SEPUP Pathway Session

# Using Simulations and Modeling in an Issue-based Science Classroom


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# SEPUP's Model of Issue-Oriented Science

- Science courses, units, or activities that involve students in learning science concepts and processes and applying their understanding and evidence to a problem, issue, or decision.
- The issue is not an add-on, but is woven into the curriculum.
- The issues and content are closely related.

# Why Issue-Oriented Science?

- Provides a natural hook for students
- Allows for learning of science concepts in a relevant, more familiar context
- Students use scientific evidence in part to make informed decisions
- Encourages students to look at both sides of an issue and evaluate trade-offs

# SEPUP Key Features

- Standards-based
- Inquiry approach
- Issue-oriented approach to science
- Assessment system
- Literacy approaches
- Support for teachers and students
- A complete program:

  investigations, laboratories, readings, modeling and computer simulations, and other types of activities integrated in a logical sequence for learning

What is modeling?

What is *not* modeling?

What models have you used in your classroom?

What computer simulations have you used?

What makes a simulation "good"?

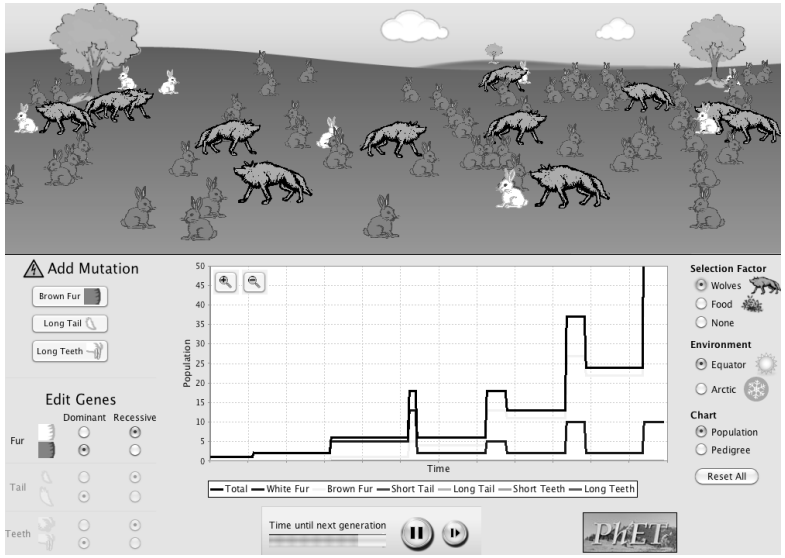
# Elements of Good Sims

- High degree of interactivity (user control)
- Dynamic feedback
- Use of multiple representations
- "Balanced Challenges"
- Promote student inquiry

For example, see: Podolefsky, et al. "Factors promoting engaged exploration with computer simulations," PRST-PER, **6**, 020117 (2010).

