May 2021

Lesson Plan: Developing a Persuasive Scientific Argument

Center for Urban Resilience

LESSON 8: DEVELOPING A PERSUASIVE SCIENTIFIC ARGUMENT

OVERVIEW:

In this lesson, students examine their data and construct an argument that answers their original research question. Students apply what they have been learning about behavioral adaptations to make sense of their bioacoustics data. After analyzing their data in groups and writing up their arguments, they present their research studies to the class, including their research question, methodology, and conclusions from their data. As part of these presentations, the class will discuss the validity of the different groups' claims and whether they are supported by the data collected from the field as well as the various science concepts they have been learning in class.

WAYS OF KNOWING URBAN ECOLOGY:

	Students will…
Understand	• Understand that arguments are composed of claims which are supported by evidence and reasoning. • Understand that part of doing science is questioning the validity of claims based on the arguments.
Talk	• Present scientific arguments to the class in order to persuade the class about their particular claim. • Ask other groups questions about their arguments, suggest counter claims, and debate multiple ways to interpret the data.
Do	• Analyze their bird bioacoustics data. • Write scientific arguments in which they write a claim that answers their original research question about bioacoustics. Students will support that claim with appropriate evidence and reasoning.
Act	*No specific goals connected with acting on urban ecology in this lesson.*

SAFETY GUIDELINES:

There are no specific safety concerns associated with this activity.

PREPARATION:

Gather materials
Reserve computer lab, if necessary

Time:

2 class periods
Day 1: Activity 8.1
Day 2: Activity 8.2

Materials:

For each group

Copies of student data
Student sheet
Computers with PowerPoint

INSTRUCTIONAL SEQUENCE

Activity 8.1: Constructing an Argument

1. Have students return to their research teams
2. Students should open up their data files, or have a print copy of their spectrograms, along with their data tables.
3. In groups students should go back to their original research question in order to draw a conclusion about the question.
    - Students should write their arguments on the student investigation sheet. Encourage students to justify the claims that they are making with evidence from the data they collected in their field studies.
    - Students should also explain their reasoning for why that evidence supports their claim. Their reasoning should draw from the various concepts they have learned about behavioral adaptation during the unit.
    - Tell students they are going to present their arguments to the class so they need to consider how they are going to justify or prove the claims that they are making.
4. Students should also consider the original predictions they made for their research study. Does their graph support their initial prediction? Why or why not.
5. Students should put together a PowerPoint presentation (a skeleton PowerPoint presentation is provided on the teacher CD). If time is short, students could also put together a poster or just orally explain their data to the class.
    - This will be used to present their findings to the class.
    - Show students the example PowerPoint, or allow them to use this as a template.

Activity 8.2: Presentations of their Findings

1. Students should present their findings to the class. Even if the field study was completed as a full class the "messiness" of the data could result in different groups coming up with different conclusions from the same data.
    - The purpose of the presentation is to have students share their conclusions as well as debate why different groups came up with their varying conclusions.
    - When students are explaining, it may be important to refer students back to their original data.
        - If they were comparing two areas, what differences did they notice between the two sites? Could this explain similarities or differences in their data?
        - Were their any differences besides noise levels?
        - If they looked at dominant frequency, do they think this would have caused them to have different results than if they looked at the minimum frequency (or vice versa)

        - Have students consider observer effects, such as their improving ability to see, hear and identify birds over time.
2. After all of the groups have presented their scientific arguments, discuss the similarities and differences between the conclusions they made from their data.
3. Ask students to consider the implications of their findings across all of the groups for their field site. What do they think they might find if they came back and conducted similar studies in 10, 20 or 50 years? Why?
4. You may also want to give students an opportunity to revise their written scientific arguments based on the discussion in class.

Concluding the Lesson

1. Have students reflect on their field investigation. Ask:
    - If you were do to your field investigation again, what would you do differently?
    - If you were to continue your research in the future what would you focus on? Why?