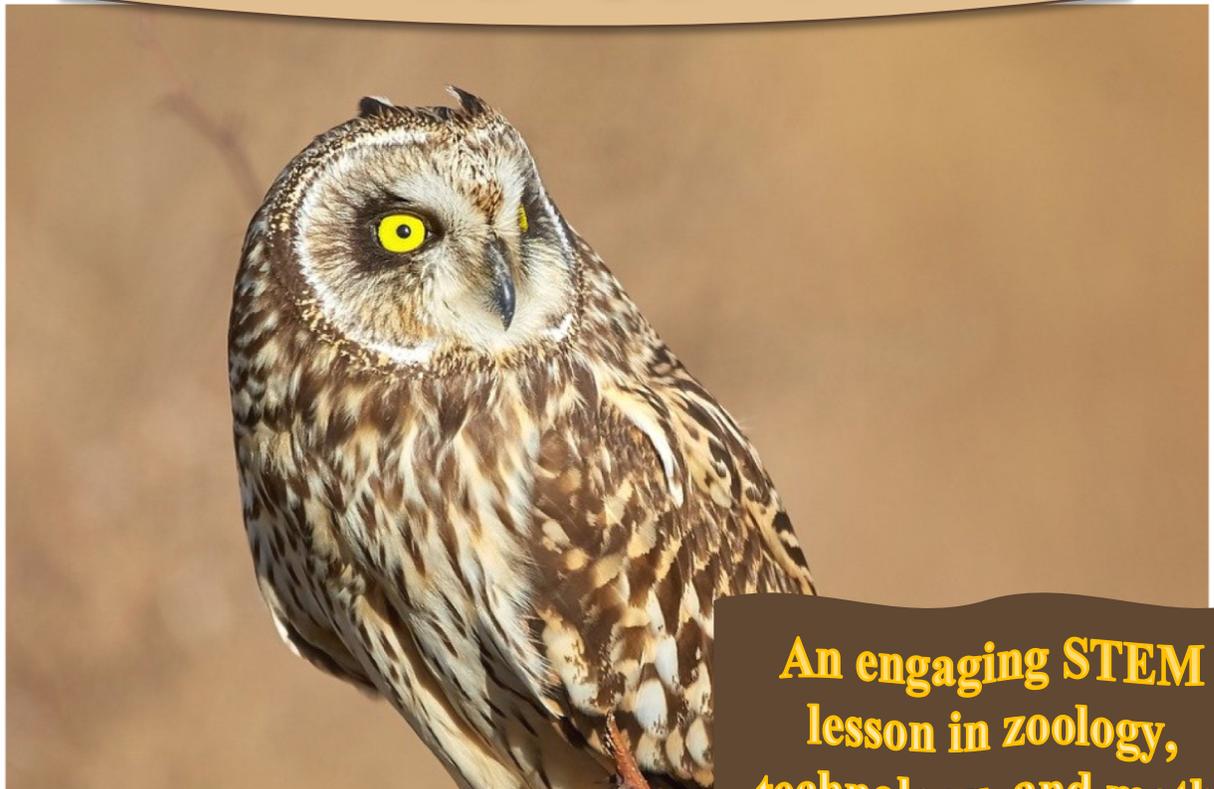
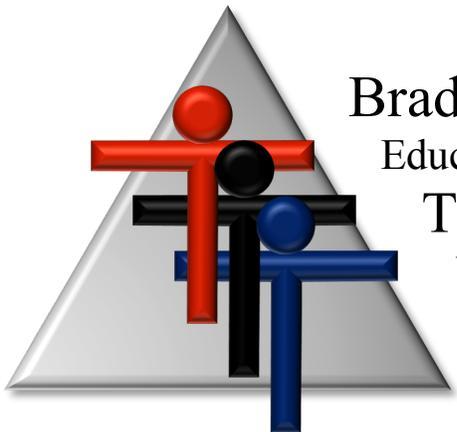


The Wonderful World of Owls



An engaging STEM
lesson in zoology,
technology, and math.



