



Everblue Education

Penguins and Observations

Ready to journey to meet the penguins of Antarctica? In this lesson, students will learn about animal behavior and making scientific observations. This lesson is based on a research paper written in 2019 by scientists James McClintock, Charles Amsler, Margaret Amsler, and William Fraser, and describes a new feeding pattern observed in gentoo penguins.

Everblue is a 501(c)(3) nonprofit dedicated to encouraging ocean-conscious living by increasing scientific literacy. Our online education resources connect current science to daily life, allowing you to learn about the ocean at your fingertips! Stay in touch by following @oceaneverblue on your preferred social media platform or by visiting our website at www.oceaneverblue.org.

To help us keep the ocean ever blue, please share this program with the teachers and parents you know so we can spread ocean science far and wide. Partnering with marine scientists from around the world who study all parts of the ocean, we've created simple and engaging activities based on recently published papers! These activities connect you and your students to current research while fulfilling education standards for reading, math, science, and writing. Even though the activities are created for grade school, they're fun and informative for parents and siblings, as well! More activities will be available to download for FREE off of our website, with a new activity added every Friday until the end of quarantine.

Research Paper:

Intertidal foraging by gentoo penguins in a macroalgal raft. *James B. McClintock, Charles D. Amsler, Margaret O. Amsler, and William R. Fraser. 2019.*

Grade Level:

Pre-K - 2nd Grade

Timing:

1 hour

Materials:

Paper, writing utensils, scissors, printer (optional)

Next Generation Science Standards

Science & Engineering Practices: Developing & Using Models Carrying Out Investigations	Crosscutting Concepts: Cause & Effect Patterns	Disciplinary Core Ideas: Ecosystems Energy
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Common Core State Standards

Sort and classify objects into given categories

Activity Overview

Title of Activity	Learning Cycle Stage	Time
Meal or Snack?	Invitation, Exploration	5 minutes
Eat Like a Penguin	Concept Invention	20 minutes
Science Eyes	Application	30 minutes (or however long your students' attention span can last)
Reflection	Reflection	5 minutes

Appendix Contents

Appendix I Instructor Support	Appendix II Attached Lesson Materials
Ocean Vocabulary Common Questions	Meal or Snack Flashcards Penguins and Krill



Activity

Meal or Snack?

In this activity, students will think about how food gives us energy by sorting different types of human food as meals or snacks. Meals take more time to prepare and keep you full longer. Snacks are quicker and need to be eaten more often. In Appendix II, there are cards with examples of different human meals and snacks along with different foods eaten by Gentoo Penguins. These cards will be used again in our next activity.

First, let's prepare our cards!

- If you have access to a printer:
 - Print and cut rectangles along the solid lines.
 - Fold rectangles in half, along the dotted lines.
 - Mix the cards up in a pile, ready to be used in a moment
- If you do not have access to a printer:
 - Create your own cards to look like those in Appendix II
 - Use two types of objects to represent the meals and snacks.

Next, let's start by thinking about the foods you and your student eat.

- Ask your student about their favorite meal.
 - What do you call it? What is in it? Who normally makes it? How long does it take to make? Does it keep you full of energy for a long time or a short time?
- Ask your student these questions again about their favorite snack. If you have some around, feel free to go grab this snack to munch on during our activities.

Help your student to see the two big differences between meals and snacks: How long it takes to be prepared, and how long it keeps you full of energy.

1. Now, let's use those two differences to sort some of the favorite meals and snacks of our Everblue community! This will also help set up our next activity.
 - a. Take each card and read the name of the dish, how long it takes to be prepared, and how long it keeps you full of energy.
 - b. Have your student decide if it is a meal or a snack.
 - c. Place the meals in one pile and the snacks in another pile.

With your meals and snacks sorted into their respective piles, think about what meals and snacks might mean for animals in the wild that only have a limited amount of time and energy to get the food they need. These thoughts will get your students ready for our next lesson!

Eat Like a Penguin

In this activity, we'll pretend to be the penguins in this research study and play a game to gather food! Move furniture or other items to open up a large open space in your home or backyard in order to play, then follow the instructions below to set up the game.

1. Designate one area on the side of the room as the “shoreline” - this could be a couch that the students sit on, or a wall that they stand next to.
2. Make a pile of pillows or blankets about 5-10 feet from the wall to use as the “algae raft.”
3. Flip over the “meal” and “snack” cards from the first activity to reveal your krill and fish! Scatter the krill on the pillow/blanket **algae** raft and scatter the fish at the far end of the room, as far away from the shoreline and algae raft as possible.
4. Have the students stand by the wall or sit on a couch or other area while you read them the following instructions. Notes for instructors are in italics.

