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Paper Chase: The Green Quest for Recycling

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Paper Chase: The Green Quest for Recycling

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Florida Next Generation Science Standards:

STANDARDS SCIENCE HIGH SCHOOL:

SC.912.L.17.20: Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.

SC.912.N.1.1: Define a problem based on a specific body of knowledge and use appropriate methods to solve it.

SC.912.P.10.1: Differentiate among the various forms of energy and recognize that they can be transformed from one form to others.

MA.912.DP.1.1: Given a set of data, select an appropriate method to represent the data, depending on whether it is numerical or categorical data and on whether it is univariate or bivariate.

ELA.11.C.1.3: Write literary analyses to support claims, using logical reasoning, credible evidence from sources, and elaboration, demonstrating an understanding of literary elements.

SS.912.E.2.11: Assess the economic impact of negative and positive externalities on the local, state, and national environment.

VA.912.C.1.1: Integrate curiosity, range of interests, attentiveness, complexity, and artistic intention in the art-making process to demonstrate self-expression.

VA.912.F.1.1: Use divergent thinking, abstract reasoning, and various processes to demonstrate imaginative or innovative solutions for art problems.

STANDARDS MIDDLE SCHOOL:

SC.8.P.9.2: Differentiate between physical changes and chemical changes.

SC.7.E.6.6: Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air, and water quality, changing the flow of water.

MA.7.DP.1.5: Given a real-world numerical or categorical data set, choose and create an appropriate graphical representation.

ELA.8.C.1.3: Write to argue a position, supporting at least one claim and rebutting at least one counterclaim with logical reasoning, credible evidence from sources, elaboration, and using a logical organizational structure.

SS.8.G.5.1: Describe human dependence on the physical environment and natural resources to satisfy basic needs in local environments in the United States.

VA.68.C.1.1: Apply a range of interests and contextual connections to influence the artmaking and self-reflection processes.

VA.68.F.1.1: Use non-traditional thinking and various techniques to create two-, three-, and/or four-dimensional artworks.

STANDARDSELEMENTARY:

SC.4.L.17.4: Recognize ways plants and animals, including humans, can impact the environment.

SC.5.P.8.4: Explore the scientific theory of atoms (also called atomic theory) by recognizing that all matter is composed of parts that are too small to be seen without magnification.

MA.5.DP.1.1: Collect and represent numerical data, including fractional and decimal values, using tables, line graphs or line plots.

ELA.5.C.1.3: Write to make a claim supporting a perspective with logical reasons, relevant evidence from sources, elaboration, and an organizational structure with varied transitions.

VA.5.F.3.2: Create artwork that shows procedural and analytical thinking to communicate ideas.

Goals:

I wanted to have a project that would introduce and reinforce sustainability and sustainable practices regarding the reuse, recycling and repurpose of paper. This project works well for any grade level or subject and I have used it with my AICE Environmental Management AS Level and AICE Marine Science AS & A Level courses as this pertains directly to the environmental impacts of paper products and waste. In addition, the applications of being able to recycle wood pulp due to the nature of the cell structure in plants integrates directly with Biology and Chemistry.

In an age where sustainability is key, recycling paper stands out as a vital practice. This project focuses on transforming discarded or used printer paper into new sheets of paper, highlighting an engaging and hands-on approach to recycling. The process begins by shredding the used paper, soaking it in water, and then forming it into shapes using paper-making screens.

In my classroom, we utilize colorful tardy passes printed on paper that can be recycled into beautiful new creations. The resulting paper not only looks appealing but also serves as a canvas for creativity.

During our Earth Day celebration, students participated in a demonstration where they created their own paper, which requires time to dry. While waiting, they were given pre-made paper to draw, write, or paint messages about Earth Day and the importance of reducing, reusing, and recycling.

Additionally, the Art Club has used the textured paper produced through this process to create unique works of art. The varying thickness of the handmade paper altered the way paint absorbed, allowing for diverse artistic expression.

This project is adaptable across grade levels, making it an excellent addition to any curriculum. The paper-making screen kits are inexpensive, encouraging schools to embrace this eco-friendly initiative. Let’s inspire the next generation to appreciate and practice sustainability by turning their recycling efforts into creative opportunities!

Objectives:

- Students will be able to explain the steps involved in the recycling process, including shredding, soaking, and forming new sheets of paper.
- Students will be able to analyze the environmental impact of recycling paper and discuss its importance in promoting sustainability.
- Students will be able to create their own sheets of recycled paper using provided materials and demonstrate proper techniques for paper making.
- Students will be able to evaluate the physical properties of several types of paper and how these properties affect artistic mediums.
- Students will be able to collaborate effectively on group projects, demonstrating teamwork and communication skills while creating recycled paper artwork.
- Students will be able to write persuasive arguments advocating for recycling initiatives in their school or community, supported by data collected during the project.
- Students will be able to reflect on their learning experiences and the role of individual actions in promoting environmental stewardship.

