## Teaching Notes

### By *Megan Kelly*

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**Course Information**

Department: Environmental Science

Level: **Lower Undergraduate**

Course type: **Lecture**

Students: **Non-majors**

Number of Students: 16

**Module Information**

Original Module Name: [The Effect of Climate Change on Butterfly Phenology](https://tiee.esa.org/vol/v13/issues/data_sets/ellwood/abstract.html)

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

Link to Adapted Module:

Modified Module Name: Supporting student understanding of slope

Files associated:

→ Student Handout: Background info, instructions, pre-lab assignment, in-lab assignment

→ Lecture Powerpoint

Modification Learning Goals:

1. Interpret scatterplots with time on the x-axis.
2. Interpret scatterplots with other variables on the x-axis.
3. Compare trendlines to draw conclusions about the natural world
4. Extract information from tables

**Teaching Notes**

* What did you change and why?

I added a “warm-up” activity asking students to think about the relationship between two variables on a graph. I also made light edits to the questions and formatting of the assignments to draw students attention to the next task.

* How did the activity go?

The students enjoyed the Indexed activity, and it provided an excellent opportunity for some misconceptions and errors to come out and be discussed and corrected. The Excel activity also went well, and it was a good opportunity for students to continue building their confidence and skills in Excel.

* + What went well and why?

Students got more practice making scatterplots in Excel.

* + What went wrong and why?

We didn’t finish the whole activity because I didn’t plan for the amount of individual assistance I gave students as they worked in Excel.

* What was the prep like?

Very simple. I looked up some Indexed figures to point students to, and searched on Wikimedia Commons for images to use when discussing phenology.

* + How much time went into prep?

1 hour of building slide deck and finding Indexed charts

5 minutes during the class prior to assign the pre-lab reading and questions

* + Did you have to do any prep (i.e. grow cultures, grow seeds, order supplies) ahead of implementation?

No

* Would you do this activity again?

Yes.

* + What would you change in the future?

I would start building Excel skills earlier in the term so that students can work more independently on this activity during the class period. I would also move the Indexed activity to a different class session, or to an online discussion forum.

* What do you wish you’d known before you ran the activity?

I wish I had had a clearer idea of how long the activity would take. Introducing the activity and discussing the first few slides took about 10 minutes. The Indexed activity took about 30 minutes. In the remaining 50 minutes, most students worked through questions 1-4. For one instructor and ~16 students with early novice skills in Excel, the technical portion of the exercise (using Excel) was a bit too demanding to complete with enough time to also periodically check in and discuss the scientific concepts. This might be largely ameliorated by having a TA. The indexed activity could probably also be moved to an online discussion forum to free up more class time.

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

This activity fit moderately well in my overall course curriculum. My students are often curious about animals, so examining the impact of climate change on different animals engages them. The level of statistical detail in the paper this activity is based on is quite a bit more advanced than anything I ask my students to do, though, so it was tricky to convince them that small changes with a great deal of variability over time are important.

* In what ways, if any, did you modify your teaching practice with this activity?

This activity helped me think carefully about what quantitative skills I assume my students have. I was able to check those assumptions and help students build their skills.