Human impact on the atmosphere stem lesson plan

Eighth grade
Science/biology
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Big ideas: The conceptual ideas are using data to show how the Surface temperatures and air temperatures are around the Earth on any given day. Students will collect data from the NASA website graph the data form their own conclusions and brainstorm solutions to this problem. The big idea is climate change and how students cannot only understand how the temperature is but can think of solutions themselves.

Common core standards:
Ms-ESS2-1 develop a model to describe the cycling of earth's materials and the flow of energy that drives the process.
P-ESS2-1. Ask questions, make observations, and collect and record data using simple instruments to recognize patterns about how local weather conditions change daily and seasonally.
Measurable student learning objectives:
Students will collect data on the sea surface temperature and air temperature around the globe. Then develop a model to show how the levels have changed over time by graphing the numbers and coloring them in a map to show their results. The final product will be a presentation that they will share with their classmates.

Stem integration:
Science – Living things have enzymes and chemicals that must have a certain temperature to function properly. The ocean's temperature is affected by the carbon levels in the air. The air and the ocean temperatures are increasing yearly.
Math – graphing results and finding a change over time.
Art – drawing and coloring maps

I teach science so logically that would be part of this lesson. I am a biology teacher and part of the regent's curriculum is enzymes and human impact on the environment. Collecting data on a data table finding the average and graphing are common practices of science and drawing maps or coloring or diagramming are also a fantastic way for students to express their ideas and a cross curricular fashion.

Nature of science:
My lesson incorporates the nature of science because students are developing their own ideas and conclusions about Air and ocean temperatures. Students are collecting empirical data from the NASA website and analyzing that data. Students then graph data from the satellites. Students then create a model and form a conclusion about what is happening to the temperature in the water on earth. Students then take it to the next step after they form a conclusion to try to engineer their own solutions.

Materials:
1. Laptop
2. Graph paper
3. Blank picture map of earth so they can color in the average carbon levels and water levels
4. Color pencils or markers

Engaging activity/ phenomenon:
Students will complete a Nearpod activity on climate change that I have created. And it is video clips time to climb challenges and fill in the blanks.

Data integration:
https://eyes.nasa.gov/apps/earth/#/vital-signs/air-temperature/airs-infrared-surface-3day

https://eyes.nasa.gov/apps/earth/#/vital-signs/sea-surface-temp/sea-surface-day-temp-today

Sample student data table. Each group can choose various locations depending on what their interests are. Locations will be Chosen with the class to try to prevent groups having the same places.

Location	Sea temperature	Air temperature
New York		
Japan		
Australia		
California		
India		
Russia		
Mexico		

Teacher background knowledge:
– I will need to understand how to navigate the NASA webpage.
– I will need to understand how the Earth is heated and how a biotic factor can affect the temperature such as ice or liquid water or carbon dioxide.
– I will also need to know how to reduce the amount of carbon or water that we use to help students understand how they can.

Differentiation of instruction:
– Students are put into cooperative groups of four. Students will be given the choice of which task they would like to do.
- Researcher on the website
- Recording data
- Graphing data
- Coloring the map

– Anchor charts can be provided
– Students can decide as a group who would like to share their data as a class.

Real world connection for students:
Students can connect to this lesson in real life because temperature and weather affects them every day. Students will design a plan to reduce their carbon imprint in their water usage in their own homes or in their everyday life. Students will also be able to connect to this culturally because they will be looking at different places around the Earth. Students can choose countries or cities that they are either interested in or that they have a hereditary relationship with.

5E	Details of 5E lesson implementation

Engage Near pod activity on climate change	Procedure: – I will instruct students to get on their laptops and I will give them the Nearpod code. I will then go through each slide as the students are not only taking notes in their notebook but are also completing the different Nearpod activities. – Students will be writing notes from the Nearpod and using a highlighter highlighting key vocabulary terms. Students will also be completing questions on the Nearpod watching videos doing time to climb challenges and fill in the blank activities. Modifications: – Students with visual disabilities or impairments can Increase the percentage on their screen so they can see the words better. -captions will be turned on so students can see they are saying – Examples of sentence starters and vocabulary on the board for ELL (English Language Learners) students Common core standards: Ms-ESS2-1 develop a model to describe the cycling of earth's materials and the flow of energy that drives the process. P-ESS2-1. Ask questions, make observations, and collect and record data using simple instruments to recognize patterns about how local weather conditions change daily and seasonally. Formative assessment: – I do go over the students answers in class at that time. -near pod also provide a greed for each student depending on how much participation they had. Resources: -laptops -highlighter
Explore: lab on temperature of the sea and air.	Procedure: - teacher will prepare materials such as copies of the map and graph paper and markers color pencils. - The teacher will have directions written as a slideshow and as a hardcopy for each group. - Teacher will use colored and numbered cards and walk around the class and let students choose which group they would like to be in. The color indicates the group, and the number indicates their job. - Students will then go on the NASA webpage and collect data on the daily temperature of the air and sea in various places on the globe. The directions well instruct the students to choose five different locations that they are interested in. - Students will record temperatures on data table, then graph data. - Students will color in globe diagram according to their data. - Students will write a conclusion about the data they collected: o What did you learn? o Did your hypothesis match?

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Cite data to support your answer
Why do you think that happened?

<u>Standards</u>:
K-2-ETS1-1.
Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
Summative assessments: Students will share their individual findings with the class. We will compare class data.

Formative assessment:
-All groups hand in lab report with data table, graph. Globe coloring and conclusion to be graded.
<u>Resources:</u>

Laptops
Copies of blank globe diagram
Graph paper

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<td>Explain:
Students will present their data to the class</td>
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<u>Procedure:</u>
-Teacher writes directions on the board for students to take out a piece of paper to write a class data table:
<table>
<tr><td>Location</td><td>Air temperature</td><td>Sea Temperature</td></tr>
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-Students will share their data with the class and students will record it on data table.
-Students will have an opportunity to share their conclusions with the class.
-Students will then graph class data (as homework)

<u>Modifications:</u>
-Students are given assigned seats to allow students to sit in pairs that can help each other.

<u>Standards Addressed:</u>
HS-ETS1-1.
Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants

<u>Formative assessment:</u>
-review data graphs for homework credit
Summative assessment:
Give grade for their group presentation

<u>Resources:</u>
-graph paper
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Elaborate: Students use the data they have collected to form a hypothesis about the Earth's temperature and design solutions that they can do in their lives.	Procedure: – Teacher will prepare directions and instructions shootings to look at their data and the conclusion that they wrote. -Students will use their data to think of reasons why the temperature of the sea in the air is the way they are. They may look up additional information on the NASA webpage. -students will work in the same cooperative groups to produce everyday solutions to reduce the carbon input that they have. For example, turning off lights or turning off the water while they are brushing their teeth. Standards addressed: HS-ETS1-2. Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. Modifications: -students can use their laptops to help them design their solutions. They may not copy and paste, but they must make it something achievable in their real lives. Formative assessment: - students will hand in their Groups list of solutions. - List will be graded
Evaluate: Students will be given a Test	Procedure: The teacher creates a test with sample data that the students must graph and then answer questions about. – Students will take sample data, create a graph, and answer conclusion questions that are both multiple choice and short answer. Modifications: – Students with visual impairments will have a copy of the test made in large print. Standards: HS-ESS3-4. Evaluate or refine a solution to human impact Formative assessment: Students will be graded on their overall ability to look at data graph it Resources: - Test on data analysis. Graphing and climate change.