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EED 480

Student Project-Based Learning Outlines

I. Title and Grade Level: Fourth grade/ Earth Week: Pollution

II.

1. Launch Project: Entry Event & Driving Question (DQ)	2. Build Knowledge & Understanding & Skill to answer DQ
3 Present Products that Answer DQ	4. Develop and Revise Products and Answers to DQ

III. BIG IDEA: Why is Earth so polluted?

-What kind of pollution is there?

-Who does pollution effect?

-What are the main causes of pollution?

IV. TASKS:

A. Water Pollution: Experiment with trash and oil. The task is to try to remove as much of the pollution in the water.

B. Land Pollution: Learn about recycling and do a sorting project. The main project will be an art project where students will use tissue paper and starch to create an earth on a paper plate.

C. Air pollution: The students will experiment with different smells and methods of breathing to simulate air pollution

and how it affects their breathing.

D. Finally, the students will take all they have learned to write an apology letter to Earth identifying a problem regarding each type of pollution and how they will solve the problems.

V. **JUSTIFICATION** This lesson series . . . (STEM and Social Studies Integration)

VI. **STANDARDS: Grade Level and Subject Area: Kindergarten to 5th Science, Social Studies, Language Arts, Mathematics and the Arts**

SOCIAL STUDIES:

4.1.5 Students demonstrate an understanding of the physical and human geographic features that define places and regions in California.

5. Use maps, charts, and pictures to describe how communities in California vary in land use, vegetation, wildlife, climate, population density, architecture, services, and transportation.

ELA/Literacy:

- **RI.4.1 - Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.** (4-ESS3-2)
- **RI.4.7 - Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears.** (4-ESS2-2)

CCSS MATHEMATICS:

- **4.MD.A.1 - Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two column table.** (4-ESS1-1), (4-ESS2-1)

Comment [BSF1]: This statement should be better developed. Why engage students at this grade level in studying, observing pollution? What might they learn? What might they do with the knowledge acquired?

NGSS (Next Generation Science Standards)

A. Disciplinary Core Ideas

ESS2.E: Biogeology

- B. Living things affect the physical characteristics of their regions. (4-ESS2-1)

C. Science and Engineering Practices

Cause and Effect

- D. Cause and effect relationships are routinely identified, tested, and used to explain the change. (4-ESS2-1), (4-ESS3-2)

E. Crosscutting Concepts

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.

- Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (4-ESS2-1)

VI. ENGAGING CONTEXT: Hook- Launch activity

VII. MEASURABLE OBJECTIVES

A. As student thinking drives this lesson, students can pursue their own inquiry: About Pollution and its different effects on our environment.

B. As the culminating activity of this PBL students will create a project or presentation that meets the objective of the Big Idea.

VIII TOTAL TIME:

Launch event-One: Class Periods of 60 minutes;

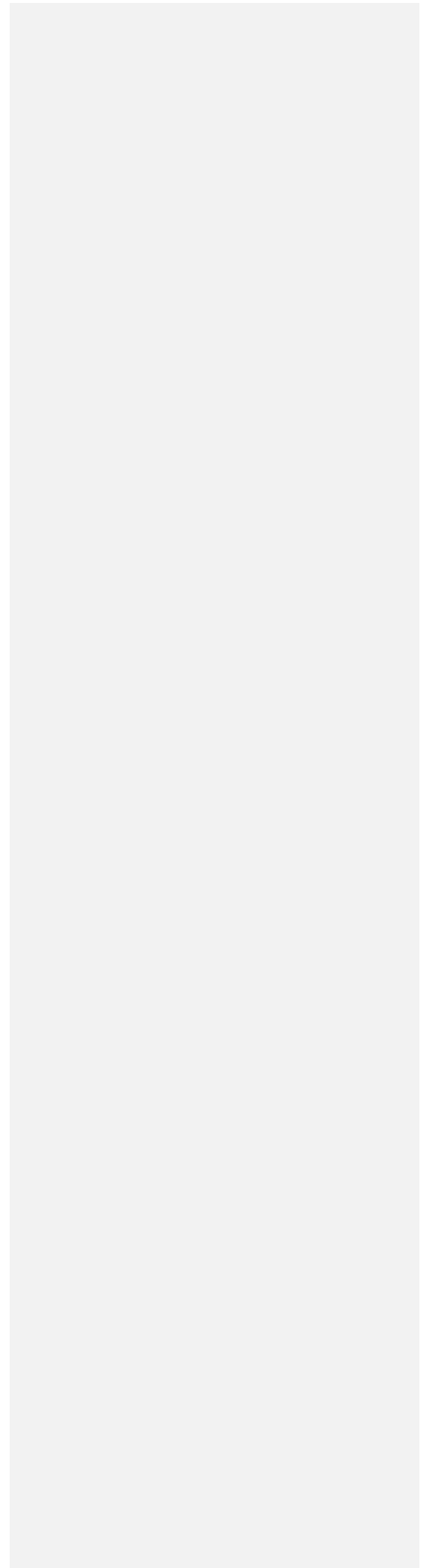
Building Knowledge: Two- ____ Class Periods; __ minutes

