April and May are always exciting months in the kindergarten classroom! Each year, chicken eggs (and for the first time, duck eggs) arrive for the children to attempt to hatch. In preparation for the big event, the children helped set up an incubator in the classroom. The incubator temperature has to be kept at a steady 99.5. The humidity has to stay around 50%. We use an egg turner to simulate the mother turning her eggs. This year we set up two incubators, putting the chicken eggs in one and ducks eggs in the other. On April 14th, eggs arrived! The children were surprised that they eggs were not white, but a variety of colors. Together we counted and then placed the eggs onto the egg turner in the warmed incubators. We made a hatching calendar to track the incubation process (21 days for chickens and 28-30 days for ducks). During this time, preschool friends enjoyed visiting our eggs. The kindergarten loved explaining the process to the younger children. Inspired by our curiosity of chickens and ducks, the friends eagerly began exploring the world of birds with the simple question: “What do we know about birds?” As we began our bird unit, we challenged the students to answer this question. A bird’s feathers protect its skin from injury and weather. The wings provided a light, broad, lifting surface that enables them to fly, steer and brake. Feathers add support, warmth and comfort in a nest and are used for display in attracting mates. As we delved into the world of birds, the students were amazed at the many different, exotic and interesting facts. They learned the anatomy of a bird’s body and the important role each part plays, the influence of habitat, the nesting practices and necessity of migration.
The students’ interest began to pique with observations through classroom windows, walks around campus and live-feed nest cameras on the Smartboard, inspiring them to become true bird watchers themselves. To introduce our new unit, friends shared their own bird watching journals, drawings and bird sightings with classmates. We then began our study of birds by exploring their attributes. Using the works of John James Audubon (a French American ornithologist, naturalist and painter) as inspiration, students chose a bird and egg to research and illustrate.

**BUILDING A NEST**

Most birds build nests to provide safe places to lay their eggs and raise their young. These nests come in a variety of shapes, sizes, and construction, and take varying amounts of time to build. They range from cup shaped nests of many woodland birds, to the gigantic platforms of branches built by Golden Eagles. Birds use a great variety of nest sites, too! Woodpeckers nest in holes in trees, an Ostrich scratches out a shallow pit on the ground, a Swallow uses mud to create what looks like an upside-down igloo on a vertical wall and Sociable Weavers build massive structures that resemble a hive of nests (like an apartment building) that can house up to 400 birds. As we continued our exploration, we discovered that birds may make thousands of trips to collect nesting materials. Some of the most common natural materials included feathers, fur, mud, grass, cobwebs, leaves, moss and twigs, while some birds have been known to use man made materials like plastic bags, barbed wire and eyeglasses. Using found materials and clay (a.k.a. mud), the friends were challenged to test their building skills.
WHAT'S AN OWL PELLET?
When learning about any subject, one of the best ways to build understanding is through hands-on exploration. The kindergarten friends were very eager to explore what they called “One of our best science experiments this year”- dissecting owl pellets. Owls, like many other birds, eat their food whole. Since birds do not have teeth, they can’t chew their food. Therefore, they use their strong and sharp beaks to rip their prey apart and then swallow large chunks whole. The owl slowly digests its meal by separating the softer materials (meat) from the harder materials (bones). It then regurgitates the harder materials along with indigestible items such as feathers and fur in the form of a pellet. The children enjoyed the process of dissecting the pellets, using a chart to sort and identify their findings.

BIRDS OF PARADISE
As the weather warmed up, we introduced the tropical Birds-of-Paradise, believed to be among the most beautiful creatures on earth. With the help of The Cornell Lab of Ornithology, scientists have succeeded in capturing images of all 39 species of these rare and magnificent birds. Known best for their colorful plumage (feathers) and unique courtship displays, birds-of-paradise are native to the New Guinea and satellite islands. As we learned about each bird, the friends were inspired to create their own beautiful birds using paper towel tubes, styrofoam, feathers, pipe cleaners and much more. A favorite amongst the class was the male Superb Bird-of-Paradise, known to have one of the most bizarre and elaborate mating displays in the avian world. After preparing his “dance floor” (scrubbing away dirt and branches), he attracts females with a loud call, folds his feathers in an upward shape creating an ellipse-shaped feature and begins his rhythmic dancing.
The Science/Discovery Area has continued to be a busy place in the kindergarten classroom! We have explored several experiments involving bird adaptations including habitats, nest building, and the function and importance of different feathers and beaks.

**Feathers**

I wonder...how does a feather help protect a bird from the elements of nature?

I think...the children worked with Mrs. Armbruster to make some predictions about what will happen to a feather when it gets wet. Some friends predicted: “The water will fall off the feather, keeping it dry.” “The feather will absorb the water when it rains.”

I learned...feathers help protect birds from getting drenched in the rain. Instead of soaking through them, water slides right off. Birds are able to keep their feathers waterproof by putting a layer of oil on them. They get the oil from a place near their tail called the preen gland. Feathers also insulate a bird using various layers of feathers, including soft, fluffy feathers called down.

**Beaks**

I wonder...how different bird beaks affect how a bird eats or drinks?

I think...the children made predictions about why a bird’s beak looks the way it does. The children began by looking at various photographs of beaks and predicting what type of food each bird ate and their process of obtaining and eating food. They predicted if the bird was a meat eater (birds of prey, also known as raptors, that hunt and feed on other animals) or a seed/insect eater.

