**Problem Posing Template for Individual Activity**

(Copy this template and share your ideas for incorporating problem posing in one of your courses. Share your work in the Collections.)

**Module Overview**: The transpiration activity allows the students to explore different factors that affect the rate of transpiration in plants and infer the physiological responses of the plants in the larger context of climate change.

**Setting**: Target course- Title, majors/non-majors, level [introductory/upper-division], size of class [# of students])

**Principles of Biology, Majors, Introductory, 40 students, lab.**

Learning Outcomes for the activity-

1. **Learn how to infer the effects of climate change on physiology of the plants using their prior knowledge of transpiration in the plants.**
2. **Compose a meaningful, falsifiable question to test how an environmental factor or two affect the rate of transpiration.**
3. **Design and implement a plant transpiration experiment.**
4. **Record the rate of transpiration in the experiment and determine an appropriate way to visualize the data.**
5. **Use observational and statistical evidences to describe the process and function of plant transpiration in response to the environment and under climate change.**

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 |  | Data import | **X** | Communication | **X** |
| Computational |  | Management |  | Equity, Diversity, Inclusivity |  |
| Statistical thinking | **X** | Curation |  | Universal Design for Learning |  |
| Reproducibility |  | Analysis | **X** | Ethics |  |
|  |  | Sharing/ Reporting | **X** |  |  |

**Activity/Module**:

Describe the activity-

* The students will either watch a video or listen to a presentation on climate change and its effect on plants and will be given ~10 minutes to ask as many questions as they can about the effect of climate change and physical factors on plants’ transpiration rate. The students will then be able to go back and change any statements to closed questions and prioritize three questions from their list that they would like to explore further. Next, the students will choose a question they would like to answer and design a testable experiment to answer their question.

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

* Lab

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

* Problem-posing activity, research project, group presentation

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

* Students will create a data collection table and gather data during the experiment. After the data collection, the students will import the data into a spreadsheet and implement simple statistical tests using R.

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

* What is the Question Focus? The effects of climate change on plants’ transpiration rate
* How is the Question Focus introduced? The students will either watch a video or listen to a presentation on climate change and its effect on plants.

Describe the student products-

* The students will create a presentation that includes their question/hypothesis, their experimental methods, results (including a visualization of their data), and a conclusion. Then collectively as a group, we will discuss which physical factor might be the most influential on the rate of transpiration in the plants under climate change.

**Assessment**:

How will this learning outcome be assessed?

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

**Extra information**:

What will students need to know before completing this activity?

* The students will need to know how to design an experiment using the scientific method and conduct some basic statistical tests (regression, t-test, ANOVA) in R.