|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| ACTIVITY PLAN | | | | |
| ACTIVITY PLAN | | | | |
|  | | | | |

|  |  |  |
| --- | --- | --- |
| **Theme** | **Subtopic** | **Activity Title** |
| Environmental Awareness and Conservation | Waste Management and Recycling | Let's give paper a second life |

|  |
| --- |
| Introduction part (or activity overview) |
|  |

|  |  |
| --- | --- |
|  | |
| **Introduction part (or activity overview)** | Every year, the demand for paper increases while the supply of wood, from which it is made, decreases. There are fewer and fewer green spaces, meaning significant harm is being done to the nature around us. If the reduction of green spaces is not controlled, soon the Earth's atmosphere will become almost uninhabitable for nearly all types of life. Therefore, it is important for each of us to learn to treat forests with care and consideration. Using recycled materials for paper production is one of the key solutions to this problem. |
| **SETTING** | Chemistry classroom - laboratory, mobile phones, interactive whiteboard, computers for student groups to perform the theoretical part.  This is a long-term project-based - team and individual work. |

|  |
| --- |
| Materials Needed |
|  |

|  |  |
| --- | --- |
|  | |
| **Materials Needed** | **Materials:** any used paper, water.  For paper decoration: seeds, paints, coloring tools (colored pencils, gouache, markers, acrylic paints, and other decorating tools).  **Tools:** food processor or blender, larger containers for soaking paper, 2 frames with attached mesh, towel or a larger fabric that absorbs moisture well, sponge. |

|  |
| --- |
|  |
|  |

|  |  |  |
| --- | --- | --- |
|  |  |  |
| **Learning Outcomes** | - Deepen knowledge about sustainable paper production, the use of recyclable materials, and waste minimization in the process of eco-friendly paper production.  - Enhance practical skills in making paper from secondary raw materials, identify and collect suitable materials for recycled paper production.  - Be able to assess and make responsible decisions on waste management and recycling issues.  - Understand the principles of sustainable business regarding eco-friendly and sustainable business models in the paper production sector. |  |
| **Activity Contents** | **Activity1:** Let's give paper a second life.  **Theoretical Part (Duration: 15 min.):** Introductory talk - discussion on paper recycling.  **Information for the Teacher:**  The method of making paper from tree bark, hemp, rags, and fishing nets was invented by Cai Lun (China) about 105 years ago. Plant material was ground in stone mills with water; the liquid pulp was scooped onto a frame stretched with a net, and after the water drained, the remaining layer of intertwined fibers on the net was transferred onto a cloth, pressed to remove remaining water, dried, ironed, and cut. The Chinese kept this paper-making method secret, and only in the year 610 did the Japanese begin to produce paper. In 751, the Arabs adopted the paper-making method from Chinese prisoners (rags were boiled in cauldrons with lime, soaked, and ground in mills). Such material for making paper was used until the 19th century. Paper is most often made from coniferous and deciduous fiber, rags, waste paper. In addition to fibrous material, crushed mineral substances (fillers), adhesives, and dyes are added. The properties and purpose of the paper are determined by the raw material, fillers, additives, and production technology.  **Task 1 (Duration: 30 min.):**  Step 1: Students discuss questions such as:   1. How can paper be recycled? 2. True or myth that sorting consumes more energy than it saves? 3. Do they know how to correctly sort used paper boxes? 4. Is glossy magazine paper sorted? 5. Could sorting help reduce waste?   Step 2: Students, divided into groups of 3-4, use digital sources to look for information.  Step 3: Summarize and prepare a presentation using Microsoft PowerPoint, Padlet, Canva, Movie Maker (film creation), or another presentation program.  **Task 2:** Making Recycled Paper from Used Paper  **Theoretical Part (Duration: 10 min.):** Introductory talk, the teacher explains how to make paper from various paper wastes – this is the secondary use of paper, related to ecology. Homemade paper can be used for decorations, postcards, labels, letters, or other art works.  **Task (Duration: 80 min.):**  Step 1: Students work individually, at the start of the work they view filmed material about paper making.  **Videos:**  <https://www.youtube.com/watch?v=fcjiuSD7TFo>  Duration: Approx. 2.22 minutes  <https://www.youtube.com/watch?v=TAH2IDs6DYw>  Duration: Approx. 3.18 minutes  Step 2: Gather the necessary tools for the work.  Step 3: Cut the paper into small pieces. Various types of household-used paper will do: packaging, paper bags, etc.  Step 4: Pour water over the shredded paper and leave it to soak for at least a few hours, ideally overnight.  Step 5: Place the soaked paper into a food processor and blend until it reaches a uniform consistency.  Step 6: Transfer the resulting mixture into a large container and add water.  Step 7: Using a frame with mesh (you can make one yourself from a picture frame), capture the paper pulp.  Step 8: Flip the frame onto a dry cloth, but don't lift it yet! Use a sponge or a highly absorbent cloth to dry the future paper, then carefully remove the frame.  Step 9: Leave it to dry for about a day.  Step 10: Afterwards, keep it under books or heavy objects for another day.  **Task 3:** Decorating the Made Paper.  **Theoretical Part (Duration: 10 min.):** The teacher explains the requirements for the work description, what to pay attention to. They suggest looking for ideas on how to use the homemade paper by searching digital sources.  **Task (Duration 90 min.):**  Step 1: Each student plans what they will do with the made paper, decorates it, and adapts it for a "second" life.  Step 2: Prepares a work description in the "Word" program according to the following requirements:   * Introduction (topic relevance, practical work significance, goal or idea, its relevance); * Project progress (description of the work process with photos); * Project results and their analysis; * Conclusions; * List of literature and information sources; * Self-evaluation; * Appendices (if any).   Step 3: Presents the work. |  |
| **Assessments** | Each student evaluates their work according to the provided Appendix 1. Each student presents the results of their work, assesses successes and failures, and performs an oral reflection. The final result is graded. All students in the class are included in the evaluation. |  |
| **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 - selection and investigation of environmentally friendly materials.  Science - knowledge in biology, chemistry, economics, and environmental sciences.  Technology – use of digital tools.  Engineering – paper production from secondary materials.  Art - creative solutions that encourage sustainable thinking and aesthetics.  Math - application of mathematical calculations. |  |
| **References** | <https://www.vle.lt/straipsnis/popierius/>  Links about paper making:  <https://www.klaustukai.lt/kaip-pasigaminti-popieriu/>  <https://www.skiautinukas.lt/archyvai/880> |  |
| **Notes** |  |  |
|  |  |  |

|  |
| --- |
| Appendix 1. Evaluation/Self-Assessment |
|  |
|  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Skills in performing theoretical and practical questions** | **I am very good, excellent** | **I am good** | **I am satisfactory** | **What I didn't understand/couldn't do and what I would need to learn more about** |
| 1. Formulate the hypothesis, objectives, and tasks of the practical work |  |  |  |  |
| 2. Create a plan for the practical work |  |  |  |
| 3. Independently perform the practical - creative work |  |  |  |
| 4. Evaluate the obtained results |  |  |  |
| 5. Formulate conclusions and present the work |  |  |  |