I learned...birds eat many different types of food. It may depend upon their environment and what’s available for them to eat, along with their body/beak structure. Scientists rely on a bird’s beak (or bill) to help identify and categorize them. Beak types range from those that crack, shred, chisel, probe, strain, spear and several other unique designs. Seed eaters like Cardinals have short, thick conical bills for cracking seeds. Birds of prey like Hawks and Owls have sharp, curved bills for tearing meat. Woodpeckers have bills that are long and chisel-like for boring into wood to eat insects. Hummingbirds bills are long and slender for probing flowers for nectar.
CANDLING

Our 21 days of waiting for our chicken eggs to hatch (and 26 days for the duck eggs) were filled with a variety of egg activities. The children were very interested in what was happening inside the eggs. Each day we watched this YouTube video showing the development of the chicken embryo (http://www.youtube.com/watch?v=PedajVADLGw).

On Day 7, we candled the eggs to check if we could see any development. Again we used the computer to view photos of what to look for while we were candling. We were checking for the appearance of veins and a dark spot for the eye. The children were fascinated with how much we could see inside our eggs. We marked the “good” eggs with a star, the “not sure” eggs with an X and threw away several eggs that were not fertilized. Every week we candled the eggs and watched our chicks developing. The children were so excited when we saw a chick moving inside the shell!

“EGGS”-PLORATION

Our interest with eggs led us to deeper exploration. The children were given an unfertilized egg to explore. We observed the shell, which we discovered is porous. Immediately beneath the shell are two membranes, the outer and inner shell membranes. These membranes protect the contents of the egg from bacteria and prevent moisture from leaving the egg too quickly. The yolk is the source of food for the embryo and contains all the fat in the egg. The small white spot on the yolk is called the germinal disc. The germinal disc is where the female’s genetic material is found. We continued exploring eggs by comparing a raw egg to a hard boiled egg. The children conducted simple tests on both eggs to see which egg floated, weighed more, and spun the longest. Then they recorded their observations.

FIELD TRIPS

The kindergarten friends enjoyed several different field trips this spring including a sneak peek at the CMU Carnival buggies, a trip to the Cyert Center playground, and an impromptu visit to a petting zoo on campus.
Shape=Strength

I wonder...how strong is an egg. Can it hold the weight of a person?

I think...the eggs will crack when we stand on them.

I learned...an egg can support our weight!

One end of the egg is more “pointy” while the other end is more round. Just make sure that all of the eggs are oriented in the same direction. By doing this, your foot will have a more level surface on which to stand.

The shape of the egg is the secret! The egg’s unique shape gives it tremendous strength, despite its seeming fragility. Eggs are similar in shape to a three-dimensional arch, one of the strongest architectural forms. The egg is the strongest at the top and the bottom (or at the highest point of the arch).

Forcedistribution

I wonder...although we know that the egg can hold our standing weight, we were sure that we could squeeze the egg with our hands and break it.

I think...the eggs will crack when we squeeze them in our hands.

I learned...By completely surrounding the egg with your hand or two hands, the pressure you apply by squeezing is distributed evenly all over the egg. However, eggs do not stand up well to uneven forces, which is why they crack easily on the side of a bowl.

This fact also explains how a hen can sit on an egg and not break it, but a tiny little chick can break through the eggshell - the weight of the hen is evenly distributed over the egg, while the pecking of the chick is an uneven force directed at just one spot on the egg.

Inertia

I wonder...what will happen if we hit the paper plate out from under the egg.

I think...the egg will go flying across the room!.

I learned...since the egg is not moving while it sits on top of the tube, that’s what it wants to do - not move. We applied enough force to the paper plate to cause it to zip out from under the cardboard tube (there’s not much friction against the drinking glass). The edge of the tray hooked the bottom of the tube, which then sailed off with the tray. Basically, we knocked the support out from under the egg. For a brief nanosecond or two, the egg didn’t move because it was already stationary (not moving). But then, as usual, the force of gravity took over and pulled the egg straight down toward the center of the Earth and into the glass of water.

The setup includes a large glass of water, a paper plate, a cardboard tube and an egg.
Aside from hatching our chicks and ducklings, the favorite activity of the unit was the Humpty Dumpty Egg Drop. Mrs. Blizman gave the children one egg each and asked them to design and build a protective case that would cushion the egg from becoming “scrambled” when dropped. We scoured the art closet and found a variety of materials to use for the cases. Friends also brainstormed and brought recycled items found at home. Foam, styrofoam, plastic containers, packing peanuts, cardboard boxes, fabric and bubble wrap were the popular choices.

After 2 mornings of designing and building, we were ready for the big drop. Due to rainy weather, we attempted our first drop in the main hallway, one by one each friend dropped their containers from the top of the stairs. After each friend had dropped their eggs, we opened the containers to check the eggs. We were surprised how many had survived the first round. Friends then had the option to rebuild and rethink their container during work time based on their outcome. The children discovered that the ones that broke first were the ones in plastic containers. Although the plastic containers were intact, the force of the impact caused the egg to break against the side. After the first round, the children were motivated and wanted to continue building egg cases using a technique that worked, adding new ideas and materials. The second round took place outside with half of the class assembled on the tennis court to watch while the other half took their eggs up the stairs, to drop over the railing. Ten eggs survived the first round and four eggs survived the second fall!

**FINALLY...CHICKS AND DUCKLINGS!**

After much anticipation and 21 days of patiently waiting, our chicks started to hatch....right on schedule (Tuesday, May 4th)! Out of 14 viable eggs, three chicks successfully hatched. After 26 days (a little earlier than expected), the children began to notice pips on several of the duck eggs. The friends watched and waited all day, hoping to meet the newest addition to the classroom, but it wasn’t until after dismissal that our first duck started to hatch. After 24 hours, we had a total of five ducklings. Unfortunately, two of the chicks became sick and passed away, prompting the teachers to seek guidance from Penelope’s mom and aunt (who kindly donated the chicken eggs to the classroom). Even with the bad news, the children enjoyed holding and playing with both the chicks and ducks. It was sweet to watch how nurturing the children have been, proudly showing off our new additions to the preschool friends.