Four Winds Nature Program - Structure and Function

Connections with Farm to School and Forest Days/Outdoor Learning Programs

Why do grass plants have nodes and raspberry plants have thorns? Why do spiders make silk and beavers have water repellent fur? The physical structure and behavioral adaptations of an organism help it to survive in its environment – to avoid predation, to gather the food and water it needs, to find a mate. We'll compare different organisms to think about how particular physical characteristics relate to important skills and behaviors, and ultimately to survival.

Throughout this year-long study, students will explore the characteristics of organisms, look for similarities and differences among them, learn about natural selection and wonder at the diversity of life on Earth.

Spiders

Students will: examine a variety of live spiders; learn about the different adaptations of web-building and wandering spiders; construct an accurate model of a spider; look for evidence of spiders outside and record observations; compare the number of spiders in different habitats; and model how spiders use sense of touch to feel vibrations and catch prey.

Farm to School

- Look for evidence of web-building and wandering spiders in school garden and discuss their roles in controlling insect populations.
- Ask local farmers to share photos of spiders on the farm; are certain locations more populated with spiders? Consider why.
- Eat a "spider meal"- have students locate juicy snacks through sense of touch if they are web-building or through active hunting if they are wandering.

Forest Days/Outdoor Learning

- Search for spiders outside and record how many you find; for web-building spiders, note their location and return a week later to see if they are still in the same place.
- Sit quietly at sit spots with eyes closed, trying to sense surroundings through touch like a spider.
- Model being a wandering spider hunting for prey, considering adaptations such as camouflage and speed.

Tremendous Trees

Students will: learn the parts that make up a tree and their functions; model different layers in a tree trunk and see how wood records the life of a tree; explore a variety of trees outside; examine a tree carefully using only sense of touch; observe and record information about a tree; and measure tree girth, estimating height and age.

Farm to School

- Visit an orchard to learn about pruning and grafting and the life of a fruit tree.
- Compare a piece of maple wood that has been tapped for sugar to one that has not been tapped.
- Explore both managed and wild forest and compare the trees in each forest type.

- With eyes closed, sample a variety of fruits from trees, trying to identify by sense of taste.

Forest Days/Outdoor Learning

- Examine nearby trees and create stories about their lives based on their size and observations of scars, missing branches, and other features.
- Pick a tree to observe and draw in nature journal, paying close attention to bark texture, branching pattern, and possible insect or animal activity.
- Model the importance of a tree's roots for support as well as nutrient and water uptake.

Grasses and Grains

Students will: make observations about the structure of grasses and consider the function of certain characteristics; notice patterns of similarities and differences among grasses; observe grasses outside, noting where they grow and considering why; draw or model a grass plant; make a woven display of grasses; carry out survey of grass species; and discover how grains form an important part of our diet.

Farm to School

- Notice grasses in or around school garden and record the number of different species; compare their adaptations and consider their opportunistic "weed" growth.
- Prepare a meal with a number of common grains such as wheat, barley, corn, rice, oats, or quinoa.
- Visit a local farm that grows grain or raises animals, considering the importance of grasses and grains in livestock diet as well as our own.
- Plant rice seed in a small container and record changes over time.

Forest Days/Outdoor Learning

- Explore grasses outdoors, recording where different species are found and their adaptations to certain habitats.
- Look for evidence of browsing on nearby grasses and consider their role in the food web and our diet.
- Model grasses releasing their seed in the wind.

Predators and Prey

Students will: compare the behavioral and physical adaptations of predators and prey; use modeling to consider the outcome of confrontations between different animals; model behavioral adaptations that help predators and prey survive; model the behavior of prey animals seeking food and predators tracking prey; and graph how the number of predators change relative to available prey.

Farm to School

- Look for predator-prey relationships that exist in school garden or on a local farm and discuss the role agricultural production has in the greater food web.
- Model the relative predator-prey population relationship using prepared vegetable snacks and designated roles as 'predator' and 'prey'.

- Ask local farmer about predator species around their farm and consider how the relationship between humans and domesticated animals influences the predator-prey dynamic.

Forest Days/Outdoor Learning

- Explore outdoors for track stories or evidence of predator-prey interactions and try to interpret findings.
- Model predator-prey relationships, designating half the class as prey, half as predators, and acting out various scenarios and adaptations for survival.
- Search for evidence of animal browsing on vegetation and consider how food availability for prey species impacts predator species as well.

Skull Sleuthing

Students will: discover the connection between teeth and diet and compare the dentition of carnivores, herbivores, insectivores, and omnivores; observe four different kinds of teeth in humans and investigate how we use them; and learn the parts of a skull, using observation and measurement to identify a variety of animal skulls.

Farm to School

- Eat a selection of appropriate foods that highlight the difference between our four different types of teeth and consider why humans are adapted this way.
- Examine parts of a skull on farm animals such as sheep, cows, and horses; compare these skulls to wild grazer such as deer and discuss how their physical characteristics and diet are related.
- Visit a local farm to observe livestock feeding.
- Look for evidence of omnivorous or insectivorous animals near school garden or compost.

Forest Days/Outdoor Learning

- Look for evidence of animal browsing outdoors and try to guess who may have been feeding based on diet, tooth pattern, and other observations.