The research in this lesson is all about **gentoo penguins**! These penguins live in Antarctica and eat krill and fish. The scientists who wrote this research watched the penguins to learn how they eat - so in this activity, we're going to practice being penguins to learn what the scientists saw! Are you ready to be a penguin?

First, let's practice moving like a penguin. When you're on land or going to the raft of algae that floats just offshore (point out the pillow algae raft to your students,) you have to waddle. To waddle like a penguin, straighten your arms and legs and walk without bending your knees, waddling back and forth and flapping your penguin wings! *Allow the students to practice waddling like penguins.*

When you're swimming further offshore to get fish from the open water (point out the fish in the “open ocean” at the far end of the room,) you have to swim! To swim like a penguin, put your arms together above your head and jump forward, making a rainbow forward with your arms as you jump! *Allow the students to practice swimming like penguins.*

Now, you only have a certain amount of time to be able to gather enough food to eat each day! There are two types of food near you that you can eat as a penguin: krill, and fish. The fish swim far offshore, and it takes more energy to swim to them, but they're really filling, so you only need two fish each day to eat. These fish are just like the “meals” we talked about in the first lesson! The krill live closer to the shore, hiding in the algae and seaweed in the floating algae

raft, so they don't take as much energy to waddle to and eat. However, they're smaller and don't fill up your little penguin stomach as much, so you have to eat four of them each day. These krill are just like our "snacks"!

As a penguin, you have a choice! Do you waddle to the raft to get krill, or do you swim to hunt for fish? Each time you either waddle to the raft or swim offshore, you have to bring your food (a krill or a fish) all the way back to the shoreline, which is your home base, before going back out. For this first round, you have to choose either waddling to the raft OR swimming offshore. You have 30 seconds to gather all the food you need for the day. *If you are doing this activity in a particularly small or large room, you can make this time limit shorter or longer to account for the space your students are playing in.* If you choose to waddle to the raft for krill, remember you need to collect five krill. If you choose to swim offshore for fish, remember you need to collect two fish. Have you made your decision? *Wait for the students to decide whether they want to get krill or fish. Once they've decided, you can start the timer.* On your marks, get set, go, penguins, go!

Allow the students the allotted time to hunt for krill and fish. Then, when they get back to the shoreline and the time is up, ask them the following questions:

- Did you decide to hunt for krill, or hunt for fish?
- Why did you make your food choice?
 - *Get them to think about the energy they used either waddling or swimming, how close the food options were to the shoreline, and how you had to eat more krill than fish in order to eat enough.*
- What was difficult about your food choice? What was easy?

These are the kinds of decisions that penguins have to make every day when they forage for food! Now, we're going to play this game again, but this time, if you choose, you can hunt for a combination of fish and krill! To get enough to eat, if you choose to hunt for both, you have to collect one fish and two krill. Or, if you'd like, you can choose to just get krill or just get fish again, or switch from your choice in the first round and try out hunting for the other. *Wait for your students to decide where they want to go as penguins this round, then start the timer.* On your marks, get set, go, penguins, go!

Allow the students the allotted time to hunt for krill and fish. Then, when they get back to the shoreline and the time is up, ask them the following questions:

- Did you decide to hunt for krill, fish, or both?
- Did your decision change from the first round?
- Why did your decision change or why did it not change?

- If you decided to hunt both, was it easier or more difficult to get two different types of food?

The scientists who researched the penguins in this paper thought that the penguins mostly just swam and hunted for fish. By watching and observing the penguins, they learned that the penguins have a whole different method of hunting for krill in the algae raft in addition to swimming for fish! This taught the scientists that the penguins are very resourceful, and have different ways of hunting for different types of food, just like you did in this activity. Go on to the last activity in this lesson to learn how to observe animals like the research scientists observed the penguins!

Science Eyes

In this activity, we're going to use our science eyes to observe the world around us! To start this activity, read the following information to your students:

Data are a collection of facts, little truths about the world that we can get by looking or measuring. Scientists always collect data as clues to answer their questions. What are some examples of data you can think of? (*Nudge students towards talking about the temperature outside or the weather, marking how tall they grow each year, etc.*). Now, data can either be made up of numbers, or it can be made up of observations that you, the scientist, make using your senses. What are some examples of data you can think of that use numbers or observations? (*Again, have the students think about weather - when you walk outside in the morning, you can either say that the weather feels cold, which would be collecting observational data, or you can use a thermometer or check the weather channel for the actual temperature, which would be collecting numerical data.*) The penguin paper we're learning about today used observational data. The scientists observed the gentoo penguins in Antarctica and learned a new way that the penguins collect food to eat, all just from watching the penguins over a period of time!

