**Problem Posing Template for Individual Activity**

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**Module Overview**: This activity is a group research project that is 4-weeks in duration.

**Setting**:

Target course: BIO 212: Foundations of Form and Function is a course for Biology majors that is the last in a sequence of 5 courses. Students typically take the course in the spring semester of their sophomore year.

Class Size: 144 students, but the research project is implemented in labs of 24 students per section.

Learning Outcomes for the activity:

* Access and use data from public databases.
* Apply appropriate statistical analyses to different datasets.
* Create data visualizations appropriate to the data types and analyses.
* Effectively communicate a story using visualizations of data.
* Investigate questions of organismal biology using big data.

How does data acumen align with this learning outcome? Place an “X” in the column next to the skills practiced in this activity

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| --- | --- | --- | --- | --- | --- |
| **Quantitative Pillars** |  | **Data Life Cycle** |  | **Social/Pedagogical Concepts** |  |
| Mathematical | X | Data import | X | Communication | X |
| Computational | X | Management |  | Equity, Diversity, Inclusivity |  |
| Statistical thinking | X | Curation |  | Universal Design for Learning |  |
| Reproducibility |  | Analysis | X | Ethics |  |
|  |  | Sharing/ Reporting | X |  |  |

**Activity/Module**:

Describe the activity: From the laboratory write-up...

* Your assignment is to conduct a research project and produce an infographic that uses a combination of biodiversity and environmental datasets to tell a story. Your goal is to verbally and visually represent data in a way that helps others clearly understand the information you would like to present. Your target audience is the general population.

Course type (e.g. Lecture, lab):

* Lab section of a lecture/lab course.

Pedagogy (e.g. Case, research project, final report, lab activity):

* Research project within lab.

Describe the data and the tools used to interact with the data:

* Students access data from publicly available databases
* Students use Excel to analyze their data and create visualizations.
* Students produce infographics using Piktochart (also includes some visualization tools).

Describe where problem posing will be used and how you as the instructor will use problem posing to shape the activity:

* I’d like to use the problem posing protocol as students are working to develop their research questions. Students need to identify a “Big Question” and then identify sub-questions that they would need to answer to address the Big Question.

What is the Question Focus?

* Organisms need to be able to perform the basic functions of life in any given habitat/ecosystem in order for their species to continue to exist in that location. When any of the functions of life is disrupted, that species cannot continue to survive in that location and their distribution will change.

How is the Question Focus introduced?

* The question focus will be introduced at the beginning of the research project to help students brainstorm interesting questions.

Describe the student products:

* Students produce an infographic with the target audience of the “average citizen.”

**Assessment**:

How will this learning outcome be assessed?

* Students are graded by the laboratory instructor using a rubric.

Will students practice this skill again? In what setting (same topic, new topic)?

* In our course, students don’t practice this skill again. They continue to do small data activities, but nothing on this scale and nothing open-ended.

**Extra information**:

What will students need to know before completing this activity?

* Students need to know how to use Excel.
* Students need to be able to choose the appropriate analysis for a data type and question.
* Students need to be able to produce bar graphs, scatterplots, and pie charts.
* Students need to be able to perform basic statistics, e.g., t-tests and regressions.
* Students need to know the constraints on the use of these data.