grain Characteristics** The oat grain is yellow, the lower part is covered with sparse white hairs, becoming denser towards the top and forming a brush at the very tip. The grain is elongated, has glumes, with a longitudinal narrow groove. The barley grain is spindle-shaped or elliptical, slightly curved, with a whisker at the base on the belly side, has glumes, with a longitudinal wide groove. The wheat grain is elongated, egg-shaped, with convex sides, without glumes, with a longitudinal deep narrow groove on the belly side, pinkish, sometimes with a yellow hue. The rye grain is elongated, slightly compressed from the sides, the top may be covered with hairs, without glumes, with a deep groove along the belly. The grain is wrinkled, grayish-green, sometimes with a brownish hue. **Grain Structure and Its Use in Food** The grain is a dry fruit, consisting of the ovary and the seed. The seed consists of the seed coat, germ (rootlet covered by the root sheath – coleorhiza; shoot covered by the shoot sheath – coleoptile; seed leaf – cotyledon) and endosperm (proteinaceous aleurone layer and starchy or floury layer). Nutritionally, all parts of the grain are very valuable. Bran – a by-product of grain processing. It consists of parts of the grain coat and aleurone layer. It contains a lot of proteins, fats, carbohydrates, vitamins (A, E, B1, B2, B6), minerals (Mg, K, P, Fe, Na, Ca, Zn).

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Germs – a by-product of grain processing, containing a lot of fiber, polyunsaturated fatty acids, vitamins (A, E, B1, B2, B6, PP, D), minerals (Mg, K, P, Fe, Na, Ca, Zn, Cu).

Endosperm – the part that makes up the largest mass of the grain. Flour is made from it by grinding, containing a lot of starch and proteins.

Activity 2: Chemical Composition of the Grain

Theoretical Part (Duration: 10 minutes): Introductory talk during which the teacher explains how proteins and carbohydrates accumulated in the grain's endosperm are determined using chemical reagents.

Protein Determination. In alkaline solutions, copper ions, reacting with proteins, dye the test solutions a pinkish-olive color.

Workflow:

Prepare the test solution from flour and distilled water. 10 g of flour is poured with 100 ml of water and left overnight. Then, the solution is filtered through a paper filter.

Pour 2 ml of the test solution into a test tube and, while stirring, add about 2 ml of 10% NaOH solution. Into the obtained solution, drop 0.5% $CuSO_4$ until the contents of the test tube change color.

If the contents of the test tube turn blue, it is concluded that there are no soluble proteins in the test material.

If the contents of the test tube turn a pinkish-olive color, it can be stated that there are soluble proteins in the test material.

Carbohydrate (Starch) Determination. The presence of starch in plant tissue can be determined with an iodine solution: the substance turns blue when dyed.

Workflow:

Pour about 2 ml of the prepared flour solution into a test tube and add a few drops of iodine solution. Observe how the iodine solution dyes the sample.

If the contents of the test tube turn blue, it is concluded that there is starch in the test material. Starch granules can be clearly seen under a microscope.

Workflow:

Grains are soaked for 1 day before the experiment. The grain is cut in half, and a bit of the soft part is taken with a needle or scalpel. It is placed on a microscope slide, iodine solution is added, and it is observed under a microscope.

Task (work individually) (Duration: 30 minutes):

Step 1: Using reagents, determine whether there are proteins in the flour solution. Fill in the table (Appendix 4).

Step 2: Using reagents, determine whether there are carbohydrates in the flour solution. Fill in the table (Appendix 4).

Step 3: Microscopically examine the endosperm of a soaked wheat grain, find starch granules, and draw them (Appendix 5).

Activity 3: Energy Efficiency of Food Chains

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Theoretical Part (Duration: 15 minutes): Introductory talk. The energetic functioning of ecosystems is explained. Discussion about energy flows in food chains. It is emphasized that reducing the negative
agricultural impact on the environment can be achieved by shortening food chains. Plants, using the energy of sunlight, create primary production. A portion of the assimilated energy is used for respiration, a large part of the plant mass becomes detritus and goes to decomposers. Only a small portion of energy is transferred to a higher nutritional level. A portion of the energy received from producers is not assimilated by consumers; some is assimilated but used for work and turns into heat, which dissipates into space. The longer the food chains, the greater the energy losses, hence long chains are inefficient. Energy losses in shorter chains are smaller, thus plant-based food is cheaper,
requiring less energy and agricultural resources to produce.
It is also discussed how the negative impact of agriculture on the environment can be reduced by using alternative food sources.

Task (Duration: 90 minutes):
Step 1: Mathematically prove that short food chains are more energy-efficient than long ones. A diagram depicting the agricultural ecosystem's food chain is presented.

Wheat accumulated 52,000 kJ of energy, 16,000 kJ of energy was transferred to the pig, and 4,000 kJ to the human.
Calculate the percentage of wheat's accumulated energy that reaches the pig (the primary consumer). Calculate the percentage of wheat's accumulated energy that reaches the human (the secondary consumer).
How can energy losses in the food chain be reduced? (Appendix 6)
Step 2: Working in groups, find information about a chosen alternative food source, specifying its advantages and disadvantages.
Alternative food sources:
Products of genetically modified
organisms Algae
Crickets
“In vitro” meat, etc.

Activity 4: Alternative Food Sources

Theoretical Part (Duration: 15 minutes):

Students are introduced to alternative food sources that could help address the problem of hunger: genetically modified organism products, algae, crickets, and in vitro meat.

Task (Duration: 60 minutes):

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	Step 1: Working in groups, find information about a selected alternative food source, and identify its advantages and disadvantages. Step 2: Present the group work and create a collective visual aid on the smart board about alternative food sources, indicating their advantages and disadvantages.
Assessments	The individual activities specified in the task sheet are evaluated with cumulative points (Appendix 7). The evaluation and self-assessment of the group work are conducted by the students themselves (Appendix 8).
Key Competences	Cognitive competence Creativity competence Communication competence Social, emotional and healthy living competence Digital competence
Connections with Eco STEAM	Eco – understand that the consumption of plant-based food is energetically much more efficient than that of animal-based food. Science – connect knowledge of chemistry and biology. Technology – use digital technologies cleverly and creatively. Engineering – be able to make a micro-preparation and microscope it. Art – develop skills in the art of visualization. Math – mathematically prove the energetic efficiency of plant-based food.
References	1. Alyda Daulenskienė. Biologija. Pratybų sąsiuvinis 11-12 klasei I dalis. Vilnius, 2000 2. Algirdas Grigas. Lietuvos augalų vaisiai ir sėklos. Vilnius, 1986
Notes	

Student's name, surname .....

APPENDIX 1. KEY TO IDENTIFY GRAINS

1. The grain has glumes. see 2
- The grain is bare, without glumes. see 3
2. The grain's groove is narrow oats
- The grain's groove is wide. barley
3. The grain is elongated, compressed from the sides. rye
- The grain is elongated, egg-shaped, with convex sides. wheat

APPENDIX 2. VARIETY OF GRAINS

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Plant name	Plate Number with Grains Drawing	Drawing
Barley		
Wheat		
Rye		
Oats		

Evaliuation (4 points).....

APPENDIX 3. GRAIN STRUCTURE

Parts of the grain	Image number	Nutritional value for humans
Ovary		
Seed coat		
Endosperm aleurone layer		
Endosperm starchy layer		
Germ		

Evaluation (5 points).....

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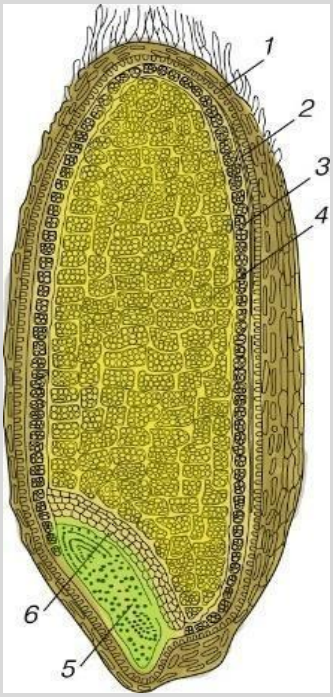

APPENDIX 4. DETERMINATION OF CHEMICAL SUBSTANCES IN GRAIN

Flour Solutions	Substance Detected	Solution Color
Solution with NaOH and CuSO4		
Solution with Iodine		

Conclusion.....
.
Evaluation (1 point for solution preparation, 1 point for performing the experiment, 1 point for conclusion)

APPENDIX 5. ENERGY EFFICIENCY OF FOOD CHAINS

1. The amount of wheat energy available to the pig.....
2. The amount of wheat energy available to humans.....

4.2.2. ACTIVITY PLAN: COLLABORATIVE INNOVATION FOR SUSTAINABLE DEVELOPMENT

Introduction part (or activity overview)	This activity involves students collaborating across different disciplines to develop sustainable solutions to environmental challenges. By leveraging diverse skills and perspectives, students will create innovative and practical solutions that address real-world problems. The focus is on teamwork, communication, and integrating knowledge from various STEAM fields
Setting	Location: Classroom for planning and discussion, online resources for research, and lab or field environment for implementation.

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	Educational Context: Collaborative group work.
Materials Needed	Research materials (books, articles, internet access) Project planning tools (whiteboard, markers, project management software) Prototyping materials (craft supplies, recycled materials, basic tools) Presentation tools (e.g., PowerPoint, poster boards) Communication tools (video conferencing software, messaging apps)
Learning Outcomes	● Develop skills in cross-disciplinary collaboration and teamwork. ● Enhance understanding of the role of different disciplines in addressing environmental issues. ● Improve abilities in project planning, implementation, and presentation.
Activity Contents	**Theoretical Part (Duration: 60 minutes)**: Provide a detailed introduction to the importance of cross-disciplinary collaboration for sustainable solutions and how different disciplines can contribute. ● **Introduction to Cross-Disciplinary Collaboration**: Cross-disciplinary collaboration involves integrating knowledge and expertise from different fields to tackle complex problems. In the context of environmental challenges, this approach allows for more comprehensive and effective solutions. By combining insights from science, technology, engineering, arts, and mathematics (STEAM), students can address environmental issues from multiple angles and create innovative solutions. Consider the development of a green building. Architects, engineers, environmental scientists, and urban planners must work together to design a building that is not only structurally sound and aesthetically pleasing but also energy-efficient and environmentally friendly. o **Case Studies of Successful Cross-Disciplinary Projects**: ▪ **Green Building Design**: Green buildings incorporate sustainable materials, energy-efficient systems, and innovative design principles to reduce their environmental impact. For example, the Bullitt Center in Seattle is a collaboration between architects, engineers, and environmental scientists to create one of the greenest commercial buildings in the world. It features solar panels, rainwater harvesting, and composting toilets. ▪ **Renewable Energy Projects**: Developing renewable energy sources such as wind farms and solar power plants requires collaboration between engineers, environmental scientists, economists, and policymakers. For instance, the Gansu Wind Farm in China, one of the largest wind farms globally, involved extensive planning and cooperation between various disciplines to ensure its success. ▪ **Conservation Initiatives**: Effective conservation strategies often require input from biologists, geographers, sociologists, and local communities. The Yellowstone to Yukon Conservation Initiative is an example where scientists, policymakers, and indigenous communities work together to protect biodiversity and promote sustainable development across a vast region.