Brad Fulton

Educator of the Year, 2005

Teacher to Teacher Press

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www.tttpress.com





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Thanks.

Brad



Brad Fulton Educator of the Year

- ◆ Consultant
- ◆ Educator
- ◆ Author
- ◆ Keynote presenter
- ◆ Teacher trainer
- ◆ Conference speaker

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Known throughout the country for motivating and engaging teachers and students, Brad has co-authored over a dozen books that provide easy-to-teach yet mathematically rich activities for busy teachers while teaching full time for over 30 years. In addition, he has co-authored over 40 teacher training manuals full of activities and ideas that help teachers who believe mathematics must be both meaningful and powerful.

Seminar leader and trainer of mathematics teachers

- ◆ 2005 California League of Middle Schools Educator of the Year
- ◆ California Math Council and NCTM national featured presenter
- ◆ Lead trainer for summer teacher training institutes
- ◆ Trainer/consultant for district, county, regional, and national workshops

Author and co-author of mathematics curriculum

- ◆ Simply Great Math Activities series: six books covering all major strands
- ◆ Angle On Geometry Program: over 400 pages of research-based geometry instruction
- ◆ Math Discoveries series: bringing math alive for students in middle schools
- ◆ Teacher training seminar materials handbooks for elementary, middle, and secondary school

Available for workshops, keynote addresses, and conferences

All workshops provide participants with complete, ready-to-use activities that require minimal preparation and give clear and specific directions. Participants also receive journal prompts, homework suggestions, and ideas for extensions and assessment.

Brad's math activities are the best I've seen in 38 years of teaching!

Wayne Dequer, 7th grade math teacher, Arcadia, CA

"I can't begin to tell you how much you have inspired me!"

Sue Bonesteel, Math Dept. Chair, Phoenix, AZ

"Your entire audience was fully involved in math!! When they chatted, they chatted math. Real thinking!"

Brenda McGaffigan, principal, Santa Ana, CA

"Absolutely engaging. I can teach algebra to second graders!"

Lisa Fellers, teacher

◆ *References available upon request* ◆

Like my activities? How about giving me a favorable rating on the Teachers Pay Teachers website? Four stars would be much appreciated and would help me sleep better at night.



Like me even more? Then please don't make copies for your colleagues. I know it's tempting when they say, "Wow! Groovy activity! Can I have a copy?" But this is how I make my money, and why are they still saying "groovy" anyway?



If we make copies for our friends, can we honestly tell our students not to copy or take things that don't belong to them? (Ouch!)



Discounted site licensed copies are available on the TPT website. Please encourage them to take advantage of this affordable option. Okay?

Thanks, and happy teaching,

Brad 

This activity helps students learn about the amazing lives of owls.

The students will conduct research to learn more about these unique birds. In my teenage years, I found and raised a baby short-eared owl. A brief story about my experience follows. Our local vet found out about that. Each spring, people would bring him owlets that had fallen out of their nests. Over the years, he gave me four more barn owls to raise.

Unlike most birds that have a crop to help with digestion, owls swallow their prey whole. This means they have to dispose of the fur and bones. Owls will regurgitate a pellet of the animal's undigested remains.

I begin the lesson by putting my students in groups of two to four and assigning them one of the eight research topics. For each topic, a QR code and a URL are provided, but they are free to do research of their own. Each team then has to prepare a slide show presentation. I teach them how to create a captivating slide show using some of these principles:

- Begin with a title slide. This should tell what your research topic was about. You should also include your team members' names on the title slide and perhaps a picture.
- Use pictures on each slide. Remember that, "A picture is worth 1,000 words."
- Limit your text: you want them to listen to you, not read your words off the screen.
- Make your font size large: size 24 at least.
- Don't use creative font styles or colors. No pink text in Old English. Just use a simple, readable font.

