Lesson Plan—The Case of the Penguin’s Missing Lunch

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Summary

Help the penguins find their lunch! Students will be solving the Adelie Penguin Mystery of the missing lunch based on the data collected in Antarctica by Dr. Josh Kohut. The clues will help the class unlock the boxes and solve the mystery with the BreakoutEDU game platform. Students will work collaboratively to problem solve and learn information. Prior knowledge that will be helpful for students is an understanding of tides and different types tides as well as latitude and longitude coordinates.

*[TAGS:data, Antarctica, polar literacy]*

Key Concepts

* Problem solving authentic polar issues
* Collaborating with peers
* Analyzing real and current data

Objectives

Students will be able to:

* ***Analyze*** scientific research data
* ***Collaborate*** to solve problems
* ***Demonstrate*** understanding of ocean currents
* ***Connect*** ocean features with marine life
* ***Reflect*** on the strengths and weaknesses of their results
* ***Communicate*** results

Materials

* BreakoutEDU kit <https://www.breakoutedu.com/about>
* Clues with maps, diagrams, and data (laminating will help them last longer!)
* Background information on convergence and the Antarctic data

Procedure

Teacher Set Up

1. You will need your BreakoutEDU box set
2. Set the codes

3-DIGIT LOCK = 6-4-9 (latitude degree)

4-DIGIT LOCK = 0-1-2-7 (date of best semidiurnal tide)

MULTILOCK = g-l-i-d-e

DIRECTIONAL MULTILOCK = RIGHT, LEFT, UP, DOWN, UP (the movement pattern of the gliders)

On the Student Doc 1 - Penguin Feeding Diagram, write in **invisible black light ink** “diurnal” on the top map and “semidiurnal” on the bottom map. Also circle the coordinate (-64.9 latitude, -64.2 longitude) on the bottom map

Place the Student Doc #4 and #5 in the small box with the directional multilock on it. Place the small, locked box in the large box with the remaining locks on it.

Hide Student Docs #2 and #3 around the room

The end goal will be to have the students explain the connection of convergence zones, tides, use of gliders to collect data, and feeding locations of penguins. Each code will unlock a lock that will provide students with the necessary diagrams and data to be able to make connections between them. Each time a lock is unlocked, provide the students with the next student document. When the final small box is unlocked, students will have to write

Playing the Game

1. Begin the game and give the students the locked box and the Student Doc 1 diagram (they will have to use the black light to highlight the location and “diurnal” and “semidiurnal” words.
2. Give clues to aid them along when they truly get stuck :)
3. When they have opened all of the boxes and solved all of the clues, they have all of the diagrams to put together the information. They will need to discuss and construct a description of the data including tidal data, penguin locations, chlorphyll and temperature data. surface currents, and glider information.
4. Solution for the “Case of the penguin’s missing lunch” is that
	1. The hypotheses that:

H1. Convergence zones in the surface waters within 50 km of the coast shift location between the diurnal and semi-diurnal tidal regime.

H2. These convergence zones concentrate phytoplankton and aggregate schools of krill and subsequently influence the behavior of top predator species between tidal regimes.

Assessment

* **Performance—**what will students do during the lesson to demonstrate understanding?
* **Product—**what will students produce to demonstrate understanding?
* Assessment should be directly related to the lesson objectives
* ***Assessment rubrics that you would use in the classroom are also helpful***

Additional Resources

Please list any websites, books, publications, or other resources that would be helpful for teachers or students preparing for this lesson.

Extensions or adaptations

List any adaptations to the lesson that will make it more accessible to a wider audience, or any extensions that will move the lesson beyond initial understanding or experience.