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- **Key Skills for Effective Collaboration**:
  - Clear and open communication is vital for successful collaboration. It involves active listening, expressing ideas clearly, and providing constructive feedback. Teams should establish regular communication channels and meetings to ensure everyone is on the same page.
  - Effective project management helps teams plan, execute, and monitor their projects. It involves setting clear objectives, defining roles and responsibilities, creating timelines, and using project management tools like Gantt charts or Trello boards to track progress.
  - Critical thinking involves analyzing problems objectively, evaluating different solutions, and making informed decisions. Problem-solving skills enable teams to overcome challenges and adapt to changing circumstances.

- **Video Resources**:"
  Cross-disciplinary collaborations mean better solutions "
  https://www.youtube.com/watch?v=UCySbuxZRcE

Discussion Prompts:

- How can different disciplines contribute to solving environmental issues?
- What are the key challenges in cross-disciplinary collaboration, and how can they be addressed?
- How can effective communication and project management enhance collaboration?

Task 1: Project Ideation and Planning (Duration: 90 minutes) Steps:

1. Divide students into teams, ensuring that each team includes members from different disciplines (e.g., science, technology, engineering, arts, mathematics).
2. Conduct a brainstorming session to generate project ideas that leverage the diverse skills and perspectives of the team members. Use mind maps or idea boards to visualize concepts.
3. Create a detailed project plan that outlines the objectives, methodology, timeline, and roles and responsibilities of each team member. Use project management tools to organize tasks and monitor progress.

Task 2: Project Development and Implementation (Duration: 120 minutes) Steps:

1. Use provided materials to research the environmental challenge and gather relevant data. Collaborate with team members to analyze the data and develop innovative solutions.
2. Use the knowledge and skills from different disciplines to develop prototypes or solutions. This may involve coding, building hardware, designing visuals, or conducting experiments.
3. Test the prototypes or solutions in a controlled environment or field setting. Collect data on performance and make necessary refinements to improve effectiveness

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	Task 3: Presentation and Feedback (Duration: 60 minutes) Steps: 1. Each team creates a presentation that showcases their project, including the problem addressed, interdisciplinary approach, development process, and results. Use visual aids such as slides, videos, or live demonstrations. 2. Present the projects to the class, highlighting the contributions of each discipline and the overall impact of the solution. 3. Engage in a Q&A session where peers and instructors provide feedback and ask questions. Discuss potential improvements based on the feedback received
Assessments	Effectiveness of cross-disciplinary collaboration and integration of knowledge. Quality and innovation of the developed solutions. Clarity and persuasiveness of the presentation. Ability to defend solutions during the Q&A session. Team collaboration and participation.
Key Competences	Cross-disciplinary collaboration and teamwork Research and problem-solving skills Project planning and management Effective communication and presentation skills Critical thinking and innovation
Connections with Eco STEAM	Eco: Developing sustainable solutions through interdisciplinary collaboration. Science: Applying scientific principles to environmental challenges. Technology: Utilizing and developing technological tools and applications. Engineering: Creating and refining prototypes to address real-world problems. Arts: Creatively presenting solutions and demonstrating their impact. Math: Analyzing data collected during testing and evaluating the effectiveness of solutions.
References	https://www.mdpi.com/2071-1050/12/4/1515 - Cross-Disciplinary Collaboration in Sustainability
Notes	This activity can be extended into a longer-term project, where students further develop and implement their solutions in real-world settings. Encourage students to engage with local environmental organizations or experts from different disciplines for real-world insights and support.

Evaluation Criteria Table for Collaborative Innovation for Sustainable Development

Evaluation Criteria	Points Available	Comments

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1. Effectiveness of Cross-Disciplinary Collaboration and Integration of Knowledge	20	Assess how well the team integrated knowledge and skills from different disciplines to develop the solution.

Evaluation Criteria	Points Available	Comments
2. Quality and Innovation of the Developed Solutions	20	Evaluate the quality, functionality, and innovation demonstrated in the developed solutions.
3. Clarity and Persuasiveness of the Presentation	20	Rate the clarity, persuasiveness, and engagement level of the presentation given by each team.
4. Ability to Defend Solutions During Q&A Session	20	Assess the quality and relevance of responses during the Q&A session and the ability to defend the solutions.
5. Team Collaboration and Participation	20	Evaluate the level of teamwork, communication, and participation among team members throughout the activity.

Total Points: 100

4.2.3. ACTIVITY PLAN: DETERMINATION THE PRESENCE OF STARCH IN POTATOES	
Introduction part (or activity overview)	Worldwide, the starch is the most common source of carbohydrates in the human diet and is found in large amounts in staple foods such as wheat, potatoes, maize, rice and cassava. Students will have to prove the presence of starch in potatoes, as a significant source of energy support for the organism. Starch is a plant polysaccharide, polymeric carbohydrate consisting of numerous glucose units joined by glycosidic bonds. This polysaccharide is produced by most green plants and is used as an energy storage, being found in the form of both amylose and the branched amylopectin. Students will research the structure and presence of starch in potatoes, whose structural component is carbohydrates, or rather polysaccharides, they will calculate the required daily amount for the body and connect it to a healthy diet.
Setting	Classroom and Laboratory
Materials Needed	Potatoes, distilled water Lugal's solution - potassium iodide, colander, mixer, cups, funnel, erlenmeyer, filter paper, a glass rod, test tube, pipettes, computer or phone, microscope.
Learning Outcomes	• Learn about the structure and characteristics of starch, carbohydrates, polysaccharides • Identify the presence of starch in potatoes through an experimental activity • Develop communication skills and discuss about healthy food • Collaborate with the group in research and demonstration • Calculate the required amount of carbohydrates daily

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Activity Contents	**Activity 1: Investigation of starch structure** **Theoretical Part (Duration: 35 minutes):** Introductory discussion. Discussion about polysaccharides and describing their characteristics. **Task (Duration: 35 minutes): Observing starch grains: molecules of amylose and amylopectin** Step 1: Work in groups One group will investigate the properties and structure of polysaccharides. Polysacharides are high molecular compounds whose molecules are built from a large number of monosaccharide units. Polysaccharides made of different monosacharides are called heteropolysacharides, and those made of the same monosacharides are called homopolysacharides. Polysaccharides or polycarbohydrates contain more than ten monosaccharide units, and often several hundreds or thousands of monosaccharide units. The linkage between monosaccharide units in polysaccharides occurs through O-glycosidic bonds. That is why they are called glycans. Polysaccharides are an important class of biological polymers. Their function in living organisms is usually either structure- or storage-related. Storage polysaccharides are starch, glycogen, galactogen and inulin. Structural polysaccharides are arabinoxylans, cellulose, chitin and pectins. Glycogen's properties allow it to be metabolized more quickly, which suits the active lives of moving animals. In bacteria, they play an important role in bacterial multicellularity. Step 2: The other group will investigate the properties and structure of starch grains associate it with a group of polysaccharides, using a microscope, in order to identify the structure of amylose and amylopectin. Starch grains contain at least two different types of molecules. These are amylose and amylopectin. Starch grains are insoluble in water and give a blue color to the amylose chain. Starch grains can have different shapes and sizes. In amylopectin, a large number of glucose molecules are interconnected so that its structure resembles a branch with many long and short branches. Amylopectin does not give a blue color with Lugal's solution because the branched molecules cannot be coiled into a helix. In amylose, a large number of glucose molecules, over 200, are interconnected in a long unbranched chain. In nature this chain is coiled in a spiral. Amylose consists of linear and unbranched chains of several thousand glucose units. These units are linked by a glycosidic bond between their first and fourth carbon atoms. Amylose in the human and animal organism is hydrolytically broken down under the action of the amylase enzyme. The disaccharide maltose is obtained. **Activity 2: Chemical Composition of the Starch** **Theoretical Part (Duration: 10 minutes):** Introductory discussion about the properties of pure starch. Pure starch is a white, tasteless and odorless powder that is insoluble in cold water or alcohol. In industry, starch is converted into sugars, for example by malting, and fermented to produce ethanol in the manufacture of beer and whisky. **Workflow: Isolate the starch from the corn (Duration: 45 minutes):** Chop the potatoes with distilled water and a mixer, let the glass stand for a while the starch

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grains did not settle, filtered them, put the starch in a test tube, add Lugol solution with a pipette and got a blue coloring.
Lugal solution - Lugal's iodine, also known as aqueous iodine and strong iodine solution, is a solution of potassium iodide with iodine in water. It is a medication and disinfectant used for a number of purposes.

Workflow: Determine the starch in potatoes using reagents **(Duration: 30 minutes):**

Add a solution of potassium iodide to the starch solution, a blue coloration is obtained. It is a characteristic reaction that proves the presence of starch. The blue color is due to the insertion of triiodide ions I^3 into the amylose chain. This reaction serves for the identification of starch, but also of iodine and finds application in analytical chemistry.

Video: https://www.youtube.com/watch?v=SgDeHXWm8Hk Duration: Approx. 1min 34sec.

Overview: This video shows how to test food for the presence of Starch. A blue/black colour would indicate that starch was present in the food (Iodine test for starch).

Task (Duration: 45 minutes): Testing the effect of temperature on amylase

Step 1: Six test tubes are required. Mark each of them with a number.

In three of them eg. 1,2 and 3 put 5 cm^3 of 1% starch solution and then add 6 drops of iodine solution to each of them. In the next three test tubes 4, 5 and 6 put the same amount of amylase (Appendix 4).