I follow up this activity by letting my students dissect owl pellets. I collect mine locally near where I found my owl, but you can purchase them online.

I give each pair of students a pellet and some gloves. At first, your students may squirm a bit as they find the pieces of a mouse's skeleton hidden in the pellet, but if they are like mine, they soon will be engaged in exploring the owl's diet. You may wish to have them include a picture of their owl pellet's contents in their slide show.

Students can also try to identify the types of mouse bones in their pellet. Can they find the skull? The mandible (lower jaw)? Femurs?

If you want to incorporate some mathematics into the lesson, students can look at the data they collect about their pellets.

- How many pellets were dissected?
- How many skulls were found? Remember that the number of skulls tells us the number of mice eaten.
- What is the average (mean) number of skulls in a pellet? What is the median?

You can also print and share with them the story of my first owl that is included in this lesson.

Here are some possible answers for the eight research questions:

1. Let's learn about owls

- How many species of owls are there in the world?

There are over 200 species of owls

- What is the smallest and largest species?

The elf owl is the smallest at less than six inches tall, and the Blakiston fish owl is the largest and can have a wingspan of six feet! My short-eared owl was just over a foot tall and had a wingspan of two and a half feet.

- What do they eat?

Most owls eat rodents like mice, but they can eat reptiles, other birds, and even other owls.

- When do they hunt?

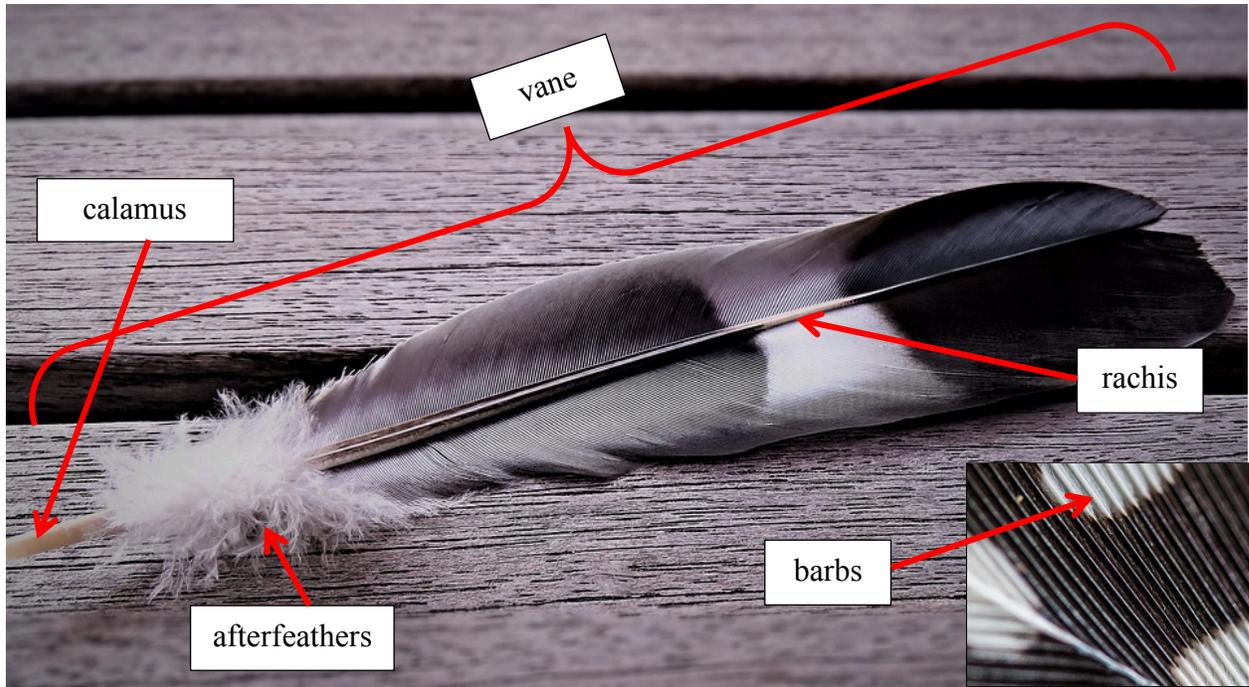
Many owls hunt at night, but some hunt in the early evening as well. A night-hunting owl is called *nocturnal*. Owls that hunt in both night and day are *diurnal*.

