Applying the Learning Cycle to Data Labs

	Anoxic Events
Invitation How will it get learners interested in learning about the topic and access their prior knowledge?	Students do a turn and talk to briefly discuss what they know about dead zones. They watch a graphic video clip of dead crabs, and engage with a map of dead zones around the world and over time. Students are challenged with the question: *What is killing the crabs on the Oregon coast?* They make a concept map to record their initial ideas about the atmospheric and oceanic processes that might have caused it.
Exploration How will learners have experiences that provide observations and discoveries to help them ask and answer questions, and make sense of the topic?	Students investigate the followup question: *How do changing weather conditions and ocean circulation patterns affect our ability to fish for benthic organisms like crabs?* Pairs or small groups examine the DO and temperature data widgets, and then a second exploration has them investigate the longshore wind speed widget to look for patterns and correlations across the data sets. Students are asked: What questions could you answer with the data? What aren't you able to explain yet with the data? What more information do you need?
Concept Invention How will learners be encouraged to struggle with their understanding and negotiate their ideas with others?	Students puzzle out the link between dissolved oxygen and water temperature and participate in a class discussion about whether the relationship makes sense as they explain and support their ideas to answer the challenge question with evidence gathered from the widgets and prior knowledge about the concepts. Instructor provides additional information as needed (Ekman transport, vertical section of diss. O_2) as questions arise. Students are challenged to use the widgets and their conceptual understanding to explain the connection between the 3 variables (DO, water temp., and wind direction) and what's causing the crab deaths.
Application How will learners authentically use what they've learned and apply it to a new situation or context?	The Oregon anoxic area is compared to others around the world and the class engages in discussions about whether the atmospheric/oceanic conditions might be the cause of these dead zones. Students make predictions about how pH and seasonality might affect dead zones, what might future climate change and human activities bring, and the implications for fisheries as dead zones become more common. Instructor provides additional resources and information as needed.
Reflection How will learners think back on the process of learning to help reinforce their understandings & make them better learners in the future?	Students revisit their concept maps and revise them to reflect what they learned. They respond to prompts regarding what skills and concepts they needed to learn, and what new connections they made in order to figure out the mystery of what was causing the crab deaths. Students reflect on what was the most difficult part of the exercise for them and what helped them to figure out the mystery.