Step 2: Prepare three water baths (jars with the same amount of water).

Add ice to the first jar. In the second jar, the water should be at room temperature - about 20 degrees. The third jar should have hot water around 35 degrees.

Place test tubes 1 and 4 in the first jar, 2 and 5 in the second, and 3 and 6 in the third. Mix the test tubes that are in the same jar into each other

Step 3: Observe what is happening. Each test tube in each of the jars has a blue colored solution because starch turns blue in the presence of iodine. But gradually the blue color will start to disappear. Why? Amylase is an enzyme that breaks down starch and will break down the iodine-starch complex.
This process will take place the fastest in hot water, but if you were to place such a test tube in hot water, because amylase is an enzyme - protein composition, it will be destroyed at high temperature and will not work.

Task (Duration: 30 min): Energy and nutritional value of carbohydrate

Step 1: Students research the nutritional value of potatoes, working in groups: How much energy and nutrients does 100 g of potatoes contain?

Energy value 76 kcal / 319 kcal Carbohydrates 16 g
Protein 2 g Fats : 0,1 g Fiber 2 g

Step 2: Mathematical calculation the required daily amounts of carbohydrates in the body, working in groups:

To calculate the necessary intake of carbohydrates in the body is by using several different

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	methods, depending on goals, physical activity, health conditions and individual needs: Based on energy expenditure: One way to calculate the need for carbohydrates is based on energy expenditure. If there is physical activity, the body may require more carbohydrates to maintain energy levels. The recommended amount of carbohydrates for active people usually ranges between 45% and 65% of total energy intake. Individual Needs: Individual carbohydrate needs can vary depending on many factors, such as age, gender, weight, metabolism, health conditions and goals. Some people may have higher carbohydrate needs, especially if they are in a phase of growth, development or heavy physical training. Calorie intake: Carbohydrates contain 4 calories per gram. To calculate how many carbs you need, calculate daily calories and choose what percentage of those calories come from carbs. Example: If the daily caloric intake is 2000 calories. 50% of the calories come from carbohydrates, that would be 1000 calories. Therefore, to calculate how many grams of carbohydrates you need, divide the number of calories from carbohydrates by 4 (the number of calories per gram). Example: 1000 calories from carbs / 4 = 250 grams of carbs This is just one example of calculating the need for carbohydrates. It is always important to consult a health professional or dietitian to determine individual food intake. Step 3: Students summarize the role of carbohydrates as one of the three basic macronutrients, am important role in nutrition. They are the basic source of energy and many vital processes in the body function. However, in order to use them to your advantage as much as possible, you must make sure that you choose them correctly. The majority of carbohydrate-containing foods should be those that contain complex carbohydrates and at the same time are rich in fiber, i.e. products from whole grains, legumes and vegetables, reducing food with a high content of simple sugars. Carbohydrates should make up approximately 45-60% of our total daily energy intake. With an energy intake of 2000 kcal, this represents 225-300 g of carbohydrates. This amount is recommended by the European Food Safety Agency (EFSA). Potatoes are an excellent source of carbohydrates, potassium, fiber, and even vitamin C, with only 16 g carbohydrates/100 g on average
Assessments	The individual activities specified in the task sheet are evaluated with points.The evaluation and self-assessment of the group work are conducted by the students themselves.
Key Competences	Cognitive competence Creativity competence Communication competence Social, emotional and healthy living competences Digital competence
Connections with Eco STEAM	**Eco** – Realize that plant food is a source of nutritional ingredients, necessary for bio-chemical processes in cells, tissues and the body as a whole.

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	Science - Connects knowledge from chemistry and biology. Technology – Search with digital technologies. Engineering – Use a microscope as a modern model. Art - Draw the structure of amylose and amylopectin. Mathematics - Calculates the required daily amount of carbohydrates for the normal functioning of the body.
References	https://www.youtube.com/watch?v=SgDeHXWm8Hk https://www.sciencedirect.com/science/article/pii/S0168945222000474
Notes	Location: Chemistry cabinet in our school  Isolation of potato starch and filtration of the mixture  Poving the presence of starch in the potato mixture

Determination structure of starch granules

Structure of amylose **Structure of amylopectin**

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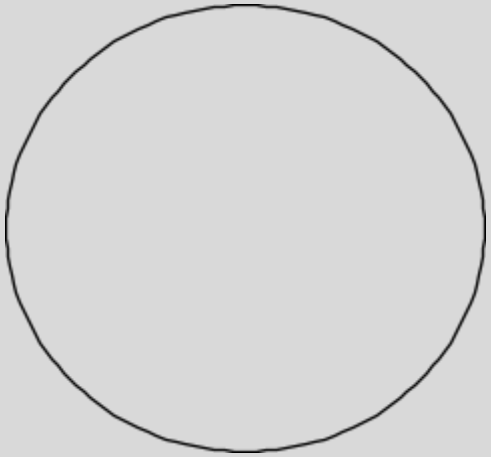

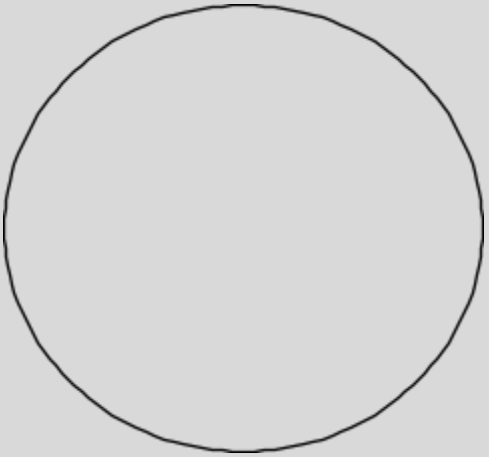

Evaluation (1 point for preparing the micro-preparation; 1 point for finding the microscopic image; 1 point for the drawing)

EVALUATION TABLE

Evaluated Activities	Points
Demonstration an experimental activity	_/5
Proper use of chemicals	_/4
Determination of starch in potatoe with the necessary reagents	_/3
Microscopy of starch granules	_/3
Mathematical calculation the required daily amounts of carbohydrates in the body	_/3

GROUP WORK SELF-ASSESSMENT

Self-Assessment Criteria	Points
Ability to use digital technologies for information search	_/5
Ability to work in a group (discuss, listen to different opinions)	_/5
Ability to generate ideas, suggest solutions	_/5

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4.3. SUBTOPIC. EFFECTIVE ENVIRONMENTAL COMMUNICATION AND ADVOCACY

4.3.1. ACTIVITY PLAN: SUSTAINABLE DEVELOPMENT GOALS	
Introduction part (or activity overview)	An activity aimed at familiarizing students with the Sustainable Development Goals set forth by the member states of the United Nations, which recognize that the eradication of poverty and other deprivations must proceed in conjunction with strategies that improve health and education, reduce inequality, and encourage economic growth – all while addressing climate change and striving to preserve our oceans and forests.
Setting	Classroom.
Materials Needed	Notebooks and pens Computer Internet
Learning Outcomes	• Will become acquainted with the Sustainable Development Goals and their importance for the welfare of society. • Students will gain an understanding of the Sustainable Development Goals and take actions to achieve a world with better welfare for all.
Activity Contents	**Activity1: Sustainable Development Goals.** **Theoretical Part (Duration: 45 minutes):** Students become acquainted with the Sustainable Development Goals (SDGs). **Videos:** Do you know all 17 SDGs? https://www.youtube.com/watch?v=0XTBYMfZyrM&t=54s Overview: The Sustainable Development Goals (SDGs) are a universal call to action to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity. Duration: Approx. 1.24 minutes Narrated by a teacher, students read online at (https://www.un.org/sustainabledevelopment/) Texts: 17 Goals to Transform Our World. https://www.un.org/sustainabledevelopment/ The Sustainable Development Goals are a call to action for all countries – poor, rich, and middle-income – to promote prosperity while protecting the planet. They recognise that eradicating poverty must go hand in hand with strategies that foster economic growth and address a range of social needs, including education, health, social protection, and job opportunities while tackling climate change and environmental protection issues. World leaders came together in 2015 and made a historic pledge to ensure the rights and well-being of every person on a healthy, prosperous planet when they adopted the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs). Text: https://www.un.org/sustainabledevelopment/sustainable-development-goals/

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	The Sustainable Development Goals represent a plan for a better and more sustainable future for all. They address the global challenges we face, including those related to poverty, inequality, climate change, environmental degradation, peace, and justice. All 17 goals are interconnected, and achieving them all by 2030 is crucial to ensure that no one is left behind. Text: Sustainable Development Goals. https://lt.wikipedia.org/wiki/Darnaus_vystymosi_tikslai The Sustainable Development Goals (SDGs) are a set of objectives related to future international development. The United Nations established them, promoting them as international objectives for sustainable development. This program replaced the Millennium Development Goals program, which concluded in 2015. The SDG program is set to run from 2015 to 2030, with 17 goals and 169 specific targets to achieve those goals. **Task (Duration: 90 minutes):** Step 1: Divide students into small groups, assigning each one a Sustainable Development Goal (see Annex 1 for goal assignments). Step 2: Each group works at computers, searches for information about the Sustainable Development Goals at the provided page, finds their assigned goal, reads the information provided, and prepares a short presentation about it. Step 3: Each group presents their goal to the entire class, explaining its essence and importance. Step 4: Students are encouraged to discuss how the Sustainable Development Goals can affect their local and global community, how they can be achieved, how they can contribute to the implementation of the SDGs, and how our daily activities can influence the Sustainable Development Goals. Step 5: After analyzing the Sustainable Development Goals in groups, present arguments on which goals can be easily achieved and which ones are difficult to implement and why (Annex 2. Task. Sustainable Development Goals in the local environment). Step 6: Present the activity conducted in step 5.
Assessments	Evaluation is conducted based on several criteria: ● Accuracy of information - the ability to prepare presentations on a Sustainable Development Goal and Sustainable Development Goals in the local environment, ● Teamwork and collaboration. ● The ability to argue in discussions. After the presentations, students perform a verbal reflection. Evaluation table (Annex 3).
Key Competences	Cognitive competence Creativity competence Communication competence Social, emotional and healthy living competences Citizenship competence Digital competence Cultural competence
Connections with Eco	**Eco –** understanding of ecosystem functions, sustainable use principles, and resource

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STEAM	management. Science – the importance of science in understanding natural processes and environmental challenges related to the Sustainable Development Goals. Technology – explores how technology can be used to achieve environmental objectives and sustainable development. Engineering – understanding how engineering can be applied to solve environmental and sustainability issues. Art – used to encourage sustainable development and change people's perspectives. Math – understanding how mathematics can be used to analyze data and formulate effective sustainable development plans
References	• https://sdgs.un.org/goals • https://www.un.org/sdgmediazone/ • https://www.un.org/sustainabledevelopment/ • https://lt.wikipedia.org/wiki/Darnaus_vystymosi_tikslai • Vadovėlis ,,Ekonomika ir verslumas" 11 klasei. I dalis. Daiva Strielkūnienė, Danutė Bareikienė, Inga Niuniavaitė
Notes	

Annex 1. Sustainable Development Goals

1 goal	No poverty
2 goal	Zero hunger
3 goal	Good health and well-being
4 goal	Quality education
5 goal	Gender equality
6 goal	Clean water and sanitation
7 goal	Affordable and clean energy
8 goal	Decent work and economic growth
9 goal	Industry, innovation and infrastructure
10 goal	Reduce inequalities
11 goal	Sustainable cities and communities
12 goal	Responsible consumption and production
13 goal	Climate action
14 goal	Life below water
15 goal	Life on land
16 goal	Peace, justice and strong institutions
17 goal	Partnerships for the goals

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Source:
https://am.lrv.lt/lt/veiklos-sritys-1/es-ir-tarptautinis-bendradarbiavimas/darnus-vystymasis/darnus-vystymasis-ir-lietuva/jt-darbotvarke-2030-darnaus-vystymosi-tikslai-ir-kiti- tarptautiniai-susitarimai
Annex 2. Task: Sustainable Development Goals in the Local Environment.

Sustainable Development Goals in the Local Environment.		
In groups, analyze the Sustainable Development Goals and present arguments on which sustainable development goals can be easily achieved and which are difficult to implement, and why:		
a)	In your school	
b)	In your town	

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c)	In the chosen company	
d)	In the country	
Which Sustainable Development Goal do you think is the most important, and why? Support your answer with three arguments.		

Annex 3. Evaluation Table

Evaluation Criteria	Points	Comments
Ability to prepare a presentation about a Sustainable Development Goal	/2	
Ability to prepare a presentation about Sustainable Development Goals in the local environment	/2	
Teamwork and collaboration	/2	
Ability to argue in discussions	/2	
Accuracy of information	/2	
Quality of presentations		

4.3.2. ACTIVITY PLAN: INTERDISCIPLINARY TEAMWORK FOR ECO-INNOVATION

Introduction part (or activity overview)	This activity focuses on fostering cross-disciplinary collaboration among students from different educational backgrounds to address complex environmental challenges. Through collaborative exercises, students will integrate knowledge from various disciplines to design innovative, sustainable solutions.
Setting	Location: Classroom and computer lab for research and presentations. Educational Context: Teams comprising students with diverse academic specialties (science, technology, engineering, arts, mathematics).
Materials Needed	Computers with internet access Access to research databases and digital libraries Projector and screen for video presentations and final pitches Whiteboards and markers for brainstorming sessions Materials for creating prototypes or models (optional)

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Learning Outcomes	• Develop an understanding of the value and methods of interdisciplinary approaches in solving environmental issues. • Enhance skills in integrating diverse knowledge bases to create cohesive and innovative solutions. • Improve communication and collaboration skills across different disciplines.
Activity Contents	Theoretical Part (Duration: 50 minutes): Begin with an exploration of the concept of cross-disciplinary collaboration and its critical role in addressing the multifaceted nature of environmental problems. • Introduction to Interdisciplinary Approaches: o Discuss the necessity of combining insights from science, technology, engineering, arts, and mathematics (STEAM) to innovate and solve environmental challenges effectively. o Explore case studies where interdisciplinary approaches have led to breakthroughs in environmental sustainability. • Video Resources: o "The Power of Interdisciplinary Collaboration" https://www.youtube.com/watch?v=qmhPIzsF1UE An overview of successful interdisciplinary projects and their impact on sustainability. o "Integrating Arts and Science for Environmental Innovation" https://www.youtube.com/watch?v=qw_PJZgI8RA Examples of how art and science collaborate to communicate and solve environmental issues. Task 1: Cross-disciplinary Team Challenge (Duration: 90 minutes) Objective: To design a solution for a local environmental issue using an interdisciplinary approach. • Step 1: Identify an environmental problem that affects the local community, such as waste management, water pollution, or energy conservation. • Step 2: Formulate teams ensuring a mix of students from different academic backgrounds. • Step 3: Each team brainstorms potential solutions, drawing on their diverse fields of study. • Step 4: Develop a preliminary project outline that incorporates scientific research, technological tools, engineering practices, artistic interpretations, and mathematical models. • Step 5: Teams create a visual representation of their solution, either through sketches, digital models, or small prototypes. Task 2: Interdisciplinary Solution Pitch (Duration: 60 minutes) Objective: To present the proposed solution to a panel of judges simulating a group of stakeholders. • Step 1: Refine the project outline into a comprehensive plan that details the execution, expected outcomes, and sustainability of the solution. • Step 2: Prepare a pitch presentation that effectively communicates the interdisciplinary nature of the solution and its benefits. • Step 3: Conduct a Q&A session where teams defend their solutions and respond to hypothetical challenges posed by the judges. Task 3: Reflective Discussion and Feedback (Duration: 30 minutes) Objective: To analyze the effectiveness of interdisciplinary collaboration and gather feedback. • Step 1: Groups discuss what they learned about the value and challenges of integrating different disciplines. • Step 2: Facilitate a feedback session where participants critique each other's approaches and suggest improvements. • Step 3: Conclude with a discussion on how these interdisciplinary strategies can be applied to future environmental challenges.

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Assessments	Innovation and creativity in solution development. Depth of integration of cross-disciplinary elements. Clarity and persuasiveness of the pitch. Team dynamics and collaborative effectiveness.
Key Competences	Interdisciplinary knowledge application Strategic thinking and problem-solving Effective communication and presentation skills Adaptability and teamwork.
Connections with Eco STEAM	Eco: Understanding the ecological impacts of building practices. Science: Application of scientific principles in energy efficiency and sustainable materials. Technology: Utilizing digital tools for research and presentation. Engineering: Analyzing the engineering challenges and solutions in green building. Arts: Creatively presenting information and arguments. Math: Using data to analyse the effectiveness of building codes.
References	https://www.sustainabledevelopment.org/
Notes	This activity could be part of a larger project or competition, encouraging ongoing development and implementation of the proposed solutions in the real world.

Evaluation Criteria Table for Interdisciplinary Teamwork for Eco-Innovation Activity

Evaluation Criteria	Points Available	Comments
1. Innovation and Creativity in Solution Development	15	Assess the originality and creativity of the proposed solution to the environmental issue.
2. Integration of Cross- disciplinary Elements	15	Evaluate how well the project incorporates knowledge and methods from different STEAM disciplines.
3. Scientific and Technical Accuracy	10	Rate the accuracy of scientific and technical content in the solution.
4. Feasibility and Practicality of the Solution	10	Judge the practicality and feasibility of implementing the proposed solution in the real world.
5. Quality and Completeness of Action Plan	10	Evaluate the thoroughness and clarity of the action plan, including goals, timelines, and resource allocation.
6. Communication and Presentation Skills	15	Rate the effectiveness of the team's communication and presentation, including clarity, persuasiveness, and use of visual aids.
7. Team Collaboration and Dynamics	10	Assess the level of teamwork, including communication, cooperation, and mutual support among team members.
8. Conflict Resolution and Problem-Solving	10	Evaluate the team's ability to resolve conflicts and solve problems during the project development process.
9. Reflection and Feedback Engagement	5	Rate the students' engagement in reflecting on their performance and providing constructive feedback.

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10. Application of Feedback	10	Assess how well the team incorporates feedback into improving their project and presentation.

Total Points: 100

4.3.3. ACTIVITY PLAN: JEWELTY AND ACCESSORIES FROM RECYCLEDE PAPER	
Introduction part (or activity overview)	This activity will help students develop responsible and sustainable attitudes towards the environment and creative work. By creating accessories and jewelry from recycled paper, students not only learn about sustainability but also deepen their creative and design skills. It's an excellent opportunity to promote understanding of sustainability in the community. Waste sorting is an important step in reducing environmental pollution and contributing to sustainability.
Setting	Classroom.
Materials Needed	Advertising brochures, newspapers, faded posters. Ribbons, threads, colored beads, clasps for bracelets or earrings. Scissors, rulers, pencils, paper-cutting knives, glue. Wooden or metal sticks.
Learning Outcomes	● Enhance understanding of how to reduce waste quantity and use recycled materials. ● Develop creativity and design skills, experiment with colors, shapes, and textures. ● Understand how to recycle paper and use it to create new products. ● Grasp the stages of the paper recycling process and their benefits to the environment. ● Strengthen sustainable consumption habits.
Activity Contents	**Activity1: Paper and Its Use in Accessory and Jewelry Making** **Theoretical Part (**Duration: 15 minutes): Step 1. Waste Sorting. A video is viewed, and students discuss in groups on these topics: ● How waste sorting can reduce the amount of waste, and why? ● How can one contribute to sustainability and efficient waste management? ● Recycling helps reduce energy consumption and environmental pollution. **Video:** https://www.youtube.com/watch?v=6fj2AzS4tls&ab_channel=Ger%C5%B3Naujien%C5%B3TV Duration: Approx. 1.41 minutes **Videos:** How recycled paper is sorted & baled | Paper & Cardboard recycling https://www.youtube.com/watch?v=AFWogncmqoQ&ab_channel=HOWit%27sMA

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	DE Duration: Approx. 4.21 minutes https://uratc.lt/kaip-teisingai-rusiuoti-atliekas-universalios-atlieku-rusiavimo-taisykles/ **Task (Duration: 90 minutes):** Create a piece of jewelry or an accessory using advertising brochures, newspapers, or colored posters. Step 1. Idea Search and Selection. Students search for ideas online, draw sketches, and choose their favorite idea. They select methods and tools to implement their ideas. Various jewelry and accessories made from paper (video ideas for teachers and students): **Video**: Triangle Scrapbook Paper Earrings Things to make awesome https://www.youtube.com/watch?v=JptkYn3KRZE&ab_channel=CraftMind%26Creativity Duration: Approx. 3.19 minutes **Video**: Easy paper beads like porcelain using simple materials https://www.youtube.com/watch?v=7HD3vo9r8yA&ab_channel=HappyBerryCrochet Duration: Approx. 25. 10 minutes Videos: How to make Realistic, Easy paper Roses | Paper flower DIY| Rose flower making.. https://www.youtube.com/watch?v=dIGHgIGXslM&ab_channel=AashuArt%26Craft Duration: Approx. 2.21 minutes Step 2. Creative Process. Based on the chosen idea, a piece of jewelry or accessory is created. The created accessory (jewelry) can be decorated, supplemented with necessary and desired details - clasp, chain, etc. Step 3. Finalizing the Product. The finished product is evaluated and self-evaluated, difficulties and gained experience are discussed. A photoshoot of the created accessory (jewelry) can be conducted.
Assessments	• Evaluation and Self-Evaluation Criteria (APPENDIX 1) • The created accessory (jewelry) is evaluated with points. For evaluation, a table can be used (APPENDIX 1).
Key Competences	• Creativity competence • Digital competence • Cognitive competence • Communication competence • Cultural competence
Connections with Eco STEAM	Eco - Jewelry and accessories are created from sorted and recycled materials. Science - The creation process can encourage interdisciplinary learning (biology, physics, or chemistry). Technology- Exploring new recycling methods, waste reduction, or the use of energy-saving technologies.

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	Engineering - Emphasizing the importance of a sustainable lifestyle by broadly applying material recycling in everyday life. Arts - Creating jewelry or accessories fosters creativity and self-expression, develops aesthetic taste. Math- Engineering, technological, mathematical calculations.
References	https://lt.wikipedia.org/wiki/Atliek%C5%B3_tvarkymas https://shidokan.lt/atlieku-rusiavimo-taisykles/
Notes	https://lightningstruckitself.blogspot.com/2010/04/furniture-gifts-made-of-recycled.html  https://get-green-now.com/diy-christmas-gifts/  https://www.pinterest.com/pin/273875221063967261/ 

APPENDIX 1

Evaluation and Self-Evaluation Table

Assessment Criteria	Points	Comments
Innovation and Creativity	_/5	

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Material Use and Sustainability	_/5	
Aesthetics and Visual Appeal	_/5	
Technical Implementation	_/5	
Presentation	_/5	

4.3.4. ACTIVITY PLAN: CREATING A COMEDY ABOUT SUSTAINABLE LIVING	
Introduction part (or activity overview)	The ideas can be adapted to various film genres (comedy, documentary, historical, promotional, etc.) and are intended for different audiences, encouraging people to engage in environmental movements and promoting sustainable behavior in their close surroundings. The films depict a sustainable lifestyle and attempts to live sustainably. They show various humorous situations that ordinary people encounter while trying to reduce their ecological footprint.
Setting	Classroom, outdoor environment, individually chosen room for presenting the created film.
Materials Needed	Computers, phones, drone. Software for video editing (Canva, Movie Maker, Davinci Video Editor, etc.)
Learning Outcomes	Help change viewers' attitudes and behaviors by encouraging them to become active participants in the sustainable living movement and contribute to environmental protection in the city (main goal). This can be shown through the main characters' attempts to engage in sustainable living and their creative solutions. Show the importance of using humor to highlight the issue. Increase civic engagement, as the films will encourage active participation in community actions, promoting sustainable living and nature conservation. Deepen the understanding of sustainable living solutions. Encourage students and viewers to creatively seek solutions to sustainable living issues, promoting innovations in city planning, construction, transportation, and other areas. Find ways to change their behavior and lifestyle in the city, encouraging them to reduce waste, use sustainable transportation, produce food, etc. Raise awareness about the importance of sustainability. The main task of the film would be to emphasize the challenges of sustainable living and show various ways to cope with them. All of this can help create not only entertaining but also meaningful films that promote sustainable living in the city.
Activity Contents	**Theoretical part (30 min.)**

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You can organize a discussion.

- What is a film?

A film can be defined as an audiovisual creation that presents a plot or story using moving images and sound. It can be a feature film, short film, documentary, animation, or even a commercial film.

- What are film genres?

Film genres are diverse and can be classified based on different criteria such as plot structure, atmosphere, theme, or target audience. Here are some popular film genres:

- Action film
- Comedy
- Drama
- Thriller
- Horror
- Fantasy
- Science fiction
- Romance
- Documentary
- Animation, etc.

- What is called a short film?

A short film is a video work that typically lasts from a few minutes to about 30 minutes. This is a relatively short time span compared to a full-length feature film, which can last for hours. Short films are often created to tell a brief but profound story, present a specific idea or theme, or simply express an author's opinion. They can be creative, shocking, comedic, tragicomic, or even documentary-style.

Creating short films is often challenging because it requires expressing a powerful idea and being able to intensify emotions and engage the audience, all within a limited time frame. However, this challenge also allows creators to be creative and innovative in their work.

Short films viewing

THE DEAL - Short Comedy
https://www.youtube.com/watch?v=Tg7jAnS78JA&ab_channel=Mumbo
Duration: Approx. 8.13 minutes

One-Minute Time Machine - The Short Film that (probably) helped Rick & Morty win an Emmy https://www.youtube.com/watch?v=CXhnPLMIET0&ab_channel=DevonAvery
Duration: Approx. 5.40 minutes

Activity 1 Script Creation and Writing (105 min.) Theoretical part (15 min.)

Discuss the main steps of scriptwriting:

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1. Choosing a Theme or Idea

- What will be the main theme or idea you want to explore in your film? This can be a specific story, event, character, or emotion you want to convey. You can use the "Brainstorming" method.

2. Plot

- Discuss the main plotline and storyline – what will happen in the film from beginning to end.

3. Main Parts of the Plot

- Introduction: Introduce the audience to the main characters, setting, and the central conflict.
- Development: Deepen the conflict, show the characters' actions and relationships.
- Conclusion: Resolve the conflict, show the characters' transformations, and draw conclusions.

By communicating and collaborating, you can find ideas and perspectives that can enrich the film's plot and quality**.**

Practical Activity (90 min.)

Students collaborate in groups to create a plot for a film about sustainable living and attempts to live sustainably.

- The main storyline of the film can be about characters trying to adopt a sustainable lifestyle in the city and the comical situations that arise from their efforts.
- Students work in groups and can distribute roles (e.g., scriptwriter, actors, cameraman, director, editor, etc.).

At the end of the practical activity, discuss the film's plot, characters, and their behavior within the groups.

- How did the process of creating a well-structured narrative go?
- Analyze whether the film script showed how the characters changed throughout the film
- Try to answer the question of whether the film's plot has a main line and if the idea is properly and clearly conveyed.

Activity 2 Filming and Editing (280 min.) Theoretical part (20 min.)

Discuss with the students:

1. Filming Planning

- Create and discuss a filming plan based on the script, specifying what will be filmed, where, and when it will happen.

2. Shot Planning

- Visualize how each shot should look and discuss camera positions, movements, and angles to achieve the desired effect.

3. Selecting Filming Locations

- Determine if the selected filming locations are appropriate and match the script to create

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the desired atmosphere.

4. Preparing Costumes and Decorations

- This can involve simple everyday clothing choices or even comical costumes that emphasize the comedy element.

5. Editing Software

- Discuss recommended professional programs for film editing. These can include Adobe Premiere Pro, Sony Vegas Pro, DaVinci Resolve (a powerful and free video editing tool), Movie Maker (also known as Windows Movie Maker), Canva, etc.

Practical Activity (260 min.)

- Filming (130 min.)
- Students film the scenes according to the planned shots, locations, and costumes. Each group member performs their assigned roles, such as acting, directing, operating the camera, or managing sound and lighting.
- Editing (130 min.)
- Students edit the filmed footage using the discussed software. They select the best shots, arrange them according to the script, and add music, sounds, and special effects to enhance the comedy

elements.

Practical Activity (130 min.)

Group Work

- Filming Scenes (130 min.)
- Based on the created script, film the scenes.
- Students can use phones, cameras, or drones for filming.
- Students determine when and where the scenes will be filmed and plan what decorations will be needed.

Practical Activity (130 min.)

- Editing the Film (130 min.)
  - Edit the footage to create a film about sustainable living or attempts to live sustainably.
  - Students choose their preferred software (Adobe Premiere Pro, Sony Vegas Pro, DaVinci Resolve, Movie Maker, Canva) and edit the filmed material into short films.

Film Presentation (120 min.)

Theory (20 min.)

Discuss the film presentation and plan:

1. Film Presentation Event
   - Date, location, film screening, discussion, reflection, conclusions.
2. Promotional Material
   - Posters, flyers, etc. Discuss the composition of the poster or flyer, the font to be used, etc.

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	Introduce the templates available in Canva for posters and flyers. **Practical Activity (100 min.)** 1. Create the Film Presentation Script in Groups - Plan the entire presentation event, including the sequence of activities. 2. Develop Questions for Reflection and Self-Evaluation - Think of questions to guide the audience's reflection and self-evaluation. 3. Create a Poster Mockup Using the Free Canva Program - Design a promotional poster for the film presentation event using Canva
Assessments	Evaluation and Self-Evaluation Criteria (Table No. 1) (You can use the film presentation plan table No. 2)
Key Competences	Creativity competence Digital competence Digital competence Communication competence Citizenship competence Cultural competence
Connections with Eco STEAM	Eco - Encouraged to participate in environmental actions and gain more knowledge about sustainability. Science - During the creation process, there is interdisciplinary communication and collaboration (biology, chemistry, literature, IT, media, theater). Technology - Searching for new recycling methods, waste reduction, or the use of energy-saving technologies. Engineering – The importance of a sustainable lifestyle, broadly utilizing material recycling in daily life. Art - Creating a film fosters creativity and self-expression, develops aesthetic taste, and demonstrates how ideas can be conveyed in various forms. Math - Engineering, technological, and mathematical calculations.
References	THE DEAL - Short Comedy https://www.youtube.com/watch?v=Tg7jAnS78JA&ab_channel=Mumbo Duration: Approx. 8.13 minutes One-Minute Time Machine - The Short Film that (probably) helped Rick & Morty win an Emmy https://www.youtube.com/watch?v=CXhnPLMIET0&ab_channel=DevonAvery Duration: Approx. 5.40 minutes **Activity Detailed Explanation Idea Generation** Initially, gather as many ideas as possible related to sustainable living in the city and consider how they can be turned into humorous situational scripts. These can be comical interpretations of daily habits, city infrastructure, or interactions between residents. **Script Creation and Writing**

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- **Creating Humorous Situations:** Creatively come up with comical situations and develop them to match the characters' traits and the film's theme. These could be absurd events, unexpected remarks, or situations that reveal the challenges of sustainable living in the city.
- **Developing the Story Structure:** Establish the main storyline and interruptions that should be humorously expanded throughout the film. The film's main plotline can revolve around the characters' attempts to adopt a sustainable lifestyle in the city and the humorous situations arising from their efforts.
- Along with writing humorous situations and dialogues, it's important to create a coherent and well- structured narrative. This might mean adjusting the script, removing unnecessary scenes or characters, and making the dialogues as natural as possible.