- What are some characteristics that set the owl apart from other types of birds?

Owls have no crop. They grind their food using the bones of the animal. They also have unique feathers that help them fly silently. Their night vision is excellent as is their sense of hearing. They can hear a mouse crawling under two feet of snow! They can also rotate their heads side to side nearly a full circle and can rotate their heads sideways too.

2. Let's learn about feathers

- Identify the five parts of a feather: afterfeather, barb, calamus, rachis, and vane.



- Besides birds, what other animals has feathers?
Some dinosaurs had feathers! Birds are closely related to dinosaurs.
- What are some animals that have wings that aren't feathers?
Many animals such as insects and bats have wings, but not all winged animals have feathers.
- How have humans used feathers throughout history?
Feathers have been used to make pens, and to decorate costumes. The soft, downy feathers that keep the bird warm have been used in pillows and to make insulated coats.

3. Let's learn about owl feathers.

- What is special about the edges of owl feathers?

The very tips of the barbs are serrated. That is, they are separated instead of blending together to form a smooth edge.

- How does that help the owl?

This jagged edge means that the owl flies more slowly, but its wings don't make any noise. My pet owl would sometimes surprise me by flying in from behind and landing unexpectedly on my head!

4. Let's learn about the owl's vision.

- How well can owls see at night?
Owls have excellent night vision.
- What makes their eyes work so well in darkness?
Eyes have two types of receptors: cones and rods. Cones detect color but not light and dark. Rods detect light and dark but not color. Owls have many more rods than humans but fewer cones. Thus, they can see with much less light, but don't detect colors well.
- What is special about the location of an owl's eyes?
Their eyes are in the direct front of their head instead of toward the sides. This allows them to see the prey in front of them. Most of their prey, such as mice, have eyes on the sides of their heads so they can see danger that is in front, to the sides, and even behind them.
- What is special about the shape of an owl's eyes?
Their eyes are tubular instead of spherical. They work somewhat like binoculars allowing the owl to see great distances, but not so well up close.
Also, owls cannot move their eyes in their sockets. They always face straight ahead. An owl must move its whole head to judge distance. When an owl rocks its head left and right, it is trying to judge the distance to its prey.

5. Let's learn about the owl's sense of hearing.

- How well can owls hear?

Owls have excellent hearing. An owl can hear a mouse walking under two feet of snow!

- Where are their ears located?

Their ears do not stick out like ours. The "ears" we see on the short-eared owl are not ears at all but merely tufts of feathers. Their ears are holes in the side of their skull.

- What does it mean that their ears are "asymmetrical"?

Human ears are symmetrical: one on the left and a matching one on the right. An owl's ears do not match.

- How do asymmetrical ears help the owl?

Ears on the left and right help us to tell which side a sound is coming from. An owl has one ear lower than the other as well allowing it to tell if a sound is from above or below. And one ear is more toward the front and the other slightly back so they know if the sound is in front of them or behind them.

6. Let's learn about the owl's food.

- What do owls like to eat?

Owls love to eat mice and rodents, but some owls eat other animals such as lizards, snakes, and other birds.

- How much do they eat in a day?

It partly depends upon their diet. Since mice are smaller than rats, an owl can eat many more mice in a year than rats. A barn owl can easily eat 200 to 500 rodents in a year.

- What is an herbivore, omnivore, and carnivore?

Herbivores eat only plants. Carnivores eat only meat.

Omnivores, like humans, can eat both plants and meat. Owls are carnivores.

- Do owls eat other owls?

Yes, owls will sometimes eat other owls.

