## 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: [Processes that Regulate Patterns of Species and Genetic Diversity](https://qubeshub.org/qubesresources/publications/1097/1)

Link to Original: https://qubeshub.org/qubesresources/publications/1097/1

Modified Module Name: Collaborative Data Collection in Introductory Environmental Science

Files associated:

Slide Deck introducing Island Biogeography and Activity instructions

Dice roll instructions (PowerPoint file)

Data Analysis Template

Student In-class Handout

Links:

Introduction to Excel (HHMI Excel Tutorials)

Screencast video instructions for making scatter plots

Google Sheet Data Collection tools

Modification Learning Goals:

1. Represent expected outcomes of an experiment by sketching a graph
2. Plot experimental data using spreadsheet software, including appropriate axis labels, legends, and figure captions
3. Format data in a standardized way to support scientific collaboration
4. Practice spreadsheet skills such as locating specific cells, sorting data according to various characteristics, and using basic formulas such as average, range, and standard deviation.

**Teaching Notes**

* What did you change and why?

I wanted students to work together to enter the whole class’s data, and to plot the data themselves. I created a Google Sheet for students to use for collaboration, and instructions for downloading the data to Excel for analysis.

I added a dice roll to improve the likelihood of randomness in migration, and created instructions for the dice roll that I included with each bin/island.

* How did the activity go?

This activity went poorly for my classes. In the first section, after a brief introduction to island biogeography and an orientation to the activity, students collected just 3 rounds of data collection. I had created a data entry form in Google Sheets that would complete some of the analysis for students if they entered their data in the same format, so I had students record their community composition each round. This was too time intensive, so for the second section, I had students record community composition only at the beginning, and then record the changes (migrations, reproductions, and mortalities) for each round after that. In this way, students accomplished 5 rounds of data collection. I spent an extra class period on the activity in an effort to get the students through the data entry and far enough into the data analysis that they could complete the post-activity questions. For the first section (recorded community composition every round), the three rounds of data collected were not enough to observe any patterns. For the second section (recorded community composition once, recorded changes every round), the data entry tool I created failed in such a way that no student was able to do the analysis.

* + What went well and why?

Students thought the first day of the activity was fun.

* + What went wrong and why?

In addition to the technical challenges noted above, students found the data entry very tedious.

* What was the prep like?

This is one of the most prep-intensive activities I have ever done, in lab or lecture. This lab is probably not realistic to do without a lab manager, several TAs, and access to a car (or planning far enough ahead to have things shipped to your classroom).

* + How much time went into prep?

3 hours to get to and from a big box store to pick up all the materials at the same time, via public transit in a large metro area (~$90)

30 minutes to create or find all materials and print them

15 minutes to cut out all lizard pictures

1 hour to stick all lizard pictures to ziploc bags

1 hour to add candy to all bags

20 minutes to sort extra candy to simplify reproduction step

30 minutes to distribute baggies to bins

15 minutes classroom preparation

3 hours to create Google Sheet data entry tool

* Would you do this activity again?

Probably not. The intensity of the prep work combined with the technical challenges of collecting, entering, and analyzing data make this activity a very heavy lift in the service of concepts that are relatively small components of my overall course.

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

The prep time was much more than I was prepared for. Each round of the activity also took much longer than I anticipated. I thought I could modify the activity so it would be doable in a 75 or 90 minute class period, but I found that it wasn’t doable.

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

This activity was a moderately good fit for my overall course curriculum. Biodiversity is a major focus of the course, and students typically struggle to understand genetic diversity. This activity is a nice way for them to get some hands-on understanding of genetic diversity. It is also a good way for students to understand the concept of drift.