Filming

- **Planning the Filming:** Review the script and determine the necessary shot types and locations. Create a filming plan indicating what will be filmed, where, and when it will happen.
- **Preparing Filming Equipment:** Choose appropriate filming equipment based on the needs and available resources. This could be a professional camera, a set of cameras for mobile filming, or even a compact drone camera.
- **Planning Shots:** Shots are a crucial aspect of filming. Imagine how each shot should look and plan the camera positions, movements, and angles to achieve the desired effect.
- **Preparing Costumes and Decorations:** If needed, ensure appropriate costumes and decorations that match the characters and the film's theme. This could be simple everyday clothing choices or even comical costumes that emphasize the comedy element.
- **Directing and Leading the Actors:** During filming, the director plays a very important role. They must clearly articulate their vision, lead the actors and crew, and ensure that all participants understand what needs to be done in each shot.
- Filming often requires teamwork, including camera operators, sound technicians, lighting specialists, and others. It's essential to ensure everyone understands their role and works together to achieve the common goals.
- Filming can be a creative and fun process, so enjoy it and don't be afraid to experiment!
- The most important thing is to have a clear plan and collaborate with the team to achieve the desired result.
- Remember to film multiple takes, and experiment with different angles and perspectives to have enough material for editing.

Editing the Film

Once filming is complete, the editing process begins. Review the footage, select the best shots, and align them according to the script. Add music, sounds, and special effects to enhance the comedy elements.

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	Software for Film Editing You can use various professional programs for film editing that offer extensive features and tools necessary for quality editing. **- Adobe Premiere Pro** **- Sony Vegas Pro** - **DaVinci Resolve** is a powerful and free video editing tool. - **Movie Maker (**also known as Windows Movie Maker) is a basic editing program included with the Windows operating system. It is a simple and easy-to-use program for beginners who want to start with video editing. - **Canva** can be useful for creating video content such as animated graphics, title slides, presentation slides, or social media posts. However, for creating a full-length film or editing video footage, Canva may be limited.
Notes	

Evaluation and Self-Evaluation Table No. 1

Evaluation Criteria	Points	Comments
Innovation and Creativity	_/5	
Aesthetics and Visual Appeal	_/5	
Technical Implementation	_/5	
Communication and Collaboration	_/5	
Presentation	_/5	

Film Presentation Plan Table No. 2

Activity Name	Activity Description	Notes
1. Choosing Location and Time	Selection of the film screening location, date, and time.	
2. Creating Presentation Plan	Decide what will be included in the film presentation, including presentation content, film screening, Q&A session with creators, or audience discussion.	
3. Advertising	Promotional materials (posters, social media ads, emails, etc.) to attract the audience to the film	

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	presentation.	
4. Film Screening	Ensure the film is prepared for screening in the appropriate format and quality. The technical equipment should be properly configured to ensure a smooth screening.	
5. Film Presentation	Present the story of the film creation, main characters, themes, and key moments to the audience.	
6. Questions and Answers	Prepare to answer audience questions about the film creation process, theme, characters, etc.	
7. Self-Evaluation	Encourage the audience to share their impressions, questions, and comments about the film. This will provide valuable feedback and strengthen the connection with the audience.	
8. Responding to Feedback	After the presentation, pay attention to the received feedback. Respond to questions, and comments, and thank the audience for their participation.	

4.4. SUBTOPIC. COMMUNITY ENGAGEMENT AND PARTNERSHIPS

4.4.1. ACTIVITY PLAN: STUDENTS AS INITIATORS OF AFFORESTATION OF THE ENVIRONMENT	
Introduction part (or activity overview)	The purpose of this activity is for the students to launch an initiative for afforestation of the environment in which they live and realize it with the help of the local community. The students will receive information from the local community about which places in the environment need afforestation and applying their knowledge and skills in mathematics and science, they will decide which trees are most suitable for planting, in what quantity and at what distance. Based on the student project, the local community will provide the necessary seedlings and tools and the transportation of the students to the necessary places. These activities will help students see the importance of trees in the ecosystem, develop critical thinking, make independent decisions and feel useful to society through their work.
Setting	Classroom
Materials Needed	Computers , video presentation equipment, paper, markers, tree saplings, shovels, trowels, and gardening gloves, watering cans or access to water, measuring tapes or rulers, notebooks and pencils.
Learning Outcomes	• Understanding the importance of trees in the ecosystem.

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	• Learning the process and techniques of planting and caring for trees. • Applying STEAM concepts to design a tree planting project. • Creating artistic representations related to trees and the environment. • Defining afforestation and deforestation. • Application of mathematical reasoning in afforestation planning. • Developinga critical opinion, independent decision-making and developing a sense of responsibility towards society.
Activity Contents	ACTIVITY 1 (50 min): Afforestation vs Deforestation Theoretical part 1 (10min) Through questions the teacher initiates the students' prior knowledge of the importance of trees in the ecosystem and leads the students to highlight and explain the role of trees in maintaining a healthy environment such as: oxygen production, carbon sequestration, improving air quality, preventing soil erosion, regulating the water cycle, support of biological diversity, economic benefits, aesthetic and psychological benefits, noise reduction, etc. The teacher writes down the key words on a flip chart. Then students watch a video about how the extreme values of functions can be calculated using derivatives. Video: “Why planting trees is important?” https://www.youtube.com/watch?v=c3GerbZMRWA (duration: 3 min) Overview: An educational video designet to explain 7 reasons to protect forests and grow many more. Theoretical part 2 (10min) • The teacher explains to the students that afforestation is planting trees where forests never existed before. There are many benefits to this, such as creating jobs, increasing biodiversity and sequestering carbon dioxide from the atmosphere. There are three main mechanisms to do this - such as natural regeneration, silviculture and agroforestry. Students watch an educational video about reforestation: Video: “What is afforestation?” https://www.youtube.com/watch?v=amtXcNe_Scc (duration: 3 min 15sec) • The teacher then explains that, in contrast to afforestation, deforestation is the clearing of large areas of trees by cutting down trees. Our planet's forests are some of the most valuable resources we have. They provide us with clean air, a source of food, building material and much more. More importantly, forests are the main line of defense against climate change, but despite this, forests are being systematically eliminated around the world - a process we know as deforestation. Students will see more about deforestation and how to limit the negative effects of cutting down trees in the following educational video. Video: “What is deforestation?” https://www.youtube.com/watch?v=vJnnrpSDWPI (duration: 2 min 50sec) Task 1 (30 min) The teacher divides the students into groups of 4-5 students. Each group receives Venn Diagram Worksheet Compare and Contrast Afforestation and Deforestation (Appendix 1). The

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groups should research, discuss and complete the diagrams together. Finally, each group presents its findings to the class.

ACTIVITY 2 (80 min): Planning the tree planting project
Theoretical part 1 (10min)

- The importance of trees cannot be overstated. Trees help clean the air we breathe, filter the water we drink, ensure a healthy environment and provide habitat for over 80% of the world's terrestrial biodiversity. Despite this, we are witnessing constant destruction of forests by humans or by natural disasters. But all is not lost, there is a way to reduce deforestation by implementing sensible approaches to energy, land use and agriculture. Beyond that, reforestation is vital to counteract the deforestation that has occurred historically. Only by planting native trees can we restore our damaged landscapes to lush and healthy forests.

Planting trees is not a simple process and requires good preparation and skill. Before planting trees, it's important to be well prepared and know a few key factors to ensure the trees grow healthy and thrive. One should first select a suitable area, then know the climatic conditions in the afforestation area, the type of soil and the appropriate type of wood. Planting the wrong trees in the wrong place can do more harm than good. The following video highlights the importance of choosing the right location and type of tree for afforestation.

Video: **“When tree planting goes wrong”**

https://www.youtube.com/watch?v=m3wXop8GKoc

(duration: 3min 37 sec) *Task 1 (20 min)*

Students are tasked with researching their surroundings to choose the most suitable site for afforestation (they should take into account distance from the city, accessibility to the site, soil type, water accessibility, etc.) and the type of trees. They can use Google Maps or other mapping tools to identify suitable locations. Students work individually and then as a class choose one site to plant trees.