7. Let's learn about how owl's digest their food.

- Can owls chew their food?
Birds have no teeth, so they cannot chew their food. Owls usually swallow their prey whole.
- How many stomachs does an owl have?
Owls have two stomachs. The first one is used to grind up the mouse. Then the soft parts pass to the second stomach for digestion.
- What is an owl pellet?
The pellet is formed in the first stomach. It is the remaining bones and fur that don't get digested.
- What does "regurgitate" mean?
Regurgitate means to throw up. The owl will regurgitate the unused pellet after its meal.

8. It's fun to learn about amazing animals such as the owl.

- Do owls have eyeballs?

No, owls don't have eyes that are shaped like ours. Their eyes are tubular and work like binoculars.

- Tell about how an owl can turn its head.

An owl can turn its head nearly 180° to the right or left to make nearly a full circle. An owl can also rotate its head sideways so that its two eyes are vertical.

- What do you call a group of owls?

A group of owls is not a "flock". It is called a "parliament."

- What does "zygodactyl" mean? Isn't that a great word for a game of "hangman"?

Zygodactyl refers to the arrangement of an owl's toes. Most birds have three toes facing forward and one facing backwards. Owls have two forward facing and two backward facing toes. This allows them to get a good grip on their prey.



Suddenly, my dog froze. With foreleg bent beneath his chest, he leaned forward, his nose pointed straight ahead into the rushes of the prairie.

We were walking through the high desert ranchland of northeastern California. Peering into the grass, I couldn't see the bird my dog had spotted. A duck? A goose? That was what he'd been trained to find.

I stepped cautiously forward expecting a bird to take flight at any moment. Closer and closer. Still nothing. And then I saw two golden eyes glaring at me from a mass of snowy feathers. An owlet still in down, puffed up to appear as wide and formidable as possible. It screeched at me: a piercing and terrifying scream to try to scare me away.

Owls rule the night, but by day, they are often harassed by other birds. This one had apparently been taken from its nest and left in the marsh. It would not be able to survive.

I reversed my coat, sliding my arms into the sleeves so that the back of the coat covered by chest. Then I bent down to embrace the terrified bird. It screeched again and tried to tear at me with its knife-like beak and claws, but I tenderly wrapped my arms and held it against my chest.



A short-eared owl in flight. Their feathers are adapted for slow, silent flight.

I was now the parent a fledgling short-eared owl. Covered in the down that would keep it warm on the cold desert nights, the owlet was not yet capable of flying. Back at the cabin, I found an old varmint cage and placed the owl inside with a bowl of water. It sat there hunkered down and staring at me angrily. Out on the prairie there were hundreds of gophers. I got out my bow and arrow and quickly had one. I cut off one of its legs and put in in the cage with the owl.

That night, I was sound asleep when suddenly I heard a nearby scream so terrifying that I was immediately wide awake. My eyes struggled to adjust to the inky darkness, and there at the foot of my bed two amber angry eyes stared menacingly at me. My owl was telling me that it was meal time.

Birds don't have teeth and can't chew their food the way we do. Most birds have a crop, a sack of small gravel and sand that grinds their food before it passes on to digestion. Owls have a different way of

breaking down their food. They tear off large parts of their prey or swallow it whole. They let the bones of the animal help grind up their meal. After the food is digested, they will regurgitate a pellet of all the fur and bones. If you give an owl pure meat, it will starve to death unable to digest it.

Adult short-eared owls stand over a foot tall and have a wingspan of nearly three feet. Two small feathered tufts rise up from the top of their head looking like the ears on a horse. They are not ears at all, but simply a display the owl shows when it is interested, hungry, or just showing off. Lacking its adult feathers, my owlet didn't have its beautiful adult plumage yet.

Over the coming months, my owl grew into a beautiful and accomplished flyer. By day, I kept him in a much larger pen that I built, and in the evenings, I would take him out and teach him to hunt. I began by setting out a dead gopher or mouse and let him approach it and take it. The mice he would swallow whole: the wiggly tail would go down last, looking like a noodle hanging out of his beak.



