



# Using CREATE in the Undergraduate Ecology Classroom



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## WHAT IS CREATE?

- **CREATE** is a pedagogy designed for students to analyze primary scientific literature in a structured way.
- **CREATE**, pioneered by Hoskins et al. (2007) and Hoskins (2008) in genetics and neurobiology classes, favors depth rather than breadth in curricular coverage.
- **CREATE** asks students to: **C**onsider, **R**ead, **E**lucidate the hypotheses, **A**nalyze and interpret the data, and **T**hink of the next experiment using a scaffolded approach (See Application section for more details).
- **CREATE** has been shown to help students read critically, analyze data, and improve understanding of science and research as processes rather than a disconnected body of facts (Hoskins et al. 2007).

Hoskins, S., Stevens, L., & Nehm, R. (2007). Selective use of primary literature transforms the classroom into a virtual laboratory. *Genetics*, 176, 1381-1389.  
 Hoskins, S. (2008). Using a paradigm shift to teach neurobiology and the nature of science: A C.R.E.A.T.E.-based approach. *Journal of Undergraduate Neuroscience Education*, 6(2), A40-A52.

## CREATE IN UNDERGRADUATE ECOLOGY AT REGIS

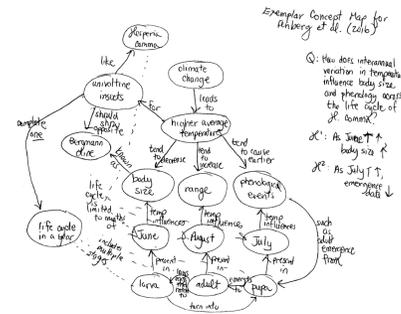
- Ecology is an increasingly broad field which professors must help students navigate.
- At Regis, we chose to implement CREATE in our *BL 402: Principles of Ecology* course, favoring depth over breadth in ecology coverage to leverage its benefits.
- We choose 6 papers to cover over the course of the semester that focus on big ideas at various levels of the ecological hierarchy.
- Our implementation differs from Hoskins et al. (2007) in that we do not try to find connected papers. We do this to ensure enough breadth in basic ecology.
- In addition to the six papers, students are required to write a grant proposal detailing an ecological study they wish to perform.
- Course grades are computed as follows: 20% Daily Work & Participation, 25% Grant Proposal, 55% Exams

## TYPICAL CREATE UNIT IN BL402: PRINCIPLES OF ECOLOGY (MWF, 50 minute class)

### Day 1:

**In class:** Lecture over background ecology of paper.

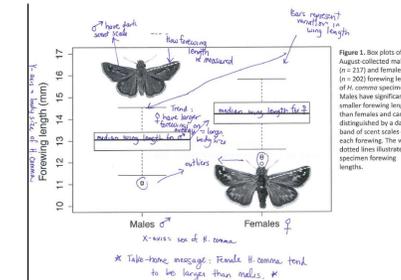
**At home:** Read *Introduction* of paper and create a **concept map** of the major ideas highlighting hypotheses



### Day 3:

**In class:** Jigsaw over methods, including how measurements relate to questions. Stats lecture

**At home:** Read *Results* of paper and **annotate figures/tables** as they relate to hypotheses.



### Day 5:

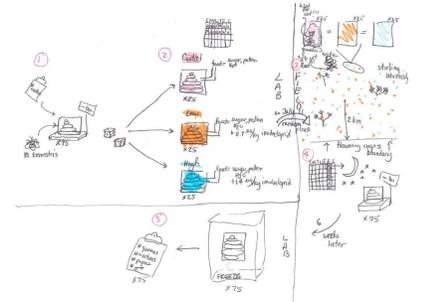
**In class:** Group presentations of next experiments and class vote on best! Revisit hypotheses, findings, and who cares.

**At home:** Study for exam!

### Day 2:

**In class:** Guided activity over introduction, including key concepts and major hypotheses

**At home:** Read *Methods* of paper and create a **methods cartoon** depicting the study.



### Day 4:

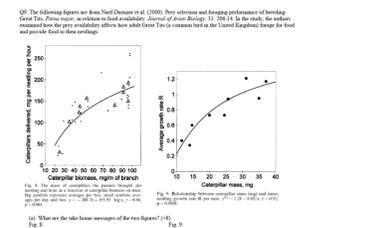
**In class:** Group presentations over figures/tables as they relate to authors' hypotheses.

**At home:** Read *Discussion* of paper to summarize main findings and think of **next study**.

**So what? Why do ecologists care about these findings? Why do people who are not ecologists care? What's the next experiment you would do?**

### Day 6:

**In class:** Exam consisting of explanation of concepts, explanation of figures/tables from required paper, and explanation of figures from other papers.



## WHAT STUDENTS HAVE LEARNED

- Students remark that CREATE helps them improve their ability to read scientific articles, especially figure and table interpretation.
- These skills are transferrable across the curriculum.
- Students successfully apply the scientific process they are analyzing through CREATE to novel field investigations they design in their grant proposals.

## WHAT WE HAVE LEARNED

- Some students initially have misgivings about the approach, but in the end are convinced that they can learn a lot by digging deeply into the literature..
- Students need to be coached about the nightly homework demands in comparison to a "traditional" lecture-only and exam course.
- We need to develop an instrument to formally and quantitatively assess the attainment of the course learning goals using a pre-post assessment.