DIVE BENEATH THE SURFACE

Lesson 3: Live Dive Experience

4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
[Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.]

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence. • Construct an argument with evidence, data, and/or a model. (4-LS1-1)	**LS1.A: Structure and Function.** • Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.(4-LS1-1)	**Systems and System Models.** • A system can be described in terms of its components and their interactions. (4-LS1-1)

Objective:

Students will ask questions and make observations to refine their knowledge of marine structures that serve the function of movement during the live dive experience.

Materials

- Overhead projector
- Computer
- Access to YouTube Live

Engage

Introduction:

10 minutes

Prior to the start of the lesson be sure to access the live dive feed on YouTube live. A link will be emailed to you from the Cal Poly DBS team. Be sure the video feed you have selected is titled with the date of your scheduled dive.

Students will want to have their "5 Structures and Functions" worksheet out as they will be using it as a guide throughout the dive. During the dive itself, they can also fill in any new information they learn throughout the dive or add any notes that they have missed during Lesson #2. It is crucial that these worksheets are filled out thoroughly as they will be the main resource for the Engineering Design activity (Lesson #4).

At the end of Lesson #2, students were asked to think of some questions that would be appropriate to ask the dive team during the live dive. Begin this lesson by creating a list of these questions. These subject questions do not have to be limited to the 5 structures and functions.

Examples of questions to engage the dive team with the students:

- Why do you have to wear the full facemask? (Diver speaking to students will be wearing this to house and protect her hearing device and microphone).
- Where is your buoyancy control device?
- How long can you stay under water?
- Is it hard to pick an organism up that is stuck to something using its tube feet?

- Does all kelp have holdfasts and pnuematocysts?
- What besides kelp has holdfasts?
- Do all animals underwater have swim bladders or only fish?
- How many fins do fish have?

*Teacher will need to be prepared to type and send these questions to the dive team during the live dive. The questions will be received to a computer on the Cal Poly Vessel and then read to the lead diver.

Background: Where is the Cal Poly Pier? What is the Cal Poly Vessel?

General Information: http://www.marine-stage.calpoly.edu/marine-ops

Detailed History of Pier: http://www.marine-stage.calpoly.edu/history-pier

Information about the Cal Poly Pier (where Cal Poly Students SCUBA dive and conduct research) and a list and description of the various boats used by the research and dive teams can be found at these link.

Teacher can directly access information and explore the web page and information with students or utilize the visuals and information summaries provided through DBS.

Have students popcorn read through information. Encourage participation by allowing students to ask clarifying questions throughout.

Note to teachers: Be prepared to adjust time of introduction. The exact start time of the live dive may vary slightly as it is dependent on an actual team of divers that will be performing safety checks and preparing sophisticated technology.

Cal Poly Pier:

Cal Poly Vessel:

Explore

Live Dive:

30-45 minutes

The length of the dive is dependent on many variables. The most significant of which are water conditions and technological errors. Ideally the live dive will last at least 30 minutes and may even go as long as 45 minutes. Teacher should be sure to set aside an adequate amount of time.

During the live dive students will be engaged with dive team, actively listening, asking purposeful questions, and recording new information learned.

No two live dives will be the same. It will be the goal of the team to find examples of all five marine structures during the dive.

The team will consist of 3-4 Cal Poly divers.

1. Camera Operator
2. Lead Diver (speaking directly to classroom)
3. Explorer (searching for organisms)
4. Safety Monitor

After the dive team has finished their introduction they will tell the classroom when they will be open to answering questions.

Throughout the dive the teams goal will be to find examples of organisms that possess one of the structures as discussed in class and capture the function of movement. During the time when members of the dive team are looking for these organism, the lead diver will continue to interact with classroom and answer the questions that have been submitted.

Explain

Wrap-up and Conclusion of Live Dive:

5-10 minutes