# Compare/Contrast Models

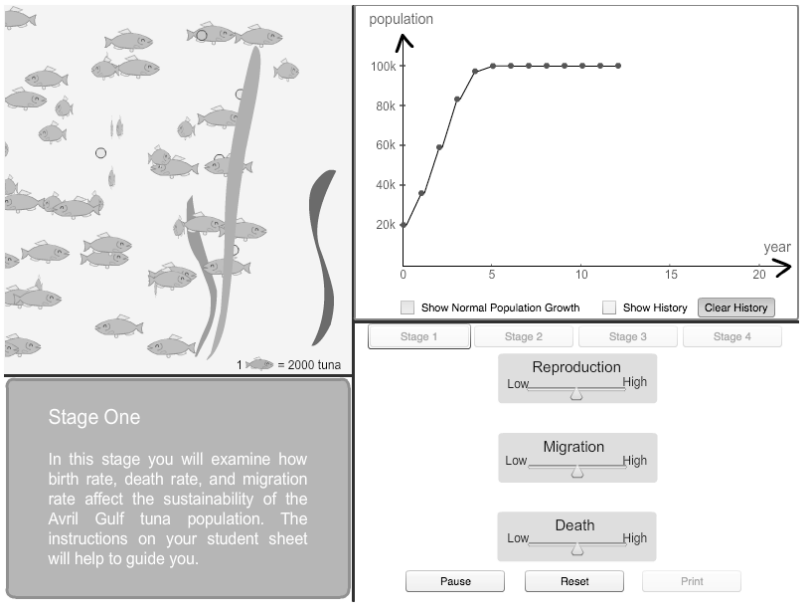

Predator/Prey Physical Model



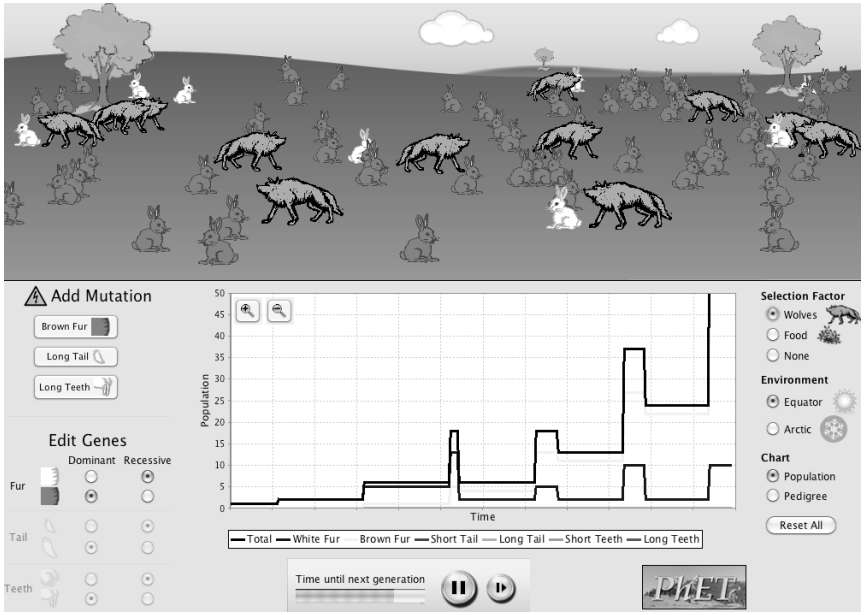

Natural Selection Simulation from *PhET*

Where/how does an issue fit into all of this?

# Compare/Contrast Simulations

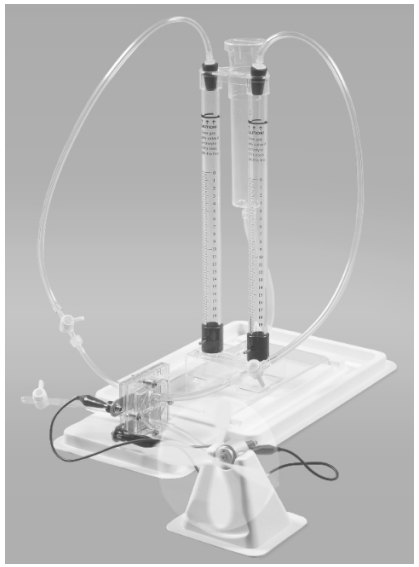



Avril Gulf Tuna Population Simulation (SEPUP)

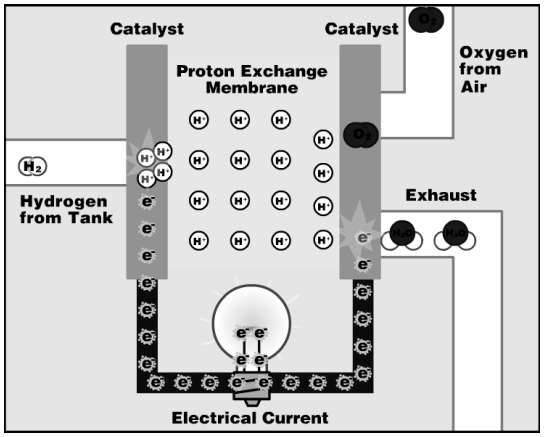



Natural Selection Simulation (PhET)

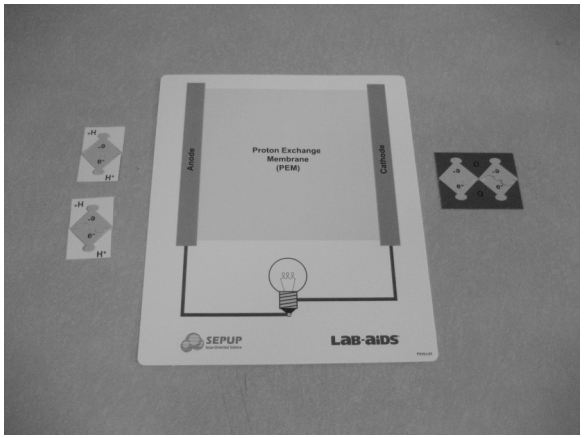
# Hydrogen Fuel Cell Models



Physical Model




Fuel Cell Simulation




Hands-on Puzzle Model

# Genes and Chromosomes

- DNA & chromosome physical models
- Simulations –
  - DNA Replication
  - Protein Production

# Differentiation

- Each group will be given a classroom scenario
- Discuss with your group how you would design a lesson around fuel cells given your scenario

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