Bird Beak Adaptations

Birds are an incredibly diverse group of organisms of all shapes, sizes, and color. They range from very small hummingbirds to large eagles to slender blue herons. There is an important reason for the fact that birds all look different: the way a bird looks and behaves is dependent on what kinds of food they eat. There are two types of feeding habits in birds, generalists and specialists. Generalists, such as jays and gulls, tend to eat almost anything that is available. Specialists, on the other hand, are specifically adapted to a certain food source, whether it be seeds, fish, nectar, insects, or other birds and small mammals. The beaks of different birds are shaped according to the food a bird eats. For example, a cardinal has a sturdy, triangular beak perfect for cracking open seeds while a hawk has a strong, hooked beak that allows it to tear apart meat. A cardinal would have a tough time eating the kind of food a hawk does and a hawk would not have much luck cracking open seeds. The specialization of diets between bird species is important because it means that every bird fills its own niche, which in turn reduces competition. If all birds ate the same food, there would not be enough to go around causing constant competition and some bird species would be more successful than others.

The following in-class activity demonstrates the ideas of specialization:

Materials
• Tin baking trays (1 per group)
• Small plastic cups (1 for each student)
• Plastic forks (1 per group)
• Plastic spoons (1 per group)
• Toothpicks (1 per group)
• Wooden clothespins (1 per group)
• Binder clips (1 per group)
• Pipe cleaners, cut into 1” pieces
• Rubber bands
• Kidney beans
• Marshmallows

Prepare
The class will be split into groups of five students. Each group needs one tray, one fork, one spoon, one toothpick, one clothespin, one binder clip, and five cups (one per student). In each tray, add marshmallows, kidney beans, rubber bands, and pipe cleaners. Although it is not incredibly important how much of each material is added, there should be fewer marshmallows than everything else. Cut out the chart at the end of these instructions and make enough copies for each student.

Instructions
Split the class into groups of five students and allocate one tray to each group. In every group, each of the five students will have a different “beak,” represented by the fork, spoon, toothpick, clothespin, and binder clip. Each student will also have a “stomach,” represented by a plastic cup. Let the class know that they are going to be birds, foraging for food in the “woods,”
represented by the tray. Each group is made up of five different birds with different shaped beaks. For a few minutes, the birds are going to forage in their tray for food using their beaks. The goal is to collect as much food as possible in the time allocated. However, the trick is that they can only take one item at a time and must place it in their stomach before they go back for more. For example, if a spoon beak picks up a kidney bean, they must drop it in their stomach before returning to the woods. Additionally, their other hand must always be holding on to their cup, because “you don’t want to lose your stomach.” The only way to collect food is with the beak; they cannot use their other hand for assistance. Because it is a competition, be sure to advise the students that in order to get the most food, they must be efficient and collect the food that is easiest to pick up (the food their beak is most adapted to eating).

Discussion
After time is called, have each student sort their food and count up how much of each kind they collected. Record those numbers on their data sheet. Then have them add up those numbers to find the total amount of food that they collected. They should fill out the last row on the chart with the two most common foods they collected. Once each student has filled out the chart, run through the list of beak types one at a time, asking the students with that beak the total amount they collected and their most commonly collected foods. Write these values on the chalkboard. After recording these numbers, it should be relatively easy to see a pattern.

Generally, students with spoons and forks are able to collect a little bit of everything. Students with toothpicks tend to collect marshmallows and rubber bands. Those with binder clips collect pipe cleaners, and those with clothespins collect marshmallows and pipe cleaners. Lead a discussion with the class describing how the students that were able to collect a little bit of everything were the generalists and how every other student was a specialist to their two most common foods. Be sure to mention that if there had been only one resource, such as beans, they would have been fighting for the same food. Spoons and forks would likely have collected the most, therefore outcompeting the other birds. This demonstrates the importance of specialization.

<table>
<thead>
<tr>
<th>Your name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your beak type:</td>
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</table>

<table>
<thead>
<tr>
<th>Food</th>
<th>Amount Collected</th>
<th>Total Amount of Food</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(add together your amounts for each type)</td>
</tr>
<tr>
<td>Marshmallows</td>
<td></td>
<td></td>
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<tr>
<td>Beans</td>
<td></td>
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<tr>
<td>Rubber bands</td>
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<tr>
<td>Pipe cleaners</td>
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Your two most common foods collected: