

5E Integrated STEM Lesson Plan.

Lesson Title: An Experiment in Inclusive Instruction

Author: Alyssa Stewart

Topic: In this lesson, students will investigate how varying temperatures in air and water impact the density of the fluid. First, students will explore convection currents by conducting a short experiment using a container of dyed hot and cold water. Students will then read about how convection currents form a conveyor belt in the ocean. Then they will investigate how scientists studying marine life have created technology to overcome the motion of currents. Students will apply this information in their final lesson by creating models that demonstrate how energy from the sun creates currents in the ocean.

Targeted Grade Level: 8th grade

Time needed: 3 days

Subject Integration: Science, Engineering and ELA

Justification:

ELA: Informational reading is essential to bringing scientific inquiry to life in the classroom. With authentic, high-interest science texts, students gain the benefit of literacy development.

Engineering: Students will create and explain a model that demonstrates how energy from the sun creates convection currents in the ocean

Science: Students will identify and describe how unequal heating and rotation of the Earth cause differences in climates around the world.

Standards:

Standard: DCI ESS2.C: The Roles of Water in Earth's Surface Processes: Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents.

Standard Achievement: Models can be used to represent systems and their interactions— such as inputs, processes and outputs—and energy, matter, and information flows within systems.

Reading: Learning Target: I can cite textual evidence to support my claims. Students will be reading and evaluating a text. Afterwards, they have to make a claim and cite evidence from the text to support the aforementioned claim.

<u>NGSS Performance Expectations</u>		
Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts:
Developing and Using Models: Develop and use a model to describe the phenomena.	DCI ESS2.C: The Roles of Water in Earth’s Surface Processes: Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents.	Systems and System Models: Models can be used to represent systems and their interactions— such as inputs, processes and outputs—and energy, matter, and information flows within systems. Levels.
Common Core State Standards:		

ELA: RS.8.1 I can cite textual evidence that strongly supports an analysis.

Measurable Student Learning Objectives:

Students will be able to cite textual evidence to support their claims.

Students will be able to Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.

Nature of STEM: In this lesson, students will investigate how varying temperatures in air and water impact the density of the fluid, causing a current to form. At the beginning of this lesson, students will explore convection currents by conducting a short experiment using a container of hot and cold water. Students will then read about how convection currents form as well as how scientists have created technology to overcome the motion of currents. As the lesson progresses, students will create a model showing how energy from the sun creates convection currents in the ocean. By incorporating reading, technology and Science, this lesson provides students a chance to engage in multiple STEM domains.

Engaging Context/Phenomena:

To engage students, I will begin with an experiment that will create student engagement and encourage students to have interest in the topic. Students will make predictions, do experiments, record data, make claims, and support their claims with information gathered by first hand experiments.

Data Integration:

Students will be using data provided by NewsELA articles. This will serve as a basis for students to make their claims. They will cite data from the articles as well as the data that was collected from their work to support their claims.

<https://newsela.com/read/DIY-tech-helps-marine-scientists/id/42159/>

Differentiation of Instruction:

Students will be placed into groups of 4. These groups will be differentiated based on Lexile levels. Each group will have an assigned leader with an advanced Lexile level. This will ensure that each group has someone who can read and comprehend data at an advanced level. Each group will also have assigned tasks. The tasks are as follows: recorder, experiment leader, director, and fact checker.

Real-life Connection:

This lesson has a real life connection in the form of social and environmental reform. Environmental protection is a high interest topic for many of my students. The current models demonstrate how the changing ocean tides impact pollution of the waterways and how pollution clusters are being formed.

The fact that this problem will greatly impact my students' futures makes this lesson more impactful and lends a real world connection.

Possible Misconceptions:

A lot of my students think that burning garbage and fossil fuels is what creates the temperature changes in the ocean. Some of the students may think that the hot water will just stay on top, because they have been told that heat rises, they have not been taught equilibrium.

Lesson Procedure:

Create groups of 3-4 students and provide the following materials for each group:

- 2 containers filled about a third of the way with cold water (dyed blue)
- 2 containers filled about a third of the way with hot water (dyed red)

Tell students that after the class discussion, they will be mixing the cold and hot water in two different ways.

First, they will pour one cold water sample into a container with hot water.

Then, they will pour the other hot water sample into the remaining container with cold water.

After completing the experiment, students will create a labeled drawing of each mixture and explain what happened in each container when the different water temperatures were mixed.

Teacher Background:

The teacher needs access to student lexile levels as well as the resources (newsela, Google Classroom) and materials.