Showing Knowledge (Claims and Evidence) 30 minutes
(Students develop and revise products and or performances)

IX. Social Skills and or Habits of Mind to Engage/Assess

<input checked="" type="checkbox"/> Persistence	<input checked="" type="checkbox"/> Problem posing
<input checked="" type="checkbox"/> Decreasing impulsivity	<input checked="" type="checkbox"/> Drawing on past knowledge
<input checked="" type="checkbox"/> Empathic listening	<input checked="" type="checkbox"/> Application to new situations
<input checked="" type="checkbox"/> Flexibility in thinking	<input type="checkbox"/> Precision of language and thought
<input type="checkbox"/> Metacognitive awareness	<input checked="" type="checkbox"/> Using all the senses
<input checked="" type="checkbox"/> Checking for accuracy	<input checked="" type="checkbox"/> Ingenuity, originality, insightfulness and creativity
<input checked="" type="checkbox"/> Questioning	<input type="checkbox"/> Inquisitiveness, curiosity
	<input checked="" type="checkbox"/> Enjoyment of problem solving

IX. Level of Voice Appropriate for Activity:



Noise Levels

	SILENT MISSION: Silent - No talking at all
	TOP SECRET PLAN: Quiet - Only you and a partner
	SUPER TEAM TASK: Normal - Just your table team
	POWER VOICE: Strong - Hear it across the room
	BIONIC NOISE: Loud - Only used outside

X. BSCS 5-E Framework

Engage:

Day 1:

Students will be placed in teams using a human graph. I will ask students to line up based on the order of their birth month. Then each group will get 2 containers or paper bags for our activity. After they are in teams we can begin our activity.

-To open the lesson I will take the students on a treasure hunt throughout our school. The students will have to find as many natural and unnatural things throughout the school and classroom. The class will have 5 minutes to complete the task before we go back to the classroom to share our findings.

-When we return to the classroom we will discuss the items we found throughout our school. Theoretically, students will find more unnatural items because the school and classroom are full of them. This will be when I present the big idea as a problem.

-I will tell the students I am sad because Earth has helped us humans survive and have provided so many natural resources, but over time we have taken over a lot of space and covered the Earth in new materials that were not intended to be there. This will be my segue into the

amount of trash and pollution we as humans have created on earth, thereby presenting the idea of, “How does pollution affect life on Earth and Earth itself?”

-At this point, I will tell the students that they will become researchers for the next few minutes. Each team will receive 2 slips of paper with a question relating to pollution and will have to work together to answer the questions and become experts on the topic. When time is up they will present their findings to the class and I will add information when necessary.

Checklists and Rubrics provided for student goal setting and self-assessment; Peer Assessment (Team Performance Rubric) [Rate Your Mates] Content Assessment (poster)

Each team will assess their teammates accordingly using the following rubric and rate their teammates from 1-5 (1 being the lowest 5 being the highest).

_____ The students participated in the required experiment.

_____ The students participated in discussions and added to discussions.

_____ The students added to the research process and helped to answer the group’s questions.

_____ The students shared ideas during the presentation.

Explore: We will use our inquiry skills of predicting (hypothesis testing) comparing and analyzing to:

Day 2 and 4

6 groups of 4 students) Modified for class composition.

