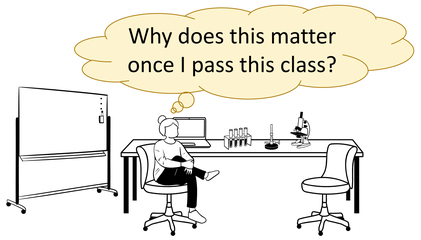
# Making Connections: The impact of modelling connections between science and society on scientific literacy

Sophia F. Buysse

Plant Biology Department and Ecology, Evolution, and Behavior Program, Michigan State University, East Lansing, MI; Kellogg Biological Station, Michigan State University, Hickory Corners, MI

## Introduction

- Increasing science literacy is often a goal of introductory biology classes.
- However, college students who took general education science courses had a similar level of science literacy as the general public.[1]
- We could use models to emphasize the connections between science and society as a method for teaching science literacy because:
  1. Models focus on connections between concepts.[2]
  2. Student motivation increases when students see the impact on society, especially in their local community.[3]




## What is science literacy?

Science literacy refers to the skills students need to make use of scientific knowledge in real-world situations. Gormally et al. (2012) define 9 science literacy skills:

1. Identify valid scientific arguments
2. Evaluate the validity of sources
3. Evaluate the use and misuse of scientific information
4. Understand elements of research design and how they impact scientific findings
5. Create graphical representations of data
6. Read and interpret graphical representations of data
7. Solve problems using quantitative skills, including probability and statistics
8. Understand and interpret basic statistics
9. Justify inferences, predictions, and conclusions based on quantitative data

## Question 1: How does modelling impact science literacy survey scores and presentation scores?

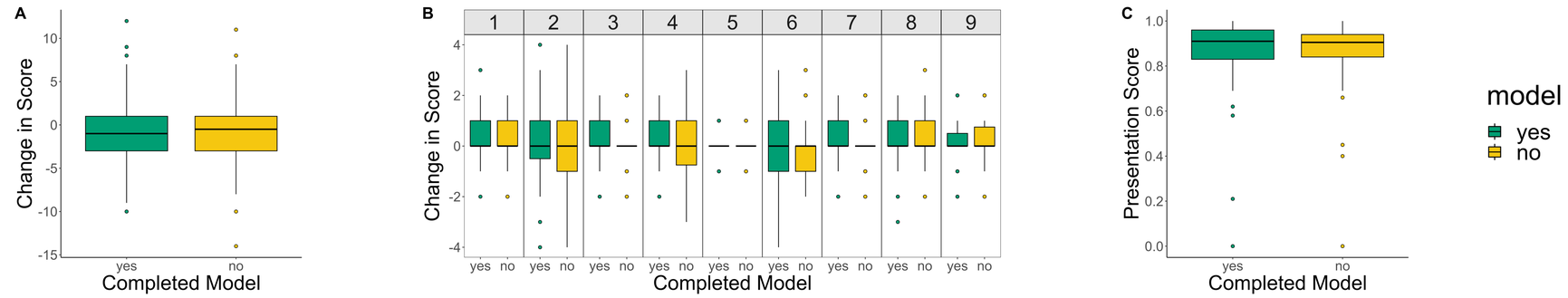



**Figure 2. The modelling activity did not impact science literacy survey scores or presentation scores.** The change in scientific literacy scores between pre- and post-surveys did not differ between students who completed the modelling activity (green, n=99) and those who did not (yellow, n=146) in overall scores (A) or when broken down by questions within each science literacy skill (B). Presentation scores also did not differ between students who completed the modelling activity and those who did not (C). All means were compared with t-tests; none were significant (minimum p-value = 0.18).

## Methods

- 4 sections of an introduction biology lab at MSU in Spring 2023.
- All sections took the same pre and post science literacy survey (28 questions).[4]
- 2 sections completed the modelling activity (Fig. 1).
- All students gave group presentations on their experiments.

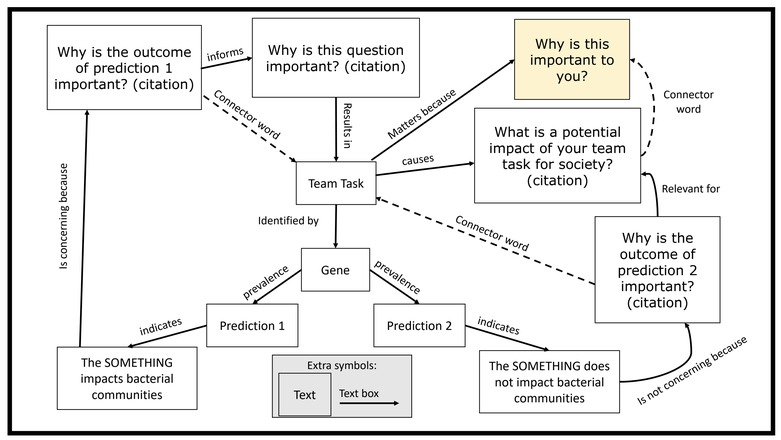
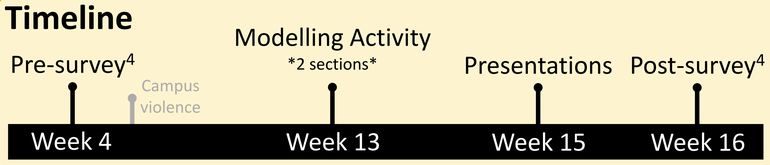



**Figure 1. Modelling Activity.** Students were asked to replace text in this model with the information about their experiment or answers to each question.

## Timeline




## Question 2: How do science literacy scores impact final presentation scores?

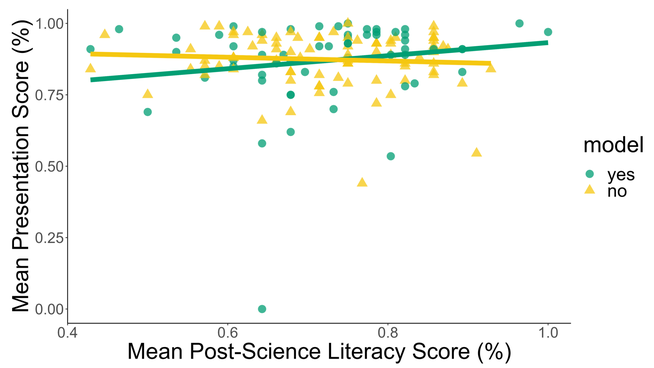



**Figure 3. Post-survey science literacy weakly predicts presentation scores.** Using group means (1-4 students per group), post-survey science literacy (p=0.08), completing the modelling activity (p=0.09), and their interaction (p=0.08) are weak predictors of presentations scores.

## Discussion

- There was no impact of the modelling activity on science literacy scores or presentation scores.
- For students who completed the modelling activity, students with higher science literacy scores also had higher presentation scores.
- Modelling may need to be incorporated into multiple components of the course.
- It is important to keep assessing science literacy and adjust instruction with our results to ensure we prepare students to interact with science outside the classroom.


## References

[1]Impey *et al*. (2011) *J Coll Sci Teach*. [2]Long *et al.* (2014) *Front Ecol Environ.* [3]Bransford *et al.,* Eds. (2000) *How people learn: brain, mind, experience, and school.* [4]Gormally, et al. (2012) *CBE Life Sci Educ.*

## Acknowledgements

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## Contact Me!

buysseso@msu.edu
sfbuysse.github.io