In this activity, we're going to collect observational data about the place we live in. Let's start with our scientific notebook. Almost every scientist records notes to help remember details that might be important later on. These details are called **observations**, and they can be written descriptions, pictures, measurements, questions, or just about anything else that you think to record. You can find your own scientific notebook page in the Appendix II - Attached Lesson Materials section of this lesson! You can either print it out, or if you don't have access to a printer, you can easily recreate it with a blank sheet of paper and a writing utensil! Once you've got your journal set up, you can start your observations by reading the next few instructions.

Today, we'll be observing animal behavior. You can pick any kind of animal you want--a bird, bug, squirrel, a pet, or any other animal that happens to be nearby. If you want, you could even

tune into a live cam at your local zoo or aquarium! One of our favorites at Everblue is from the Monterey Bay Aquarium, and you can find it at this link:

<https://www.montereybayaquarium.org/animals/live-cams>

It's important that we don't disturb the animals while we observe them, so remember to be quiet and give the animal plenty of space. The calmer you can be while observing, the more likely that your animal will feel comfortable. Find a place where you can sit and record notes. You can make a pair of binoculars using rolled up paper to help with your observations!

1. First, write your name in the "observer" box.
2. Describe your setting: Where are you? What is the weather like? What kind of plants are around? What can you hear and see?
3. Record the kind of animal you're observing in the "animal" box.
4. Now, use your senses to observe your animal. What does it look like? Can you hear it? What is it doing? Use your binoculars to help you see! To make your own binoculars, make two circles with your hands and hold them up to your eyes. This helps to focus your vision like a scientist in the field. Write all of this down in the "observations" box. Feel free to draw pictures, write words, and make tallies.

Note: right now we're just recording what we can observe without deciding what it means. For example, if you see two squirrels chasing each other, we don't know if they're playing, upset, or something else. It certainly would be a lot easier if we could just ask!

5. Try to sit and watch for several minutes at least. The longer you observe, the more you're likely to see! It's okay if your animal decides to leave early, though. If that happens, pick another animal to observe and make a note of the change.
6. Once you've finished making observations, look over what you wrote. Was anything surprising? Did you see anything you've never noticed before? In the "ideas" section at the bottom, list any questions or ideas about the animal(s) you observed.

Reflection

As you and your student are cleaning up, talk to your student about what you just did together. Here are some guiding questions to help shape your conversation.

- What was your favorite part of our activity today?
- What is something that you learned about making observations?
- Did you notice any patterns during our activity today?
- What is something you wonder about penguins?
- What surprised you the most during our activity today?



Appendix I - Instructor Support

Ocean Vocabulary

- algae - Algae, seaweed, and kelp are all names for the plant-like organisms that grow in the ocean!
- data - Facts, observations, or statistics collected to make inferences and analysis about the world
- gentoo penguins - Penguins that live in Antarctica and can grow to be 30 inches tall and weigh 12 pounds! They mostly live near shallow shorelines.

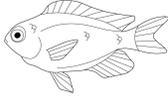
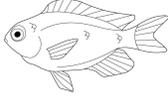
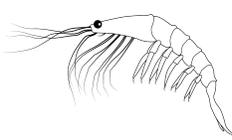
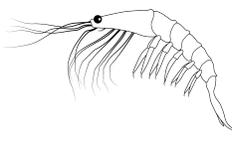
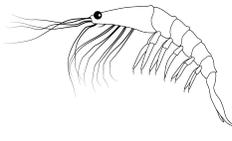
Common Questions

Is observational data just as important as numerical data?

The short answer is, yes! Just because you aren't writing down a big number from a fancy piece of science machinery doesn't mean that your results aren't important or useful. Whole scientific papers, just like the one covered in this lesson, can be written off of observations and using what you see to make inferences about the natural world!

Appendix II - Attached Lesson Materials

Meal or Snack Activity Cards + Penguins and Fish

<p>Pasta dishes, like lasagna or spaghetti, take some time to be prepared. They keep you full for a long time.</p>	
<p>Fish, grains, and vegetables take some time to be prepared. They keep you full for a long time.</p>	
<p>Lentil stews take some time to be prepared. They keep you full for a long time.</p>	
<p>Curry dishes take some time to be prepared. They keep you full for a long time.</p>	
<p>Pretzels and hummus can be prepared quickly. They fill you up, but do not keep you full for a long time.</p>	
<p>Fresh fruit and vegetables can be prepared quickly. They fill you up, but do not keep you full for a long time.</p>	
<p>Dried seaweed can be prepared quickly. It fills you up, but does not keep you full for a long time.</p>	
<p>Popcorn can be prepared quickly. It fills you up, but does not keep you full for a long time.</p>	

Science Eyes Journal Page

Observer name:

Place:

Animal:

Observations:

Questions / ideas: