

SIOP Lesson Plan

10th Grade Marine Technology Team Teaching Model for General Education and ESL Students

Topic: Introduction to boat building: Buoyancy **Length of Lesson:** Two – 45 minute classes

Content Objectives:

- ✓ Students will be able to design an experiment to test for buoyancy
- ✓ Students will be able to apply various hypotheses in order to design and implement a model boat test for buoyancy

Language Objectives:

- ✓ Students will be able to list, both orally and in writing, the steps they will use to conduct their experiments
- ✓ Students will be able to discuss their hypotheses with their team members
- ✓ Students will orally present their findings to the class

Key Concepts and Vocabulary:

- ✓ Concepts: Scientific method and buoyancy
- ✓ Vocabulary: ships, cargo, float, displacement, weight, density, buoyancy, mass, materials, process, hull, volume, keel

Supplementary Materials:

large tub of water, smaller buckets of water, clay, malleable plastic strips, cardboard, plastic wrap, aluminum foil, paper clips, pencils, pieces of wood, white paper (copy paper), glue, scissors, rulers, pennies, beads, buttons, pipe cleaners, leveled textbooks, and adapted handouts.

Preparation:

- ✓ Form five heterogeneous cooperative learning groups. Ensure that beginner and intermediate English learners are placed in groups that contain students with higher English proficiency levels.
- ✓ Post the objectives.
- ✓ Create bilingual vocabulary cards for the word wall.
- ✓ Collect materials and create small experiment boxes for each cooperative group.
- ✓ Create an observation area in the center of the room with the tub of water and five cooperative work areas surrounding the center.
- ✓ Develop capture sheets for student observations.
- ✓ Collect and photocopy articles on the first ironclad ships, the Monitor and the Merrimack.

Motivation:

- ✓ Hand out the day's agenda and review the content and language objectives with the students.
- ✓ Give each student a word wall card as they enter the classroom. Tell students to form a group with other students who have the same word and that they will work together to define their vocabulary word. Have students do a Think-Write-Pair-Share activity to discuss the word as a group and use class resources or personal knowledge to write out the definition. Tell them to list instances when they have experienced the properties associated with the word in this class.

Group A – Float

Group B – Density

- ✓ Group A– Float
 - ✓ Group B – Density
 - ✓ Group C – Mass
 - ✓ Group D – Weight
 - ✓ Group E – Displacement
- ✓ Each group will choose one presenter to discuss their definition with the class. If everyone in the class agrees with the definition, the card is added to the word wall.

Presentation:

- ✓ Place a large tub of water in the center of the room for the students to gather around. The class will observe the teacher do a simple three-part test on floating.
- ✓ Toss a ball of clay and drop it in the center of the tub of water. Say to the students, "Let's do a Think-Pair-Share. Explain to your partner why the clay didn't float."
 - ✓ Take another piece of clay and shape it into a cup. Drop it into the tub with the open side up. Say to the students, "Let's do another Think-Pair-Share with the person on your other side. Explain why the clay still didn't float."
 - ✓ Take another piece of clay and shape it into a slightly wider cup. Place a smaller clay ball into the center to act as a keel. Say to the students, "Make a hypothesis: Will the clay ball float or sink?"
 - ✓ Make a note of the number of students who said yes and no. Drop the clay ball into the tub with the open side up. Say to the students, "Do a Think-Pair-Share with your original partner and explain why the clay did float this time."
 - ✓ During the student discussion emphasize for the students the term "buoyancy."
- ✓ As a whole class, the students develop a definition of term of buoyancy and its connection to the vocabulary reviewed at the beginning of the lesson and during the demonstration.
- ✓ Present the experiment for the day. Give each cooperative group a materials box. Tell students they will develop a step-by-step format for creating some type of vessel that will demonstrate the idea of buoyancy. Tell students to chart their

steps and progress on the lab worksheets. Tell students they will create a model and test it in their buckets. At the end of the work period, the groups will present their findings to the class at the center tub.

Practice/Application:

- ▼ Tell students they will work cooperatively to:
 - ▼ Develop a plan and hypothesis
 - ▼ Create their models
 - ▼ Test their hypotheses
- ▼ Students will write out their observations after testing their hypothesis, and discuss how they used the scientific method to test their hypothesis with their teammates.
- ▼ Students will read independently adapted texts on the ironclad ships the Merrimack and the Monitor and will draft a short paragraph (5 to 7 sentence minimum) that relates what they have learned about buoyancy to the development of iron ships.

Review/Assessment:

- ▼ Students present their hypotheses, steps, and findings through group demonstrations
- ▼ Students will hand in completed lab worksheets and paragraphs.
- ▼ Review the objectives with the students. Check off which ones have been met in class, which ones will be completed for homework, and which ones need to be reviewed during the next class.

Extension Activities:

Student will visit various boats and ships of made of different materials and will discuss how each was built and how they function in regards to buoyancy, density, mass, volume, and weight.