Lesson 1 - PBL Introduction and Background on Lake Washington

**Problem statement:**

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!

Remember: Students can use the background information in this lesson to construct a solution to the problem.

**Learning Objectives:**

* I can explain the problem statement in my own words.
* I can find Lake Washington on a map.
* I can describe what a polluted lake might look like.
* I can make a cause and effect connection to humans and water quality based on my background knowledge of Lake Washington.

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

* **4-ESS-3-1 Cross cutting concept:** Cause and effect relationships are routinely identified and used to explain change.
* **4-ESS2-2 Analyzing and Interpreting Data:** Analyze and interpret data to make sense of phenomena using logical reasoning.
* **4-PS3-3 Asking Questions and Defining Problems:** Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships.
* **CCSS.ELA-Literacy.RI.4.3:** Explain events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on specific information in the text.

*If relevant to lesson, include:*

*Soft skills:* Environmental literacy, Critical Thinking and Problem Solving, Communication and Collaboration

*Locally and/or personally relevant for students*: Students in the Pacific Northwest will be able to relate to Lake Washington. Students in other parts of the world can investigate another lake with a similar history after the lesson.

*Connections to career and educational pathways:* Does not currently apply

**Materials:**

-KLEWS Chart

-Problem Statement

-Background of Lake Washington photo powerpoint

-Sticky Notes

-Hard Surface/Pencil

-Polluted/Non-polluted Signs

-Student Water Quality Science Journals

**Lesson preparation:** Teacher needs to pre-read teacher page: Lesson 1 Background Lake Washington Restoration. **Also review the notes on the Lake Washington Background PowerPoint.** Make a KLEWS (Know, Learn, Evidence, Wonder, Scientific Vocabulary) Chart ahead of time. **Copy Water Quality Science Journals for each of your students. Print Exit Slips for Lesson 1 printed. Post Polluted/Not Polluted Signs on opposite sides of the classroom.**

**Time required:**  approximately 70 minutes

**Grouping of students for instruction:** pre-assigned small groups of 4 at the most or partners.

**What is the instruction?**

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| **Time**  15 minutes  10 minutes  20 minutes  15  Minutes  10 min | **Teacher**  Introduction  -Ask students to gather a pencil and hard surface if they will be sitting on the carpet for the PowerPoint.  \*Tell the class that today we are going to write down what we think we know about how humans impact water quality.  \*Post thinking stem and have students answer in the following way:  I think I know\_\_\_\_\_\_ about the human impact on water quality.  \*Ask the class, What do we think we know about how humans impact on water quality? Give each partnership a sticky note, and ask students to write their thinking on their sticky note. Have students turn and talk, and call on several to share out their answers with the class. All answers are valid. Only ask for clarification if writing is illegible or does not make sense.  \*Prompt students to turn and tell their partner what they want to learn about water quality, questions or clarifications, feel free to prompt students with a statement like “That’s a great question to investigate.” Pass out a sticky note per partnership, and have them record their questions.  Problem Statement  \*Explain to students that you have a BIG problem to share with them that you need their help with. Gather students in a way that works for your classroom. Project problem statement so that students can read along. Read the problem statement to your students, stopping when necessary to clarify new vocabulary (i.e. *critical, budget, etc.)*  \*Have students turn and talk to discuss their understanding of the problem statement.  -Pass out Science Journals, one per student. Ask students to write down the problem in their own words on the inside cover where it says, “What problem are we trying to solve?”  \*Review expectations of playing a movement game within the classroom. Explain that they will be viewing photos and they have to decide if the photo shows polluted or non-polluted water. Emphasize that they will have to turn and tell someone next to them why they selected polluted or unpolluted and support their choice with evidence from the photo. This lends itself well to scientific argument if students disagree on whether a photo is polluted or non-polluted.  Cross the Line Water Quality Game  \*Teacher will show PowerPoint and pause to give students time to move to their perceived correct location.  -Slides 1-9 of “Lesson 1 Lake Washington.”  \*\*Constantly be asking, “How do you know?” “What’s your evidence?” “That’s an opinion, how can you support your opinion with fact?” “Why do you think that?” ETC.  \*\*Explain that the last picture is a polluted Lake Washington from 50 years ago, although the kids will likely guess non-polluted. Remind students that this lake is the lake we will be focusing on as we solve the water quality problem.  Background on Lake Washington  - Start at slide 10 of “Lesson 1 Lake Washington” Instruct students to take notes in their science journals under “Background on Lake Washington Notes.”  \*Teacher will present background information on Lake Washington through the Google Slides Presentation. This incorporates a timeline and brief overview of history of the pollution.  Conclusion  \*At the end of the PowerPoint, remind students that we ultimate have to solve the water quality problem in Lake Washington. Have students turn and talk about what they learned today, and how that can help them solve the problem.  \*Give students time to write down their thinking in their journals under “What did you learn in this lesson that will help you solve the water quality problem in the lake?”  \*Teacher will give exit slip to gauge understanding of the lesson material. | **Students**  Students prepare their materials and come to the carpet or other meeting space.  \*Listening, at their table groups or with partners  \*Turn to their partners, answer question using the thinking stem, and write on sticky note. Several students share out, and all post sticky notes on the Know section of chart.  Turn and talk with their partners about any questions, clarifications or information they want to learn about the topic. Record their thinking on sticky notes to add to the Wonder column of the KLEWS chart.    \*Listen to problem statement.  \*Turn and talk with partner or neighbor about problem statement.  \*Students write the problem in their own words in their science journals.  \*Students will move to one side of the room or the other depending on their determination of whether or not the photo is polluted or unpolluted.  Once the students are finished moving they will discuss with a partner why they are correct and come up with a rationalization for their decision using evidence from the photo.  \*Students will participate in discussion and make connections between Lake Washington and their own geographical lakes.  \*Students take notes on the “Background on Lake Washington Notes.”  \*Student turn and talk about what they learned today, and how that can help them solve the problem.  \*Students write down their thinking, what they have learned and how it can help them solve the problem..  \*Students will fill out exit slip in order to demonstrate their learning. |

**Accommodations:**

* Set up groups ahead of time to support different student learning needs.
* For students with vision needs, arrange for the to sit closer to the presentation or print out copies for personal use.
* Lesson may be broken up into parts if needed.
* Alternative to exit ticket may be used if the classroom has other strategies that work for assessing student growth and learning.
* **Preview vocabulary to pre-teach or emphasize during lesson based on student needs.**

**Extensions:**

Look up history of water quality for a local lake or body of water near your location. Have students compare and contrast conditions, make predictions about why water quality situations may be different, and investigate local fish that could be affected by the poor water quality.

**Assessment:**

Exit ticket based on learning objectives: Lesson 1 - Exit Ticket

**References/Resources:**

Powerpoint titled “Lesson 1 Lake Washington”

Supplemental Resources

What is environment and how to keep it clean?

<https://www.youtube.com/watch?v=gEk6JLJNg0U>

A Fresh Future: Crash Course Kids #33.2

<https://www.youtube.com/watch?v=N9DhJB25Efc>

EPA of Washington

<https://www.epa.gov/aboutepa/epa-washington>