Second Grade

Characteristics of Birds

Objective: To identify and classify the basic structures and their functions of birds.
- Locomotion
- Sensory
- Digestive system
- Respiratory system

Tools:
- Picture of Dinosaur
- Bird Feathers, Owl Feathers
- X-ray picture of bird showing bone structure
- Bird bone and (fake) human bone
- Picture of bird and human lung
- Gizzard stones
- Pellets
- Birdseye view

Performance Task:

Students will learn evolutionary history of birds, and relate adaptations to flight, specifically feathers, bone structure, respiratory system, eyesight, and digestive system.

Classroom Management:

Explain necessity of remaining quiet for the duration of the presentation
If small (and calm) classroom, may pass around pictures/artifacts, or hold them for students to see.
For all topics, invite students to predict first. May facilitate responses from students by showing artifact to represent topic.

Feathers:

All birds have feathers, and only birds have feathers. There are also different kinds of feathers that serve different purposes (kind of like differences in facial hair and the hair on your head!). Down feathers provide warmth and flightfeathers, which are found in the wing and tail, allow for flight. Feathers are attached to the bird's skin on the calamus (stem), which is hollow and contains a vein. The size, shape, and structure of the feather help birds fly, and different birds have different size, shape and color feathers.
Can you tell me the difference between the two feathers (owl and non-owl)? Owl feathers are much more broad and soft than other bird feathers, this allows them to flap their wings less and gives them the advantage of silent flight.

Bones:

If you had to fly to get everywhere, what would you take with you? The least amount and lightest load as possible! Birds have less bones than other animals and they have hollow bones, making them more lightweight and more efficient flyers. If you gather all the bones in a birds body, they will weigh less than all their feathers! The hollow structure of their bones makes them sliver when cooked, and when fed to dogs, those slivers can get stuck in throats. This is why we don't give chicken bones to pets!

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Lungs:
Who has ever taken an airplane somewhere? Did your ears pop? It's because of pressure! The higher up you go, the less dense the air is. That pressure change makes your ear drums expand, which makes your ears pop. Kind of like your shampoo bottles! When we fly in airplanes, the cabin is pressurized so we can breathe, but birds developed lungs that do this for them. We have two lungs; when we inhale, they expand (you can see this in your chest and/or stomach) and when we exhale, they contract like a balloon. Birds have nine sacks in their lungs that move air through the lungs like a tunnel, so the air only passes through once. Birds devote four-times as much energy into breathing than mammals, but only take about half as many breathes.

Eyes:
Birds have keen eyesight, as it is their most important sense. They have to be able to see their food from way up high in the sky, see any predators that may want to eat them too, and most of all they have to be able to see where they are going while flying. Their eyeballs aren't round like ours, they are flattened which helps them see more things, better.

Digestive:
Birds don't have jaws or teeth like us, instead they have beaks, which are also more lightweight and efficient for them. They use their beak for eating, but not chewing. Instead of chewing before they swallow, they eat rocks! These rocks are called gizzard stones, because the belly of a bird is called a gizzard. The stones will tumble around and crush up the food they eat. This is why momma birds will eat food and then regurgitate it (throw-up) and then feed it to her babies. Birds also don't have a bladder like us to form pee (water is heavy!), instead they get it all out at the same time- the white stuff in bird poop is their pee! Birds of prey like owls don't poop like other birds, instead, what they can't digest is regurgitated in the form of a pellet (like a cat coughing up a hairball). These pellets are made up of anything the bird can't digest and use for energy like hair, bones, claws and teeth. You can open pellets to see what's inside and even reconstruct a mouse from its bones!

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Topic: Conclusions and relate conservation concepts
- What did you learn today from our discussion about birds? Review similarities and differences broadly.
- Were the results what you expected? Why/why not?

What are some of the ways we (humans) get the things we need?
- get food from store
- water from tap
- live in houses for shelter

How do birds get what they need to live?
- forage/hunt for food- discuss dangers to birds (lead poisoning from bullets, pesticides, etc.)
- build own nest- discuss dangers to birds (tree trimming in spring, trash, etc.)
- find water- discuss dangers to birds (chemicals left out, chemicals dumped, scarcity)
- Discuss any other dangers to birds, emphasizing human responsibility of environment

Topic: Sustainable Solutions
Discuss conservation: preservation, protection, safeguarding
Prompt students to predict what they can do to conserve and help birds not become harmed by the human environment.
- - reduce, reuse and recycle
- - pick up after yourself when you're done camping/fishing, etc.
- - don't litter
- - trim trees in another time of year
- - make a bird house
- - make a bird feeder
- - plant more trees
- - put in a bird bath or pond for wildlife
- - preserve water by taking showers instead of baths and turning off water when brushing teeth
- - don't use chemicals for pesticides, or dump chemicals into ground
- - keep air quality clean by driving less, using less electricity, consuming less

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Possible Sustainable Projects

- Invite students to measure their water consumption for baths and showers. (Ask students to predict which uses more water: Showers or Baths. Invite them to take a bath and measure water height. The next day, have them plug the drain and take a shower, measure height and compare).
- Make a bird feeder! (Out of wood, pinecones, or oranges- for orange, peel half making a bowl, use knitting needle to stick through orange for perch).
- Invite students to make a poster about the ways to save water and encourage them to put it on their fridge to help their family conserve also.
- Invite students to create an experiment demonstrating energy conservation using a glass of warm water and a thermos of warm water. See which loses heat faster.
- Invite students to collect air pollution samples by covering an index card with petroleum jelly and leaving it somewhere for 48 hours. Take before and after pictures and compare results to different areas.
- Invite students to go on a scavenger hunt in a wildlife habitat.
- Have students imagine and draw a picture of their perfect wildlife habitat.
- Encourage students to plant trees/flowers for butterflies and birds.

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Arizona State Standards:
**Strands 1, 2 and 3 are designed to be explicitly taught and embedded within each of the content strands 4, 5 and 6, and are not intended to be taught in isolation. The processes, skills, and content of the first three strands are designed to "umbrella" and compliment the content of Life Science, Physical Science, and Earth and Space Science.

Strand 1: Inquiry Process
Concept 1: Observations, Questions and Hypotheses
PO1: Formulate relevant questions about the properties of objects, organisms, and events in the environment.
Concept 2: Scientific testing
PO1: Demonstrate safe behavior and appropriate procedures in all science inquiry
PO2: Participate in guided investigations in life, physical and Earth and Space sciences.
Concept 3: Analysis and Conclusions
PO2: Construct reasonable explanations of observations on the basis of data obtained
Concept 4: Communication
PO1: Communicate the results and conclusions of an investigation

Strand 2: History and Nature of Science
Concept 1: History of science as a human endeavor
PO1: Identify how diverse people and/or cultures, past and present, have made important contributions to scientific innovations.
Concept 2: Nature of scientific knowledge
PO1: Identify components of familiar systems
PO2: Identify the following characteristics of a system:
- Consists of multiple parts or subsystems
- Part work interdependently

Strand 4: Life science
Concept 1: Characteristics of organisms
PO1: Identify animal structures that serve different functions
PO2: Identify the following major parts of:
- the digestive system
- respiratory system
- circulatory system
PO3: Describe the basic functions of the following systems:
- digestive
- respiratory
- circulatory