The Bio/Diversity Project

Data Science Outreach Curriculum Fall 2025
Lesson 3: Collect and Compare Environmental Data

Grade Level: 8th
Time: 50 minutes

AZ Science Standards:

- *8.U1:* Scientists explain phenomena using evidence obtained from observations and or scientific investigations. Evidence may lead to developing models and or theories to make sense of phenomena. As new evidence is discovered, models and theories can be revised.
- *8.U2:* The knowledge produced by science is used in engineering and technologies to solve problems and/or create products.
- *8.E1:* The composition of the Earth and its atmosphere and the natural and human processes occurring within them shape the Earth's surface and its climate.

Student Facing Learning Objectives:

- I can predict environmental differences between two chosen locations based on abiotic factors.
- I can collect environmental data (light, temperature, humidity) using the Arduino Science Kit R3.
- I can compare real data to predictions.
- I can connect patterns to biodiversity and solar-energy design.

Guiding Questions:

- What are abiotic factors and why do they matter?
- How do temperature, humidity, and light vary across space?
- Why is this information useful for people, animals, or clean energy projects?

Vocabulary:

- Abiotic
- Humidity
- Light Intensity
- Air Pressure

Materials:

- L3 Slides_Energy
- Arduino Science Kit R3
- Smartphone or tablet with Science Journal App
- L3_Worksheet
- Clipboards and pencils
- Sticky notes

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🌵 Lesson 3: Collect and Compare Environmental Data 🌼

Mini-Lesson (10-15 minutes)

Objective: To get students thinking about how abiotic factors influence both living organisms and engineering design.

1. Ask: “If you were in charge of building a wildlife garden or installing solar panels, how would you choose the best spot?”
    a. Collect two or three quick answers.
    b. Sunlight, shade, water, flat ground…
        i. These are all examples of abiotic factors that we can measure with data
2. Introduce abiotic factors
    a. Write the word *abiotic* on the board. Ask “What do you notice about the word parts ‘a’ and ‘bio’?
        i. Guide them to ‘A’ means not, ‘bio’ means life
    b. Have one student read the paragraph at the top of page 1 aloud. Do not pass out worksheets yet to the whole class if it will be distracting, but give one student a worksheet to read from.
3. Show the sensors
    a. Air Temperature, Humidity, and Pressure Sensor:
        i. Explain that a small chip senses changes in heat, water vapor, and air pressure, converting them to numbers. Show how blocking the sensor with your hand or breathing on it changes the reading.
    b. Proximity, Light, and Color Temperature Sensor:
        i. Show how the sensor detects reflected light. Move it near a surface or under different lighting to demonstrate how lux and color temperature change.

    Emphasize: “Sensors let us collect objective data instead of just guesses.”

4. Transition to activity
    a. Pass out worksheets and clipboards to the whole class. Students can have one worksheet per pair or small group.
    b. Explain that they will:
        i. Predict which classroom spots have more light, heat, or humidity
        ii. Mark two locations with sticky notes
        iii. Take real measurements later using the Arduino

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Work Time (25-30 minutes)

Rotation Model

Only one Arduino kit per class, so groups rotate while others stay productive.

Setup

- Label one side of the room as the Arduino Station
- Place a timer for 20 minutes

1. All groups complete Part 1 of the worksheet before they can use the kit.
2. For part 2, using the kit:
    a. Each group records light, temperature, and humidity for their two marked spots.

Wrap-Up (5-10 minutes)

Display the questions on the board.

Class discussion:

- “Were your predictions correct?”
- “Did any locations surprise you?”
- “Why do these differences matter in real life?”

Introduce Lesson 4, heat mapping, and explain how we will use the data collected today for the next lesson

- “We used data to describe our classroom just like environmental scientists do. Next week, we’ll turn this into a heat map to visualize where it’s brightest, warmest, and most humid.”

Teacher: Collect completed student worksheets, add group data to a class spreadsheet for lesson 4.

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