Lesson 7 - Research Prep

**Problem statement:** Students could use the background information in this lesson to construct a solution to the problem.

Picture this: It’s a beautiful summer day and your family goes to the lake to swim. When you arrive there is a large sign that reads “Lake closed for swimming due to pollution.” While you are bummed out, you overhear a lifeguard stating that he hasn’t seen any salmon either. This gets you thinking about the connection between not being able to swim and the missing salmon.

The health of the environment is at a critical point. The government agency that oversees this, The Environmental Protection Agency (EPA), has lost a big portion of its budget. That means that they are unable to have enough employees to help make sure people are following the laws. Since people are not being held accountable, some people are breaking the laws and causing damage. One piece of the environment that is greatly impacted is the water. Bodies of water, like lakes and rivers, provide homes to many different types of plants and animals. When pollution enters these ecosystems the damage done is difficult to repair.

The Environmental Protection Agency is looking for new ideas to solve the water pollution problem. You will need to convince the EPA that your plan is the right one to solve this problem and save the fish!

**Learning Objectives:**

**Lesson standards (NGSS, CCSS, CTE):**

**ETS1.B Designing solutions to engineering problems:** Testing a solution invoices investigating how well it performs under a range of likely conditions.

**4-ESS3-2 Constructing Explanations and Designing Solutions**: Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution.

**4-PS4-1** Develop a model using analogy, example or abstract representation to describe a scientific principle

**CCSS.ELA-Literacy.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. **CCSS.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.

**CCSS.ELA-Literacy.RI.4.9** Integrate information from two texts on the same topic in order to write or speak about the subject knowledgeably.

**CCSS.ELA-Literacy.W.4.7** Conduct short research projects that build knowledge through investigation of different aspects of a topic.

**CCSS.ELA-Literacy.W.4.8** Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.

**CCSS.ELA-Literacy.W.4.9** Draw evidence from literary or informational texts to support analysis, reflection, and research.

If relevant to lesson, include:

Soft skills: Critical thinking and problem solving, information literacy, flexibility and adaptability, social and cross-cultural skills

Locally and/or personally relevant for students: Research and problem solving skills can be focused on an outcome that matches the interest of the student such as coding, constructing, or writing.

Connections to career and educational pathways: Not relevant

**Materials:**  Water Quality Science Journals, Netbooks, Research articles list

**Lesson preparation:**

\*Before the lesson Assign students to groups- in this group they will research a solution to the problem for the EPA. Assign these groups in a way that works for your classroom. In these groups all students should be trying to solve the same type of pollution problem. (One group could solve the fertilizer problem, another could research the temperature problem- or they could research and solve multiple)

\*Get student computers/tablets ready if necessary.

\*Have the article resource list either electronically for kids to use on computers or print out the articles for kids to use

Time required: 120 minutes (but will depend on your classroom)

**Grouping of students for instruction:**

\*See lesson preparation

**What is the instruction?**

|  |  |  |
| --- | --- | --- |
| **Time** | **Teacher** | **Student** |
| 5min  5-15min  20min  10min | Gather students in a way that works for your classroom. Introduce problem statement.  Review the KLEWS chart.  Tell students that today they will be picking a specific type of pollution that they would like to fix in Lake Washington.  Give the students their groups in the way that you decided.  If you want students to pick their topic, you could give them time to brainstorm what they would like to research and solve, and then put them in groups after that.  Pass out the project rubric. Go over the requirements.  Show students how they can access the articles to help their research.  Give students any other research  directions that they need.  Have the students get in their groups, and read the research articles. They will take notes in their journal on how the evidence they find could help them solve their pollution problem. This will likely take a few days.  Ensure that when the students take notes, they write down the direct evidence from the text and explain how that evidence helps with their solution idea.  Have students research until they think they have solved their specific pollution problem. After that they will be ready to make their final product to show their solution. | Listening to problem statement.  Go over rubric.  Research, take notes. |

**Accommodations:**

Resources can be printed if access to technology is limited.

Resources can be printed if specific students will do better with a paper copy.

Resources can be limited in number if needing to reduce the amount of possibilities.

Students can find their own resources to use as well.

**Extensions:**

Allow students to share preliminary research with the class.

**Assessment:**

Check to see that all groups have been taking notes and have a cohesive idea of what problem they are working on solving.

**References/Resources:**

Lesson 7 Research List from Teacher Resources