My owl explores my hand hoping for a bite of mouse in back in the summer of 1972.

He got very used to me and would sit on my shoulder. When I threw a ball to my dog, the owl would take flight and fly above the dog as if he was tracking it. Once he even bonked the dog on the head with his talons for practice. The dog yelped and did a summersault!

I slept outside that summer so that the owl could find me for his nightly feedings. He would spend the night flying the skies as he practiced hunting. Then he would come back around three or four in the morning and land on my pillow by my face. His silent flying didn't awake me, but his hungry scream did!

I could go out in the early morning when it was still dark and call the owl. It would glide silently through the night and alight on my shoulder. Owls have special feathers that allow them to flap their wings without making any sound.

By the midsummer, my owl was fully grown and spent less and less time at home on his perch. Sometimes he would stay away for a few days, returning only when for a free meal when his own hunting fell short. One late summer evening, he was riding on my shoulder as the sun dropped. He arose and began circling higher and higher overhead. A songbird dashed across the sky headed toward a nightly roost. My owl angled down behind the bird as it tried to make it to safety. My owl was too quick, and the bird had stayed out too late. That was the last time I saw him. My pet was no longer my pet. He had returned to the wild.

There were nights in the years following when I would be out gazing into the starry darkness, and high above I'd hear a screech: that familiar piercing scream, but it no longer scared me. I just smiled.

My name _____

Team members _____



1. Let's learn about owls. You and your team will create a slide show to present to the class to share what you learn. Your slide show should contain three to five slides. Include pictures with your slides. Also, you should limit your text to no more than one short phrase or title per page.

Owls are very unique. Tell us some facts about owls. Tell us some ways in which owls are different from other species of birds. Here are some questions to get you started.

- How many species of owls are there in the world?

- What is the smallest and largest species?

- What do they eat?

- When do they hunt?

- What are some characteristics that set the owl apart from other types of birds?

<https://en.wikipedia.org/wiki/Owl>



My name_____

Team members_____

2. Let's learn about the feathers. You and your team will create a slide show to present to the class to share what you learn. Your slide show should contain three to five slides. Include pictures with your slides. Also, you should limit your text to no more than one short phrase or title per page.

Feathers are specially adapted to allow birds to fly well. Tell us about the structure of feathers. Here are some questions to get you started.

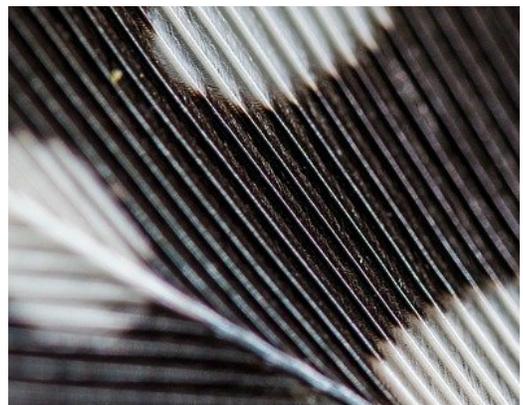
- Identify the five parts of a feather: afterfeather, barb, calamus, rachis, and vane.

- Besides birds, what other animals has feathers?

- What are some animals that have wings that aren't feathers?

- How have humans used feathers throughout history?

<https://en.wikipedia.org/wiki/Feather>



My name _____

Team members _____

3. Let's learn about the owl's feathers. You and your team will create a slide show to present to the class to share what you learn. Your slide show should contain three to five slides. Include pictures with your slides. Also, you should limit your text to no more than one short phrase or title per page.

Owls have very unique feathers. Tell us what you learned about owl feathers. Here are some questions to get you started.

- What is special about the edges of owl feathers?

- How does that help the owl?

