**LIMSST Blank Lesson Design Template – Science Notebooks**

**Name: \_310\_\_\_\_\_\_\_\_\_ Course: 8th Grade Earth Science Grade: \_\_\_\_\_\_\_\_\_\_**

**Unit: \_\_\_Oceanography\_\_\_\_\_\_\_\_\_\_\_**

**Big Idea: \_\_Density and salinity differences in water bodies can result in layers in those water bodies**

**Subconcept: \_Density and salinity differences can also result in movement (currents)\_\_\_\_\_\_\_\_\_\_\_**

**Lesson: \_Investigate Currents\_\_\_\_\_\_\_\_\_\_\_\_\_ Date Taught: \_\_4/30 and 5/3\_\_\_\_\_**

**Idaho Standards (or National Standards): \_Earth Science Standard 1 Goal 1.2.1, 1.2.2 1.2.3; Goal 1.3.2; Goal 1.6.6\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

### I N T E N D E D C U R R I C U L U M

## LESSON CONTENT GOALS GUIDING QUESTIONS (displayed during Making Meaning Conference)

1. What did you observe after the holes were poked in the separating barrier?
2. Why did this happen?
3. What properties of the two water bodies caused this?
4. Explain how density differences can cause varied layers in a body of water such as an ocean.
5. Explain what can happen when two different water bodies meet.

### I M P L E M E N T E D C U R R I C U L U M

### ENGAGING SCENARIO

#### FOCUS QUESTION (discussed by groups, recorded in notebooks)

####

Guide students to “how” or “what” questions.

You may wish to start with a class chart of group focus questions.

What happens when two different water bodies meet? What are some examples of places where different water bodies meet? What are some properties of water that cause movement?

###### PREDICTION/HYPOTHESIS (discussed by groups, recorded in notebooks)

Prediction: (optional format)

*If \_\_\_two water bodies meet \_\_\_\_\_\_\_\_\_\_\_\_then, \_\_the one with higher density will sink because it will be heavier.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*I think that\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_because\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

**PLANNING**

**General Plan**

What are we going to keep the same? The size of the container, two different solutions

What are we going to change? The salinity and density of the water will change for each group

What are we going to observe or measure? We will observe movement of the water as it forms layers and we will observe the pepper moving on the surface as a current forms when the water forms its layers.

**Operational Plan**

What will be the sequence of steps or procedures you will follow to conduct your investigation? 1. Divide the box into two compartments, using masking tape and aluminum foil. 2. Mix 500ml of water with 1 spoonful of salt in one beaker, mix 500ml of water 3 spoonfuls of salt in the other beaker. 3. Add one drop of food color to the first beaker, add one drop of a different food color to the other beaker. 4. Pour 500ml of one solution into one side of the box while a partner pours 500ml of the other solution into the opposite side Be sure you and your partner pour at the same time in order to keep the barrier from breaking. 5. Sprinkle pepper on the high salinity side. 6. Use a pen or pencil to poke two holes in the foil, one just below the water surface and another near the bottom of the box. Observe for ten minutes. 7. Clean up and return materials. 8. Finish and complete your lab report.

**DATA** **CHART**

Before we conduct your investigation, how will you collect your data? I will draw a sketch of my starting set-up and my final set-up, I will also write a description of what I see.

What will your data collection device look like? It will look like a rectangle with two different colors separated by a line. The second part will look like a rectangle with the two color in horizontal layers with a line in the middle of the box. There will be a written description below or next to the rectangles.

# MAKING MEANING CONFERENCE (Teacher directed).

1) Making a class data chart

After completing the charts in their notebooks, the groups share their results with the class. Record the data on the board or overhead transparency discuss and analyze results. Students can add observations and other comments to their notebooks.

2) Looking for patterns from the data charts:

Teacher asks: What does this tell us? Is there a rule? Is there a pattern here? (focusing on the lesson content goals.)