Task 2 (40min)

After choosing the location and the type of trees, the students are divided into 4 groups and each group receives a task:

1. The first group calculates the area they want to reforest (they use mapping applications), the number of seedlings and the distance between them.
2. The second group calculates the distance and cost of transporting seedlings and equipment from the city to the afforestation site and the cost of transporting the people who will work on the afforestation.
3. The third group aims to check local regulations and contact (e-mail) the local community and local environmental societies to ask for cooperation. In the letter of support he should present the idea of

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	afforestation, the chosen location and ask the community to provide seedlings, necessary tools and machinery, transport and support of professionals. 4. The fourth group is tasked with designing what the forested area will look like after the trees have grown and through creative artwork to represent the importance of trees and the environment. This can be drawing, painting or digital art. They can also create posters, videos or social media campaigns to promote afforestation. At the end, each group should present their work to the class and jointly evaluate and approve the work or correct it if necessary. With this, they complete their reforestation project plan and are ready to present it to the experts from the local community and the local environmental societies they will contact. *Theoretical part 2 (5min)* In order to be ready to implement their afforestation project, the students watch a videO on how to plant a tree: Video: **"How to plant a tree?"** https://www.youtube.com/watch?v=0VVeeWT3AAc (duration: 2min 11 sec) *Discussion and reflection (5 min.)* ● Students review the definition of afforestation and deforestation. ● The importance of trees in the ecosystem is emphasized. ● Students highlight the importance of choosing a suitable location for afforestation and the type of tree. ● Students highlight the steps in project planning and cooperation with the local community.
Assessments	Verbal feedback during class; Conversation with/among students; Monitoring of students during group work; Evaluation of the thoroughness and accuracy of individual work; Each student self-assesses his contribution to the work.
Key Competences	● Cognitive competence ● Creativity competence ● Communication competence ● Social, emotional and healthy living competences ● Digital competence
Connections with Eco STEAM	**Eco** - Exploring the need for afforestation encourages students to engage with their environment, understand the interconnectedness of ecosystems, and apply interdisciplinary skills to real-world problems. Science - Students will research local tree species and their benefits, soil types in their

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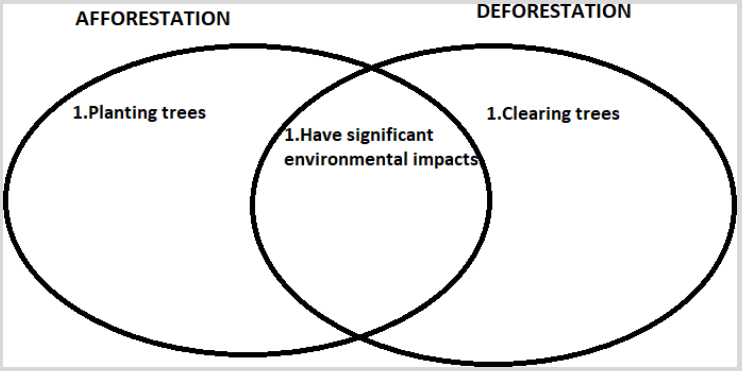
	environment, and climate conditions. Technology - Students will use GPS and mapping software to plan planting sites. Engineering - Students will design tools or methods for efficient tree planting and irrigation. Art - Students will use their artistic abilities in creating and designing afforestation projects, creating posters, videos or social media campaigns to promote afforestation. Math - Students will calculate the area of a site for afforestation, the number of trees needed, transportation costs, etc.
References	• Websites about afforestation and tree planting techniques (e.g. One Tree Planted) • Local forestry or environmental organizations • videos with a link given above in the text
Notes	• Students can monitor the growth of planted trees over time and keep a growth log. • Encourage students to explore careers related to forestry, environmental science and ecology. • Organize a community event with the department to promote tree planting and environmental awareness. • Through these activities, students develop problem-solving skills and critical thinking abilities.

APPENDIX 1 . STUDENT'S GROUP WORKSHEET

In the given Venn diagram, one example is given for each of the characteristics of afforestation, deforestation and common, you should go ahead and add at least 5 more characteristics for each section. Explore, discuss and complete the diagrams together. You can use the internet for research.



After completing the diagram, choose one representative to present the work to the class

Assessment Table for individual work:

Assessment Criteria	Points	Comments

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Understanding afforestation and deforestation	_/5	
Participating in discussions and activities	_/5	
Digital skills at work with mapping tools and GPS	_/5	
Ability to listen and evaluate the work of classmates	/5	
Accuracy in mathematical calculations	__/5	
Solving a problem and making a conclusion	/5	

Assessment Table for group work:

Assessment Criteria	Points	Comments
Understanding the objectives of the project and the concept of afforestation	_/5	
Completing worksheets on time	_/5	
Skills of presenting the work	_/5	
Ecological Interpretations and Insights	_/5	
Teamwork and Collaboration	_/5	
Skill and creativity in project design	_/5	

4.4.2. ACTIVITY PLAN: USING TECHNOLOGY FOR ENVIRONMENTAL SOLUTIONS	
Introduction part (or activity overview)	This activity involves students combining technical skills with environmental awareness to develop sustainable solutions to environmental challenges. The focus is on leveraging technical knowledge in science, technology, engineering, and mathematics (STEM) to create innovative solutions that promote environmental sustainability.
Setting	Location: Classroom for planning and discussion, online resources for research, and lab or field environment for implementation. Educational Context: Collaborative group work.

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Materials Needed	Research materials (books, articles, internet access) Project planning tools (whiteboard, markers, project management software) Prototyping materials (craft supplies, recycled materials, basic tools) Presentation tools (e.g., PowerPoint, poster boards) Communication tools (video conferencing software, messaging apps)
Learning Outcomes	• Develop skills in integrating technical knowledge with environmental awareness. • Enhance understanding of the role of technical skills in addressing environmental issues. • Improve abilities in project planning, implementation, and presentation
Activity Contents	**Theoretical Part (Duration: 60 minutes)**: Provide a detailed introduction to the importance of integrating technical skills with environmental awareness to develop sustainable solutions. • **Introduction to Technical Skills and Environmental Awareness**: Combining technical skills with environmental awareness is essential for developing effective and sustainable solutions to environmental challenges. Technical skills in areas such as engineering, computer science, and data analysis can be applied to design and implement solutions that address issues like pollution, resource depletion, and climate change. Consider the development of a smart irrigation system. Engineers, computer scientists, and environmental scientists must work together to design a system that uses sensors and data analytics to optimize water usage, reducing waste and promoting sustainable agriculture. • **Case Studies of Successful Integration Projects**: ▪ Smart irrigation systems use sensors, data analytics, and automated controls to optimize water usage in agriculture. These systems help reduce water waste, improve crop yields, and promote sustainable farming practices. For example, the use of soil moisture sensors and weather data to schedule irrigation can significantly reduce water consumption while maintaining healthy crops. ▪ Monitoring systems for renewable energy sources, such as solar panels and wind turbines, use sensors and data analytics to track performance and identify maintenance needs. These systems help ensure optimal energy production and reduce downtime, contributing to the efficiency and reliability of renewable energy projects. ▪ Technologies such as air quality sensors and water quality monitoring systems can detect and measure pollutants in the environment. These systems provide real-time data that can be used to identify pollution

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sources, assess the effectiveness of pollution control measures, and inform policy decisions.

- **Key Skills for Integrating Technical Skills and Environmental Awareness**:
  - Proficiency in technical fields such as engineering, computer science, and data analysis is crucial for developing and implementing solutions. Students should be familiar with tools and techniques relevant to their projects, such as programming languages, sensor technology, and data visualization software.
  - Understanding environmental principles and issues is essential for identifying relevant challenges and designing effective solutions. Students should be aware of topics such as ecosystems, resource management, and environmental impact assessment.
  - Effective project management helps teams plan, execute, and monitor their projects. It involves setting clear objectives, defining roles and responsibilities, creating timelines, and using project management tools to track progress
  - Effectiveness of integrating technical skills and environmental awareness.
  - q1uality and innovation of the developed solutions.
  - Clarity and persuasiveness of the presentation.
  - Clear and open communication is vital for successful collaboration. It involves active listening, expressing ideas clearly, and providing constructive feedback. Teams should establish regular communication channels and meetings to ensure everyone is on the same page.

Video Resources:

"Integrating Technology for Environmental Solutions"
https://www.youtube.com/watch?v=_fU9vvQmXfs

Discussion Prompts:

How can technical skills be applied to solve environmental issues?

What are the key challenges in integrating technical skills with environmental awareness, and how can they be addressed?

How can effective communication and project management enhance collaboration in technical projects?

Task 1: Project Ideation and Planning (Duration: 90 minutes) Steps:

Divide students into teams, ensuring that each team includes members with technical skills (e.g., engineering, computer science, data analysis) and environmental science knowledge.

Conduct a brainstorming session to generate project ideas that leverage the technical skills and environmental awareness of the team members. Use mind maps or idea boards to visualize concepts.

Create a detailed project plan that outlines the objectives, methodology, timeline, and roles and responsibilities of each team member. Use project management tools to organize tasks

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	and monitor progress. Task 2: Project Development and Implementation (Duration: 120 minutes) Steps: Use provided materials to research the environmental challenge and gather relevant data. Collaborate with team members to analyze the data and develop innovative solutions. Use the technical skills and environmental knowledge from different disciplines to develop prototypes or solutions. This may involve coding, building hardware, designing visuals, or conducting experiments. Test the prototypes or solutions in a controlled environment or field setting. Collect data on performance and make necessary refinements to improve effectiveness. Task 3: Presentation and Feedback (Duration: 60 minutes) Steps: Each team creates a presentation that showcases their project, including the problem addressed, interdisciplinary approach, development process, and results. Use visual aids such as slides, videos, or live demonstrations. Present the projects to the class, highlighting the contributions of each discipline and the overall impact of the solution. Engage in a Q&A session where peers and instructors provide feedback and ask questions. Discuss potential improvements based on the feedback received.
Assessments - Key Competences	Ability to defend solutions during the Q&A session. Team collaboration and participation. Integration of technical skills and environmental knowledge Research and problem-solving skills Project planning and management Effective communication and presentation skills Critical thinking and innovation
Connections with Eco STEAM	Eco: Developing sustainable solutions through the integration of technical skills and environmental awareness. Science: Applying scientific principles to environmental challenges. Technology: Utilizing and developing technological tools and applications. Engineering: Creating and refining prototypes to address real-world problems. Arts: Creatively presenting solutions and demonstrating their impact. Math: Analyzing data collected during testing and evaluating the effectiveness of solutions.
References	https://nap.nationalacademies.org/read/2129/chapter/13
Notes	This activity can be extended into a longer-term project, where students further develop and implement their solutions in real-world settings. Encourage students to engage with local environmental organizations or experts from different disciplines for real-world insights and support.

Evaluation Criteria Table for Using Technology for Environmental Solutions

Evaluation Criteria	Points Available	Comments

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1. Effectiveness of Integrating Technical Skills and Environmental Awareness	20	Assess how well the team integrated technical skills and environmental knowledge to develop the solution.
2. Quality and Innovation of the Developed Solutions	20	Evaluate the quality, functionality, and innovation demonstrated in the developed solutions.
3. Clarity and Persuasiveness of the Presentation	20	Rate the clarity, persuasiveness, and engagement level of the presentation given by each team.
4. Ability to Defend Solutions During Q&A Session	20	Assess the quality and relevance of responses during the Q&A session and the ability to defend the solutions.
5. Team Collaboration and Participation	20	Evaluate the level of teamwork, communication, and participation among team members throughout the activity.