<https://asknature.org/strategy/wing-feathers-enable-near-silent-flight/>



My name _____

Team members _____

4. Let's learn about the owl's vision. You and your team will create a slide show to present to the class to share what you learn. Your slide show should contain three to five slides. Include pictures with your slides. Also, you should limit your text to no more than one short phrase or title per page.

Owls have amazing eyesight. Tell us what you learned about owl vision. Here are some questions to get you started.

- How well can owls see at night?

- What makes their eyes work so well in darkness?

- What is special about the location of an owl's eyes?

- What is special about the shape of an owl's eyes?

<http://scienceline.ucsb.edu/getkey.php?key=1235>



My name _____

Team members _____

5. Let's learn about the owl's sense of hearing. You and your team will create a slide show to present to the class to share what you learn. Your slide show should contain three to five slides. Include pictures with your slides. Also, you should limit your text to no more than one short phrase or title per page.

Owls have incredible hearing. Tell us what you learned about the owl's sense of hearing. Here are some questions to get you started.

- How well can owls hear?

- Where are their ears located?

- What does it mean that their ears are "asymmetrical"?

- How do asymmetrical ears help the owl?

<https://www.barnowltrust.org.uk/owl-facts-for-kids/barn-owl-hearing/>



My name _____

Team members _____

6. Let's learn about the owl's food. You and your team will create a slide show to present to the class to share what you learn. Your slide show should contain three to five slides. Include pictures with your slides. Also, you should limit your text to no more than one short phrase or title per page.

Owls love to eat! Tell us what you learned about the owl's diet. Here are some questions to get you started.

- What do owls like to eat?

- How much do they eat in a day?

- What is an herbivore, omnivore, and carnivore?

- Do owls eat other owls?

<https://abcbirds.org/blog20/seven-facts-owls-eating-habits/>



My name _____

Team members _____

7. Let's learn about how owls digest their food. You and your team will create a slide show to present to the class to share what you learn. Your slide show should contain three to five slides. Include pictures with your slides. Also, you should limit your text to no more than one short phrase or title per page.

Owls have an unusual way of processing their food. Tell us what you learned about the owl's diet. Here are some questions to get you started.

- Can owls chew their food?

- How many stomachs does an owl have?

- What is an owl pellet?

- What does "regurgitate" mean?

<https://animals.mom.com/owls-digestive-system-based-upon-pellets-9815.html>



My name _____

Team members _____

8. It's fun to learn about amazing animals such as the owl. You and your team will create a slide show to present to the class to share what you learn. Your slide show should contain three to five slides. Include pictures with your slides. Also, you should limit your text to no more than one short phrase or title per page.

Let's learn some fun facts about owls. Tell us what you learned about the owl's diet. Here are some questions to get you started.

- Do owls have eyeballs?

- Tell about how an owl can turn its head.

- What do you call a group of owls?

- What does "zygodactyl" mean? Isn't that a great word for a game of "hangman"?

<https://www.audubon.org/news/13-fun-facts-about-owls>



If you liked this activity, you might also like some of the other lessons available in my TeachersPayTeachers store. Simply go to bit.ly/tttpressstore or use the QR code. You can also find many free and inexpensive resources on my personal website, www.tttpress.com. **Be sure to subscribe to receive monthly newsletters, blogs, and FREE activities.**



Similar activities include:

- *Petroglyphs Lab* – Combine history and language arts in this fun and engaging activity in which students tell their story through petroglyphs.
- *Best Ever Bird Beak Challenge* – Learn about adaptation in this blended science and math activity that can be adapted from primary grades through middle school
- *Electric Dough* – Students learn the basics of wiring circuits using modeling dough, batteries, and lights!
- *Give Me a Hand* – Learn about prosthetics as students make a model hand with fingers that flex.
- *Heat and Temperature Unit* – 13 simple, engaging, and educational labs await as students learn about the physics of heat and temperature.

Feel free to contact me if you have questions or comments or would like to discuss a staff development training or keynote address at your site.

Happy teaching,
Brad