COLLEGE OF SOCIAL & BEHAVIORAL SCIENCES
Women in Science & Engineering

The Bio/Diversity Project

Lesson 4: Introduction to Data Cleaning

Grade Level: 4-12th

AZ Science Standard:	Cheat sheet for AZ science standards *6.L2U1.13 – Develop and use models to demonstrate the interdependence of organisms and their environment including biotic and abiotic factors.* *HS.L4U1.27 – Obtain, evaluate, and communicate evidence that describes how changes in the frequency of inherited traits in a population can lead to biological diversity.*
Learning Objectives:	1. Students will be able to discuss why data science is important and how it applies to their everyday lives. 2. Students will practice data cleaning by identifying and sorting bird images on Zooniverse. 3. Students will use AllAboutBirds.org to identify bird species and learn about color morphs and variations.
Scientist of the Week:	Dr. Meaghan Emery-Wetherell ● Vertebrate paleontologist who specializes in data analysis ● Assistant Professor at the University of Arizona School of Information ● Teaches English as a Second Language, Outdoor School, Geology, Biology, Statistics, Science Communication, and Environmental Science ● Resides in Washington state ● Meaghan's personal website ● 

Prepared by Lily McMullen, January 2025

Vocabulary	Materials
• Data Science • Citizen Science • Biodiversity • Color morphs	• Computers or tablets with internet access • Zooniverse project page: https://tinyurl.com/birdhunt • All About Birds website: https://www.allaboutbirds.org • Optional: Printed bird ID reference guides (especially helpful for younger students) • Slideshow
Guiding Questions: • *Why is data science important in studying birds and the environment?* • *How does citizen science help real scientists collect and analyze data?* • *How can birds look different due to age, gender, or other factors?*	

🌵 Lesson 4: Introduction to Data Cleaning🌼

Engage/Introduction

Time: 10 minutes

Objective: Students will understand the importance of data science and how it applies to their long-term project.

Activity:

1. **Introduce data science:**
    - "What is data? Where do we use data in everyday life?"
    - "Why do scientists need data to study birds?"
    - Visit https://ourworldindata.org/
        - Allow students to the guide conversation about different data insights
2. **Explain the long-term project:**

- Over the next few lessons, students will:
  - Clean and classify bird data using Zooniverse.
  - Use Excel to calculate bird diversity.
  - Create graphs to visualize their findings.
  - Make posters to communicate results.

3. **Ask students:** "Why is it important to communicate scientific findings to others?"

Explore

Time: 15-30 minutes

Objective: Students will categorize images from Zooniverse, identifying those that contain birds and learning to recognize different species.

Activity:

1. **Introduce Zooniverse:**
   a. Show students how scientists use Zooniverse to analyze images.
   b. Explain that students will help by sorting through real bird images from wildlife cameras at their school!
2. **Discuss** how birds may look different due to age, sex, and seasonal variations, so using AllAboutBirds.org or searching for many different images of a bird species is helpful.
3. **Diving in:**
   a. Students will access the Zooniverse page and review images.
   b. They will identify a bird, or select:
      i. “No bird here”
      ii. “Unknown bird”
      iii. “Species not listed”
   c. If a bird is present, they attempt to identify it using AllAboutBirds.org

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Explain

Time: 10-20 minutes

Objective: Students will discuss bird identification and learn about the importance of citizen science

Activity:

1. **Discussion:**
   - Did you use All About Birds to help with identification? If not, what did you use?
2. Play the video:

a. https://youtu.be/5ijSk-QWwjw?feature=shared

Extend

Time: 5-10 minutes

Objective: Students will collaborate to share insights from their Zooniverse experience.

Activity:

1. **Students discuss in small groups:**
    - "What was easy or difficult about identifying birds?"
    - "What strategies helped in sorting images?"
    - "How can we use this data?"

Evaluate

Time: 5-10 minutes

Objective: Students will verbally summarize what they learned and complete an exit ticket with a key takeaway.

Activity:

1. **Class discussion:**
    - "What did you learn about data science today?"
    - "What surprised you about bird identification?"
    - "Why is data science important for studying the environment?"
2. **Exit ticket activity:** Each student writes down (or states) one thing they learned and one question they still have.