Understand Photosynthesis and Cellular Respiration!

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SEPUP
Lawrence Hall of Science
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A Catalyst for Learning

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Science and Global Issues: Biology

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The Science Education for Public Understanding Program

• Science curriculum design and professional development
• Based at the Lawrence Hall of Science, University of California at Berkeley
• Designing science curriculum, working with teachers, and supporting quality science instruction since 1983
• Major funding for curriculum work from the National Science Foundation
Issue-oriented Science: SEPUP’s Model

- 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 and the issues and content are closely related.
SGI Project Overview

- National Science Foundation Curriculum Development Project
- Uses sustainability as the unifying context for studying important biological concepts
- Inquiry-based, Issue-oriented science...
  - students talk, think, and discuss science content as it relates to personal, societal, and global issues
  - students learn to use evidence in the decision-making process
- Embedded assessments & literacy strategies
- Research-based & extensively field-tested
## Science and Global Issues: Biology

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Sustainability

• Sustainability in the context of human development can be defined as:
  – Meeting the needs of the present without compromising the ability of future generations to meet their own needs.

• Sustainability can be examined through three perspectives - environmental, economic, and social.

• Sustainability can also be considered on three levels - personal, community, and global.
Activity: The Photosynthesis and Cellular Respiration Shuffle

- Occurs mid-way in the unit (9 of 19)
- Students have just learned about ecosystems and the carbon cycle
- Students comfortable with 4-2-1 model
- Activity is followed by three laboratory investigations on photosynthesis and cellular respiration
- Topic is revisited with more detail on molecular level in cell biology unit
Activity: The Photosynthesis and Cellular Respiration Shuffle

• **Energy Flow in the Coral Reef Ecosystem**
  – As you watch the video, think about how the energy flow in the coral reef ecosystem is similar to the energy flow in the kelp forest ecosystem.
Activity: The Photosynthesis and Cellular Respiration Shuffle

• On Student Sheet 9.1, “Photosynthesis and Cellular Respiration Diagram”:
  – Use pencil!
  – Label the paths you think the following substances take through the ecosystem:
    • Oxygen
    • Glucose
    • Carbon Dioxide
    • Water
  If you aren’t sure, make your best guess.
Activity: The Photosynthesis and Cellular Respiration Shuffle

• Use the Photosynthesis and Cellular Respiration Cards (the set with diagrams) instead of the simulation

• Work through Step 3, then stop
Activity: The Photosynthesis and Cellular Respiration Shuffle

- Complete the remaining procedure steps
- Write out your response to Procedure Step 11
- Complete Analysis Question 4
Activity: The Photosynthesis and Cellular Respiration Shuffle

• How do carbon and oxygen cycle through the environment?
Next Up!

- Respiring Beans: Students experiment with germinated beans and cellular respiration using phenol red.

- Respiration and Photosynthesis in Plants: Students experiment with aquatic plants, cellular respiration and photosynthesis using bromthymol blue.
Next Up!

• Too Much Life: Students experiment with rates of cellular respiration, yeast, and methylene blue.

• In the cell unit: More details on the molecular mechanisms of both processes.
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