Birds of a Feather

Students will: learn how physical and behavioral adaptations allow birds to live in many habitats; observe the structure of a variety of feathers and consider their functions; make observations about the structure of a bird's wing and model flight patterns of different birds; observe different kinds of bird feet and model how they function; model how unique beaks are needed for specific food sources; and look for birds outside and survey their winter activity.

Farm to School

- Visit a local farm to learn about domesticated fowl such as turkeys, guinea hens, chickens, and ducks; make observations about their feathers, feet, and beaks.
- Model various bird beaks by eating a variety of foods with different sized "beaks" (students pick up various foods with only their fingernails, then fingertips, and finally with their whole hand).
- Observe birds in or around school garden and record observations about their physical appearance and behaviors.

Forest Days/Outdoor Learning

- Design and draw an ideal winter habitat for a real or imagined species of bird- if you were a bird, what sort of land features and food sources would you like in your habitat?
- Look for birds outside and model their winter activity, paying close attention to adaptations for keeping warm.
- Put out seed for birds; sit quietly to observe and keep a tally of how many individuals come to feed.
- Model different ways birds move along the ground and their wing motion while in flight.

Calling All Owls

Students will: learn adaptations of owls for hunting at night and catching prey on the wing; model differences between owls' eyes and our own; investigate the importance of two ears in locating sounds and model how hearing helps owls locate prey; observe owl feathers and feet, and consider importance of fringed feathers in silent flight; meet different owls and learn to recognize their calls; and investigate contents of owl pellets.

Farm to School

- Visit a local farm that may have owls in barn or evidence of hunting in fields.
- Consider the role owls have in controlling populations of mice and other animals found near farms and barns.
- Visit Outreach for Earth Stewardship, VINS, or a similar raptor rehabilitation education center to observe live owls up close.

Forest Days/Outdoor Learning

- Model being an owl, using sense of hearing to find each other outside.
- Try to move silently like an owl on the hunt, experimenting with different adaptations (clothing, way of moving).
- Look for evidence of owls outdoors, such as pellets or wing brush marks on snow.

Daunting Defenses

Students will: learn about physical adaptations that help animals and plants avoid being eaten; observe and compare plant and animal defenses and look for patterns of similarity; explore outside for evidence of plant and animal defenses and make a graphical display; design their own plant or animal with special adaptations for defense; model plant and animal defenses; and learn to identify some common local plants who are toxic or harmful.

Farm to School

- Examine various plants and consider how they avoid being eaten, such as garlic and other alliums, raspberries, blackberries, nettles, and certain tree species.
- Consider how humans have adapted to eat plants with various defenses; collect, prepare, and eat some of these foods.
- Ask local farmer for examples of companion planting on their farm and how it influences their crop production.

- Looks for examples of mutualistic relationships in the garden, such as insects and spiders that use plants for shelter, protecting the plants in return.

Forest Days/Outdoor Learning

- Model different defenses of plants and animals by performing scenario skits outdoors.
- Learn about local plants that are toxic or harmful; be able to identify and avoid them when exploring outdoors, especially if they cause dermatitis.
- If possible, safely collect and sample some plants that employ relatively innocuous defenses and sample them- wild blackberry or wild leek (ramp), for example.
- Look for insects outdoors and make observations about their various defenses.

Beavers and Muskrats

Students will: examine and compare beaver and muskrat skulls and pelts, and consider how their special adaptations function in their lives; model and experience two important activities in the lives of beavers- felling trees and gnawing branches; make a model of a dam and lodge to understand beaver engineering skills; explore a beaver pond, looking for evidence of beavers and muskrats; and optionally, create a map of findings.

Farm to School

- Visit a beaver pond and consider the impact beavers have on agricultural landscapes through felling trees, damming streams, creating ponds and wetlands, and flooding fields.
- Try "gnawing" different foods like a beaver or muskrat and learn the importance of their sharp front teeth.

Forest Days/Outdoor Learning

- Visit a nearby beaver pond and draw observations in nature journal.
- Build a beaver dam and lodge using sticks and other materials found in forest and field.
- Build a small muskrat feeding raft using natural materials and try to float it in pond.

The Buzz on Bees

Students will: learn about the role of honeybees as pollinators; examine and compare honeybees and their cousins; identify the physical adaptations that help honeybees perform a variety of jobs in the hive; model the dance language and learn how it is used to communicate direction; observe bees outside and look for evidence of other pollinators; examine the construction of honeycomb and compare other possible cell shapes; and observe life inside a hive.

Farm to School

- Arrange a visit from a local beekeeper.
- Follow the cycle from flower, to fruit, to plate, considering the importance of pollinators in our lives.
- Sample honey harvested from different areas or during different wildflower seasons.
- Bake a recipe using honey as the sweetener.
- Plant a pollinator garden.

Forest Days/Outdoor Learning

- Search for pollinators in the garden, recording which flowers or plants they visit most and considering why.
- Model honeybee language and “pollinate” nearby flowers.
- Observe bees outside and draw your favorite bee in nature journal.
- Create bee houses/habitat outdoors using natural materials.