LESSON GOALS
The goal of this investigation is to utilize the existing school campus for students to investigate the biodiversity of organisms present among various schoolyard areas. This study is useful because it allows students to be engaged in an inquiry based project and use the existing school grounds to complete the project. The investigation is interesting to students because it allows for them to see what organisms live in their school yard and how humans impact those organisms.

The students will:
• Discover that accurate record keeping, openness, and replication are essential to maintaining investigator credibility with other scientists in society;
• Know that a change in one or more variables may alter the outcome of an investigation;
• Learn how scientists use computers to collect, sort, analyze, and prepare reports and share ideas with others;
• Understand that the classification of living things is based on a given set of criteria and is a tool for understanding biodiversity and interrelationships;
• Learn that generally organisms in a population live long enough to reproduce because they have survival characteristics;
• Understand that humans are part of an ecosystem and their activities may deliberately or inadvertently alter the equilibrium in ecosystems.

MATERIALS
• Field guides of birds (1 per group)
• Bird Food
• Several bird feeders
• Triple beam balance or electronic scale
• Plastic bags

POSSIBLE STUDENT-DRIVEN QUESTIONS
From the student observations, have the students generate a list of their own questions in their notebook. Then have the students share some of their questions with a partner. Have the partners pair up with another pair of students and share some of their questions. Have each of the groups pick 2 or 3 questions to share with the class (think, pair, and share). Record their questions on the board or chart paper.

Some questions may include:
• What types of birds were in the courtyard?
• What area in the courtyard had the most birds?
• Why weren’t there any birds?
• What would happen if we give the birds a food source?

Try to lead them into their investigation question:
• How does the location of a bird feeder affect the amount of food that is eaten from that feeder?

PROCEDURE

Hypothesis: The locations that are most frequented by students will have the most amount of food left in the bird feeder

Procedures: The sampling sites used for this investigation may vary based on your school yard. However, for my classes, we will use an area of high traffic in the middle of the courtyard, and area of lower traffic towards the front of the school, and an area back behind the portables where there is little to no traffic at all.

Methodology:
Day 1: Today the students will have a basic discussion on birds and their needs. They will also look through books to become familiar with birds in the area.

Day 2: Today you will go outside and make your observations and generate some questions, a hypothesis, and a prediction. You may want to spend another day or two making observations at different times of the day if possible. From the observations, determine the sampling areas on the school grounds.

Day 3:
1. Have the students determine how much seed to start with and take the mass.
2. Add the seed to the bird feeders.
3. Secure the feeders outside in the appropriate areas of the courtyard.
4. At the end of the day, collect the seeds from each bird feeder.
5. Take the mass of the remaining food.
6. Repeat this process for several days.

To analyze the data, students will graph the results and write up a conclusion. In their conclusion they need to discuss whether their hypothesis was supported using the data collected, discuss any problems or challenges in the investigation and then propose a future studies question. These conclusions can be individual or can be generated by the entire class on chart paper and hung up for other classes to see.

RESOURCES
• The Birder’s Handbook: A Field Guide to the Natural History of North American Birds, Paul Erlich, David Dobkin, and Darryl Wheye
• Eyewitness Handbook: Birds of the World, Colin Harrison and Alan Greensmith
• National Audubon Society - Birds of America <http://www.audubon.org/bird/BoA/BOA_index.html>
• Cornell Lab of Ornithology <http://www.birds.cornell.edu/>
• Smithsonian National Zoological Park <http://nationalzoo.si.edu/Animals/Birds/>

BUDGET
• Bird Seed, $3 - 5
• Bird Feeders, $12 - 45
• Field Guides, $6.99 - 19.99

TEACHER NOTES
• To make a home connection, students can set up a bird feeder at home and make observations.
• Students can become bird watchers and observe and identify which birds are coming to feed at the school.
• Students can choose a bird species and research the migration patterns of that bird and share with the class.
• Students can design their own bird feeders and test to see which ones work the best.