Teaching Notes

By Risa A. Cohen

Department of Biology

Georgia Southern University

[rcohen@georgiasouthern.edu](mailto:rcohen@georgiasouthern.edu)

Course Information – Evolution & Ecology

Department: Biology

Level: Lower Undergraduate

Course type: Lecture – Fully Online

Students: Majors

Number of Students: 25

Module Information

Original Module Name: The Effect of Climate Change on Butterfly Phenology

Link to Original: <https://tiee.esa.org/vol/v13/issues/data_sets/ellwood/abstract.html>

Adapted Module Name: (if applicable):

Modified Module Name: Introduction to Collections and Effects of Climate Change on Butterfly Phenology

Files associated: (Introductory content with Discussion Activity and Assignment for online module, Teaching Notes, Word and Excel Worksheets)

Modification Learning Goals

At completion of this learning module, you will be able to:

* explain the importance of collections in scientific research
* manipulate data in a spreadsheet program
* create properly plotted and labeled graphs
* analyze data to test hypotheses about climate effects of butterfly phenology

Teaching Notes

 What did you change and why?

This module was developed as part of the Inclusive Pedagogy FMN, so the focus for me was about increasing inclusivity by improving accessibility for a fully online class. One challenge with this course is that the students can be from one of 3 campuses (>50 mi apart). When I teach it in the summer, the students can be from any institution (transient students). Many of the existing TIEE modules are great for face-to-face classes where the instructor can hold field trips, have hands-on activities, field questions as they arise and manage students working in groups together. My class is asynchronous, and having students work together in groups is very challenging. I also had to think about the different levels of students, to make sure this could be completed by everyone without needing a lot of additional explanation from me beyond what I provided in the materials. I decided to have this module be delivered as a combination of:

1. Lecture content introducing climate change and use of collections
2. Discussion (so the students could have some interaction) to brainstorm ideas about the importance of collections in scientific research
3. An individual assignment where they analyze the existing dataset in the original module from iDigBio to look at the possible effects of climate change on butterfly phenology.

How did the activity go?

Overall, I think things generally went well. A few students reached out with needs for clarification about what goes in each graph. A few asked about what exactly flight date meant, but not much beyond that.

 What went wrong and why?

The most common problems were: 1) students did not understand that a statement asking for flight date vs. spring temperature is in the format of y vs x. I would say more than 25% of the class gave me temperature on the y and flight date on the x. 2) the other most common problem was interpreting what a low or high number for flight date meant. I had students telling me that more butterflies were flying when it was cooler instead of flying earlier in the year when it was warmer.

 What was the prep like?

Trying to figure out how to make this all work in an asynchronous online platform and putting everything in html format took a while, but I should have taken the time to find data from a different subset of years to make this different from what the students can find online.

 Would you do this activity again?

I would definitely do this activity again. However, in the future, I will try to use a different set of data from iDigBio, and rewrite the interpretation questions more carefully. I realized when grading the student assignments that I did not modify this module enough to avoid problems with plagiarism from the internet. Several students located the original module, copied the graphs and plagiarized verbiage from the written answers. This is an ongoing battle with online courses.

 How does this activity fit in your overall course curriculum?

In my department, the curriculum in the E&E course (a required course) provides every Biology major with training for upper division ecology courses. This activity specifically fits with the goal of preparing students to manipulate data, generate graphs and draw conclusions, skills needed in the higher-level courses. This activity was really helpful in identifying difficulties generating a scatterplot (i.e. which axis is which) and interpreting patterns for variables that may not be intuitive (i.e. flight date). It complements some of my other activities which are geared toward statistical analysis, and could work well in both the face-to-face and online sections of this course that my institution offers.