Students will participate in experiments where they will have the chance to explore different kinds of pollution and how they affect our Earth and our daily lives.

Day 2: Students will perform an experiment as a team where they must try to remove trash from a bin using a small spoon. They will then answer questions regarding the level of difficulty. They will then perform the same experiment, but the water will have oil in it. Students will record their experiences and then answer a question regarding the experiment as well as doing research on other oil spills and their effects on our planet. Students will then present their finding to the class.

Comment [BSF2]: I do want to see you develop this rubric using images that are both helpful and motivating to your students. Also, modify the Rate Your Mates for this grade level and send it along to me asap.

Comment [BSF3]: Interesting and challenging!

Day 4: The students will complete another experiment about air pollution. They will be in groups of 4 where they will conduct 4 experiments and record their findings. The students will be given 4 things to smell, vinegar, onion, breathing through a straw, and fresh air. These will represent 4 types of air quality and students will need to identify their level of comfort while smelling the items as well as any difficulty they may have faced.

Comment [BSF4]: Nice adaptation and design here.

6 groups of 4 students) Modified for class composition.

Explain: As students complete the launch, inquiry, culminating activity they share prior knowledge as well as any acquired knowledge this is done through discourse at the end of every experiment when students share their findings and experiences.

Extend/Elaborate: At the end of the unit, the students will write a letter to Earth apologizing for the damage done by pollution. Their letters should include three specific problems related to pollution as well as solutions and a statement of regret and intent to improve.

Comment [BSF5]: Again, I need to see you develop the culminating activity rubric as it is central to your students' goal-setting and achievement.

XI. Materials List

Day 1:

- PowerPoint presentation
- Scavenger hunt questions

Day 2:

- 6 plastic boxes(1 for each group)
- 6 small containers with lids
- water
- oil
- different kinds of garbage (plastic, straws, paper plates, utensils, paper, etc...)
- Activity handouts

Day 3:

- paper plates
- blue and green tissue paper cut in 1x1 squares.
- glue and water (mix to make starchy glue)
- paint brushes
- plastic cups(for the glue)
- Activity handouts

Day 4:

- 6 plastic boxes(from day 2)
- sliced onions in plastic baggies
- 6 small containers with lids(from day 2)
- vinegar
- 24 plastic straws(1 for each student)
- Activity handouts

Evaluate: (Assess):

Group and Self Evaluation (Day 1)

1. On a scale of 1-10 (1 being the worst and 10 the best), how do you think you did working in your group?
2. Did you encounter any problems along the way?
3. If you could do one thing differently what would you change?
4. What was your favorite part of today's lesson? Why?

Air Pollution Activity(Day 3)

1. Take item 1 and smell it. How does the smell affect you? Does it gross you out or do you enjoy the smell? Why or why not? How would you feel if you had to smell this every day?
2. Smell item 2. How does this smell? Do you enjoy the smell of this item? Why or why not? How would this smell affect you on a daily basis?
3. Use item 4, the straw. Stick one end of the straw up your nose. Hold your other nostril closed and try to breathe through the straw. Is this difficult? How did it affect your ability to breathe clearly?
4. Now smell item 4, the fresh air around you. What are some differences between the air you are breathing and the items you breathed in and breathed through? Which would be the easiest to breathe in on a daily basis from Item 1-4?

Criteria for the Letter to Earth (Day 4):

1. The students identify three problems related to Land, air, or water pollution.
2. Students identify three ways to solve the problems.
3. Students a promise or contract with Earth about what *they* can do to improve Earth.
4. Students uses correct writing functions(spelling, grammar, syntax).

[Content Summative Assessment:](#)

Individual information detailing student learning takeaways from the Launch activity

Exit Slip: Intro to Pollution

1. What are 2 new things you learned today from our experiment or from the presentations?
2. Do you think you did your best working with a team or would you prefer doing the activity on your own?

Explain.

Formative Assessment of Non-Cognitive Factors: Self Assessment Using the Habits of Mind Check Sheet and Write-up Form (Google Docs).

Children's Literature that Supports the PBL:

1. "What A Waste: Where Does Garbage Go?," by Claire Eamer
2. "Power Up to Fight Pollution," by Lisa Bullard