Total Points: 100

4.4.3. ACTIVITY PLAN: RESEARCH THE TECHNICAL COMPONENTS OF A CAR

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 environments, where individually with parents or other close people, they inspect the car and prepare slides.
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.
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

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	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 Overview: This video shows six ways to reduce air pollution. Duration: 1.18 min.

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	https://www.youtube.com/watch?v=PG7NI-bAt-8 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.

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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.

Research Work Evaluation Table:

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.

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Additional Questions	_/2	An additional question is provided by the teacher or students.

Classmates' Presentations Evaluation Table

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

4.4.4. ACTIVITY PLAN: BRIDGING TECHNOLOGY AND ENVIRONMENTAL STEWARDSHIP	
Introduction part (or activity overview)	This activity aims to integrate technical skills with environmental awareness, enabling students to develop and implement technologically-driven solutions to environmental challenges. Through practical exercises, students will learn to apply technical knowledge to promote sustainability and environmental conservation.
Setting	Location: Classroom, computer lab, and potentially an outdoor environment for hands-on projects. Educational Context: Collaborative group work (4-5 students per group).
Materials Needed	Computers with internet access and relevant software (e.g., GIS, environmental modeling tools) Sensors and data collection devices (e.g., air quality monitors, water testing kits) Projector for presentations Materials for building prototypes or models (optional)
Learning Outcomes	● Understand the importance of integrating technical skills with environmental awareness. ● Develop practical skills in using technology to monitor and address environmental issues. ● Enhance abilities in project planning, execution, and communication
Activity Contents	**Theoretical Part (Duration: 50 minutes)**: Begin with a detailed discussion on how technical skills can be leveraged to enhance environmental stewardship. Highlight various technologies that have been successfully used to address environmental challenges. ● **Introduction to Environmental Technologies**: o Discuss technologies such as Geographic Information Systems (GIS), Internet of Things (IoT) for environmental monitoring, renewable energy systems, and environmental modeling software. o Explore case studies where technology has played a pivotal role in solving

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	environmental problems. • **Video Resources**: o "Tech for Good: Environmental Monitoring with IoT" Watch Here – A video showcasing how IoT devices are used to monitor and mitigate environmental issues. o "GIS in Environmental Management" Watch Here – An introduction to the use of GIS technology in tracking and managing environmental resources. **Task 1: Environmental Monitoring Project (Duration: 90 minutes) Objective**: To apply technical skills in monitoring a local environmental parameter (e.g., air quality, water quality, soil health). • **Step 1**: Select an environmental parameter to monitor based on local relevance and available resources. • **Step 2**: Use sensors and data collection devices to gather real-time data over a set period. • **Step 3**: Analyze the collected data using relevant software tools to identify patterns, anomalies, and potential areas of concern. • **Step 4**: Create a report detailing the findings and suggesting possible interventions based on the data. **Task 2: Developing a Tech-Driven Environmental Solution (Duration: 90 minutes) Objective**: To design and propose a technologically-driven solution to an identified environmental issue. • **Step 1**: Based on the findings from Task 1, identify a specific environmental challenge that can be addressed using technology. • **Step 2**: Develop a detailed project plan that includes: o Problem definition and objective o Technological approach and tools required o Implementation steps and timeline o Expected outcomes and sustainability considerations o **Step 3**: Build a prototype or create a digital model of the proposed solution (if applicable). o **Step 4**: Prepare a presentation to pitch the solution, highlighting the integration of technical skills and environmental benefits. **Task 3: Reflection and Peer Review (Duration: 30 minutes) Objective**: To reflect on the integration of technical skills and environmental awareness and receive feedback. o **Step 1**: Each team presents their project to the class, followed by a Q&A session. o **Step 2**: Conduct a peer review where students evaluate each other's projects based on set criteria. o **Step 3**: Facilitate a discussion on the importance of combining technical expertise with environmental stewardship and how these projects can be scaled or improved.
Assessments	Technical accuracy and innovation in monitoring and solution development. Integration of environmental awareness with technical skills. Clarity and thoroughness of the project plan and presentation. Team collaboration and dynamics.
Key Competences	Technical proficiency in environmental monitoring and

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	modeling Strategic planning and project management Effective communication and presentation skills Environmental awareness and sustainability thinking
Connections with Eco STEAM	Eco: Understanding the ecological impacts of building practices. Science: Understanding environmental processes and parameters. Technology: Utilizing digital tools and sensors for data collection and analysis. Engineering: Designing practical solutions and prototypes to address environmental challenges. Arts: Creating engaging presentations and visualizations to communicate findings. Math: Analyzing data to draw meaningful conclusions and support decision-making.
References	-
Notes	This activity can be expanded into a longer-term project, where students continuously monitor environmental parameters and iteratively develop their solutions based on ongoing data analysis.

Evaluation Criteria Table for Bridging Technology and Environmental Stewardship Activity

Evaluation Criteria	Points Available	Comments
1. Technical Accuracy and Innovation in Monitoring	15	Assess the precision and creativity in using technology to monitor environmental parameters.
2. Integration of Environmental Awareness	15	Evaluate how well environmental principles are integrated with technical solutions.
3. Feasibility and Practicality of the Solution	15	Judge the practicality and implementability of the proposed technological solution.
4. Quality and Completeness of Project Plan	15	Evaluate the thoroughness and clarity of the project plan, including objectives, methods, and expected outcomes.
5. Data Analysis and Interpretation	10	Rate the effectiveness and accuracy of data analysis and interpretation.
6. Communication and Presentation Skills	10	Rate the clarity, persuasiveness, and professionalism of the presentation.
7. Team Collaboration and Dynamics	10	Assess the level of teamwork, including communication, cooperation, and mutual support among team members.
8. Reflection and Peer Review Engagement	10	Rate the students' engagement in reflecting on their performance and providing constructive feedback.

Total Points: 100

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4.4.5. ACTIVITY PLAN: INTEGRATING TECHNOLOGY FOR ENVIRONMENTAL AWARENESS	
Introduction part (or activity overview)	This activity aims to help students integrate technical skills with environmental awareness through a simpler, hands-on project. Students will work collaboratively to use basic technology to observe and analyze an environmental issue in their local area.
Setting	Location: Classroom and outdoor environment (schoolyard or local park). Educational Context: Collaborative group work (4-5 students per group).
Materials Needed	Smartphones or tablets with camera functionality Basic environmental testing kits (e.g., pH strips for water testing, soil moisture meters) Internet access for research Poster boards and markers for presentations Data recording sheets
Learning Outcomes	• Understand how to use basic technology to observe and document environmental conditions. • Develop skills in data collection, analysis, and presentation. • Enhance teamwork and communication abilities.
Activity Contents	**Theoretical Part (Duration: 30 minutes)**: Begin with an introduction to the importance of technology in monitoring and addressing environmental issues. Discuss simple technologies that students can use to observe and record environmental data. • **Introduction to Environmental Monitoring**: o Explain the role of smartphones and basic testing kits in environmental observation. o Discuss the types of data that can be collected using these tools (e.g., water quality, soil moisture, air quality). • **Video Resources**: o "Using Smartphones for Environmental Monitoring" – A video demonstrating how smartphones can be used for basic environmental monitoring. https://www.youtube.com/watch?v=FfOoLhhlPBc o "Simple Tools for Environmental Observation" – An overview of using basic environmental testing kits. https://www.youtube.com/watch?v=D2wfRSNSbZg **Task 1: Environmental Observation Walk (Duration: 45 minutes) Objective**: To use smartphones and basic testing kits to collect environmental data in a local area. • **Step 1**: Form groups and assign each group an environmental parameter to observe (e.g., water quality, soil moisture, air quality). • **Step 2**: Walk around the schoolyard or a local park, using smartphones to take pictures and record observations. • **Step 3**: Use basic testing kits to gather data on the assigned parameter (e.g., test water pH, measure soil moisture).

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	• **Step 4**: Record all data and observations on the provided data recording sheets. **Task 2: Data Analysis and Presentation (Duration: 45 minutes) Objective**: To analyze the collected data and present findings to the class. • **Step 1**: Return to the classroom and analyze the data collected during the observation walk. • **Step 2**: Discuss findings within the group and identify any patterns or notable observations. • **Step 3**: Create a poster presentation summarizing the findings, including photos and data. • **Step 4**: Each group presents their findings to the class, explaining the significance of their observations and any recommendations for action. **Task 3: Reflection and Discussion (Duration: 30 minutes) Objective**: To reflect on the experience and discuss the integration of technology and environmental awareness. • **Step 1**: Facilitate a class discussion on what students learned about using technology for environmental observation. • **Step 2**: Encourage students to share their thoughts on the importance of environmental monitoring and how it can lead to positive changes. • **Step 3**: Discuss potential next steps for further environmental observation and action in the local community.
Assessments	Effectiveness in using technology to collect environmental data. Quality and accuracy of data analysis. Clarity and creativity of the presentation. Team collaboration and communication. Reflection on the importance of integrating technology and environmental awareness.
Key Competences	Practical application of technology for environmental monitoring Data collection and analysis Effective communication and presentation skills Teamwork and collaboration Environmental awareness and stewardship
Connections with Eco STEAM	Eco: Understanding and documenting local environmental conditions. Science: Applying scientific methods to observe and analyze environmental data. Technology: Utilizing smartphones and basic testing kits for data collection. Engineering: Considering simple engineering principles in the use of tools and data analysis. Arts: Creating visually appealing presentations to communicate findings. Math: Analyzing data to identify patterns and draw conclusions.
References	-
Notes	This activity can be extended by repeating the observation walk in different seasons or locations to compare data and observe changes over time.
Evaluation Criteria Table for Integrating Technology for Environmental Awareness Activity	

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Evaluation Criteria	Points Available	Comments
1. Effectiveness in Using Technology	20	Assess the ability to use smartphones and testing kits to collect accurate environmental data.
2. Quality of Data Analysis	20	Evaluate the thoroughness and accuracy of the data analysis.
3. Clarity and Creativity of Presentation	20	Rate the clarity, creativity, and effectiveness of the presentation.
4. Team Collaboration and Communication	20	Assess the level of teamwork, including communication, cooperation, and mutual support among team members.
5. Reflection on Environmental Awareness	20	Evaluate the depth of reflection on the integration of technology and environmental awareness.

Total Points: 100

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