Teacher will guide students in writing CLAIMS AND EVIDENCE based on the data chart(s) as students share information, teacher will assist students in associating their claim with the evidence. **Once finished teacher states” Based on our claims lets REVISIT THE GUIDING QUESTIONS and discuss the answers based on our evidence.” Teacher then goes over the guiding questions and makes sure students are able to respond to them.**

***Examples***

**CLAIM**   **EVIDENCE**

**This portion of the lab activity was conducted as a silent discussion using the following prompts:**

 **\*Where could water bodies of different density and salinity meet in the “real world?”**

 **\*What else, besides salinity differences, could cause layering in the oceans?**

 **\*If two bodies of water meet and one has a low amount of salt and the other has a lot, then the one with the most salt will have better density because the salt water is dense enough which makes things float.**

 **\*If two bodies of water meet where one is denser than another, then the less dense one will rise to the top because it’s less heavy.**

 **\*If two bodies of water meet then the one with a lower density will sink because things with lower density sink under ones with a higher density.**

 **\*The final prompt was a sketch of the experimental set-up and three possible outcomes. Students were to indicate which one they agreed with and use their observations to explain why.**

**Students were directed to include their observations in their responses to the hypotheses. They were directed to include real examples in their answers to the two questions.**

**CLAIMS AND EVIDENCE (recorded in notebook)**

INSTRUCTION: Teacher says

“You are now going to write your own claims and evidence in complete sentence form. I want you to look at the focus questions and write a claim and evidence that answer these questions. Revisit the class data chart(s) to get write your claims and evidence. Record them on your notebook.

*I claim that when \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, then \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(happens)*

*I know this because I observed \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

###  CONCLUSION (record in notebooks)

### Students are then asked to revisit their prediction and write a sentence that states whether the evidence from their charts supported it or not. They are to explain why. They are to provide clear explanations regarding how their evidence supported their prediction.

### *Today I learned \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

 *Originally I thought \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, now I think \_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*This is consistent/inconsistent with \_\_\_\_\_\_\_\_\_\_\_(other scientific ideas).*

###### REF REFLECTION (record in notebooks)

Students will revisit the “Big Idea”, they may write new questions, or design new experiments.

*What really surprised me about this investigation was \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*After doing this investigation I now wonder \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*We found \_\_\_\_\_\_\_\_\_\_\_\_\_\_, but I still want to know \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

**The conclusion and reflection portions of this lesson were included in the students’ “mini lab report.”**

**Directions for the “Mini Lab Report” will be on a separate page.**

**LIMSST Project Literacy Lesson Reflection Form**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name:** | 310 |  | **Date lesson was taught:** | April 30, 2010 |
| **Lesson Title/Topic Areas:** |
| Density differences can cause formation of layers in fluids |

**Literacy Strategies Used:**

(Please discuss what literacy strategies you embedded in this lesson. What were your goals in using these strategies? Be specific and use as much detail as possible.)

During this lesson I had students investigate currents with a lab activity using two different water solutions, one high salinity and one with low salinity. They had to read their directions and carry out the activity. In writing the lab report students were given the opportunity to use a “claims and evidence” approach to conclude their report. They also had small group/pairing discussion of the lesson.

**Student Response to the Lesson:**

(Was the strategy effective? Were students able to read/write as needed in this lesson? What attitudes were displayed? How did specific

 students and/or the class do? How did the literacy strategy aid in developing student understanding of the topic? Cite specific evidence from the samples of student work)

The students always like to work with someone else. They also enjoyed setting up the experiment and carrying it out. There were many exclamations and ahas overheard as the two different salinity/density water formed currents in the container. They struggled at first with writing their hypotheses. As the day went on and following my de-brief with Anne and Jen, I changed a couple of things to better “prime” the students to think in terms of density and what they already knew about it to write their hypotheses. The ones written in the afternoon classes were more on target.

**Lesson Reflection:**

(What worked well with this lesson? What challenges did you encounter in this lesson? Would you change certain aspects of the lesson or the questions that you asked? How does this influence future lesson planning?)

Things that worked well with this lesson were having students in the partners they chose earlier in the quarter; allowing them to talk with each other. During the first two periods students struggled with writing their hypotheses; in the afternoon I changed what I said and asked to get my students thinking more in terms of what they already knew about density and water to assist in this.

**Relationship to Previous Instruction:**

(Have you taught this lesson/topic prior to the LIMSST project? If so, how did your teaching of this lesson differ from what you taught before? How did students’ reactions to this lesson differ?)

 I have taught this lesson for the last couple of years. It usually goes well. I am pleased with the small changes I made for the afternoon classes following my meeting with Jen and Anne. This lesson allowed me to draw on my student’s prior experiences in class with density. It also allowed me to draw on their knowledge of convection currents in the mantle which we studied about a month earlier.