Project Overview:

I teach 9-12. For this project, the students created their own paper using whatever colors they wanted and then used their dried sheets to create artwork of their artistic expression. First the students had to understand the steps involved in recycling paper, including shredding, soaking, and forming new sheets. An application of this process was to learn about the importance of recycling in reducing waste and conserving natural resources.

Once the students had made their first sets of paper, they were able to explore artistic techniques using handmade paper, including how texture and thickness affect different mediums. Some students opted to recreating new sheets of paper in different manners. They have to be able to develop teamwork and communication skills through group projects and presentations related to recycling initiatives.

My AICE Environmental AS Level students had to create presentations on how recycling is an important and effective method of waste management for Unit 5, managing resources. This experience allowed them to gain insights into the practical applications of sustainability and the role of individuals and communities in promoting eco-friendly practices.

Some examples of how this project could be applied to other classes and grade levels:

In science, students can discuss the environmental benefits of recycling and how it impacts ecosystems, conduct experiments to compare the energy used in recycling paper versus producing new paper, and explore the physical properties of paper and the chemical processes involved in recycling, such as soaking and pulping.

In Mathematics, students can use measurements when shredding paper and mixing pulp with water and calculate the proportions of different paper types used to create new sheets. They can also create charts to track the amount of paper recycled over time or calculate the reduction in waste using graphs.

In art, students can experiment with different thicknesses of recycled paper in art projects and discuss how paper texture can affect various art mediums, such as watercolor versus acrylic. In addition, they can investigate the role of recycled materials in contemporary art and be encouraged to create pieces inspired by famous artists

who use sustainable materials.

In Language arts, students can draft poems or short stories on recycling and its impacts, focusing on sustainability and conservation. This project could a starting point to encourage students to write essays advocating for recycling programs in their school or community, using data collected from the project.

In Social Studies, students can create presentations on how their community can improve its recycling efforts after investigating local recycling laws and programs. In addition, they can explore how diverse cultures view recycling and sustainability and discuss global initiatives focused on reducing waste.

Lesson Plan High School Adaptation (Grades 9-12)

Materials Needed:

- Used printer paper (e.g., old assignments, colorful tardy passes)
- Shredders (if available) or scissors
- Water containers for soaking paper
- Blenders or food processors (for pulping)
- Paper-making screens (or DIY screens using mesh and frames)
- Towels or sponges for drying.
- Art supplies (markers, paints, etc.)
- Chart paper for brainstorming and presentations.
- Access to research materials (books, internet)

Background Information:

Review steps of the recycling process, the environmental impacts of recycling paper, how recycling paper products are currently being used and ideas for different art applications using the made paper.

Day 1: Introduction to Recycling and Paper Making

1. Introduction (30 minutes):
    - Begin with a discussion on recycling and its importance. Ask students what they know about recycling paper.
    - Introduce the project and outline the objectives and activities.
    - Facilitate a debate on the effectiveness of recycling programs, encouraging students to use research to support their positions.
2. Science Exploration (45 minutes):
    - Present information on the recycling process and its benefits to the environment. Use multimedia resources (videos, infographics) to visualize the impact of recycling on ecosystems.
    - Discuss the chemical and physical processes involved in recycling paper at a molecular level.
    - Assign students to research the lifecycle of paper from production to disposal and its implications.
    - Engage students in a group activity to brainstorm the environmental impacts of paper production versus recycling, encouraging them to think critically about human impact.
3. Demonstration (15 minutes):
    - Demonstrate the paper-making process. Explain each step clearly, emphasizing the science behind the transformation from waste to new paper.

Day 2: Hands-On Paper Making

1. Paper Making Activity (45-60 minutes):

- Divide students into small groups.
- Provide each group with shredded paper, water, and materials for making paper (blender, screens).
- Instruct groups to create their own sheets of recycled paper, guiding them through each step of the process.
- While the paper dries, students can engage in a related art activity, creating designs or messages on pre-made recycled paper.
- Encourage experimentation by allowing students to add natural materials (e.g., flower petals, seeds) to their pulp mixture, fostering creativity in their paper designs.

2. Reflection and Discussion (15-30 minutes):
    - Have students share their experiences making paper. Discuss the challenges they faced and what they learned.

Day 3: Applying Knowledge and Advocacy

1. Evaluation of Paper Properties (30 minutes):
    - Have students evaluate the texture, thickness, and absorbency of their recycled paper compared to standard paper? Discuss how texture, thickness, and absorbency can affect artistic choices.
    - Discuss how these properties can influence artistic choices.
2. Persuasive Writing Activity (30-45 minutes):
    - Instruct students to write a persuasive letter or essay advocating recycling initiatives in their school or community.
    - Encourage them to use data and insights gained from the project to support their arguments.
3. Presentation (15 minutes):
    - Allow students to present their letters or essays to the class or display their recycled paper artworks along with their written arguments.

Assessment:

- Evaluate students' participation in discussions and activities.
- Assess the quality and creativity of the recycled paper produced.
- Review persuasive letters or essays for clarity, argument strength, and use of data.
- Provide feedback on group collaboration and presentation skills.

Extensions:

- Organize a community recycling event or paper drive.
- Collaborate with the Art Club to display recycled paper artworks in a school exhibit.
- Conduct a survey on recycling habits within the school and analyze the findings.

Lesson Plan Middle School Adaptation (Grades 6-7)

1. Objectives:
    - Focus on understanding the recycling process, environmental impacts, and creative expression through recycled materials.
    - Encourage collaboration and critical thinking skills.
2. Materials:
    - Use a mix of hands-on tools appropriate for middle school students, such as shredders (if available), scissors, and basic crafting supplies.
    - Provide a variety of used paper types (printer paper, colored paper, etc.) for students to experiment with during the paper-making process.
3. Lesson Procedure:

Day 1: Introduction to Recycling and Paper Making

1. Introduction (15 minutes):
    - Start with a discussion on what recycling means and its importance. Engage students with questions about their recycling habits and what they know about the recycling process.
    - Introduce the project, outlining the objectives and activities while emphasizing teamwork.
2. Science Exploration (30 minutes):
    - Present information on the recycling process, including its environmental benefits. Use multimedia resources (videos, infographics) to visualize the impact of recycling on ecosystems.
    - Conduct a group brainstorming session where students can discuss the effects of paper production on the environment, encouraging them to think critically about human impact.
3. Demonstration (15 minutes):
    - Show students the process of making recycled paper, including shredding, soaking, and blending the paper into pulp.

Day 2: Hands-On Paper Making

1. Paper Making Activity (45-60 minutes):
    - Divide students into small groups. Each group will follow the steps to create their own recycled paper. Provide guidance and support as they work through the process.
2. Reflection and Discussion (15-30 minutes):
    - After the activity, facilitate a class discussion where students share their experiences, challenges faced, and what they learned about the recycling process.

Day 3: Applying Knowledge and Advocacy

1. Evaluation of Paper Properties (30 minutes):
    - Have students evaluate their recycled paper compared to commercial paper. Discuss how texture, thickness, and absorbency can affect artistic choices.

- Encourage students to document their observations and findings.

2. Persuasive Writing Activity (30-45 minutes):
    - Instruct students to write a persuasive letter or essay advocating recycling initiatives in their school or community. Encourage them to include their findings and firsthand experiences from the project.
3. Presentation (15 minutes):
    - Allow students to present their letters or essays to the class, fostering public speaking skills and peer feedback.

4. Assessment:
    - Assess students' participation in discussions and group activities.
    - Evaluate the quality and creativity of the recycled paper produced as well as the persuasive writing assignments.
    - Provide feedback on group collaboration and presentation skills.
5. Extensions:
    - Organize a school-wide recycling campaign where students can lead initiatives to promote recycling within the school.
    - Collaborate with the Art Club to create a display of recycled paper artworks, highlighting the importance of sustainability.

Lesson Plan Elementary School Adaptation (Grades K-5)

1. Simplified Objectives:
    - Focus on basic concepts of recycling and the importance of taking care of the environment.
    - Emphasize hands-on activities and creativity over complex analysis.
2. Materials:
    - Use simpler tools for paper making, such as mesh screens and shallow containers.
    - Provide pre-shredded paper to minimize the need for scissors or shredders.
3. Lesson Procedure:
    - Introduction (15 minutes):
        - Use storybooks about recycling (e.g., "The Lorax") to engage students and introduce the topic.
    - Hands-On Activity (30-45 minutes):
        - Guide students through the process of creating recycled paper with more direct instruction and support.
        - Incorporate songs or rhymes about recycling to make it engage.
    - Artistic Expression (30 minutes):
        - Allow students to decorate their recycled paper with crayons, markers, or stamps.
4. Assessment:
    - Use informal assessments, such as observations and discussions, to gauge understanding.
    - Encourage students to share what they learned about recycling through drawings or simple verbal presentations.
5. Extensions:
    - Organize a classroom recycling day where students can bring in paper from home.
    - Create a bulletin board displaying their recycled paper artworks and recycling facts.