The Cell Cycle in Normal and Cancerous Cells

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LAB-AIDS EXPERIENCING SCIENCE

SEPUP

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LAB-AIDS EXPERIENCING SCIENCE

SEPUP

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

SEPUP

Lab-Aids, Inc.

- Publishes and supports the use of SEPUP materials in classrooms across the United States
- Publishing quality science curricular materials, providing curricular support since 1963
- Based in Ronkonkoma, New York

Science and Global Issues (SGI)

- NSF curriculum development project
- Uses sustainability as the unifying context for studying important biological concepts
- Inquiry-based, issue-oriented science…
  - Students talk, think, and discuss content as it relates to personal, societal, and global issues
  - Students learn to use evidence in the decision-making process
- Embedded assessments and literacy strategies
- Research-based and extensively field tested

Sustainability

- In the context of human development:
  - Meeting the needs of the present without compromising the ability of future generations to meet their own needs
- Examined through three perspectives:
  - Environmental, economic, and social
- Considered on three levels:
  - Personal, community, and global

Science and Global Issues: Biology

Unit	Content focus	Sustainability focus
Sustainability	Interdisciplinary	Sustainability from a personal, community and global perspective
Living on Earth	Ecology	Human influence on ecosystems
World Health	Cell Biology	Global health issues
Feeding the World	Genetics	Use of genetically modified organisms
Maintaining Diversity	Evolution	Changes in and threats to biodiversity

Innovative Activities

- Show how content and problems or issues can be integrated
- Address TEKS high school Biology :
  - 5A: Stages of the cell cycle and its importance in growth
  - 5D: Disruptions of cell cycle lead to cancer
  - Other activities in this unit address 5B (specialized cells) and 5C (differentiation)

Activity: The Cell Cycle

- Occurs in the middle of the unit (Activity 13)
- Students have studied cell structure and function and specialization
- In a later activity they will study differentiation process
- Students comfortable with 4-2-1 model and literacy strategies
- Several case studies already covered

Activity: The Cell Cycle

- A game-like cell cycle activity
  - Cell cycle game board, game keys, clay
  - We will do the first few rounds together
  - Then you can do a few rounds on your own
- The activity is tied to a case study on cancer, tied to the global health and sustainability theme, that provides relevance

Activity: The Cell Cycle

- Roll 1: 7
- Roll 2: 6
- Roll 3: 4
- Roll 4: 9
- Roll 5: 6
- Roll 6-9: On your own

Let's review what's happened so far

- Roll 10: 11
- Roll 11: On your own

Activity: The Cell Cycle

- Cancer case study reading
  - Provides relevance

Read, Think, and Take Note

Read, Think, and Take Note: Guidelines

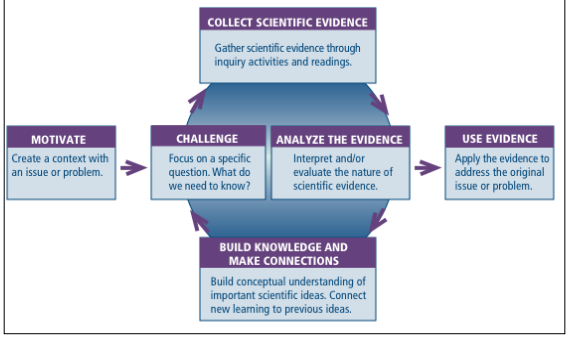
As you read, from time to time, write one of the following on a sticky note:

- Explain a thought or reaction to something you read.
- Note something in the reading that is confusing or unfamiliar.
- List a word that you do not know.
- Describe a connection to something you learned or read previously.
- Make a statement about the reading.
- Pose a question about the reading.
- Draw a diagram or picture of an idea or connection.

Cell Topics

- Cell structure & function
- Cell membrane & transport
- Photosynthesis
- Cellular respiration
- Protein functions
- Cell cycle & cancer
- Specialized cells
- Cell differentiation
- Microbes and infectious disease
- Noninfectious disease
- Global disease prevention and treatment

SEPUP: Instructional Model for Issue-oriented Science

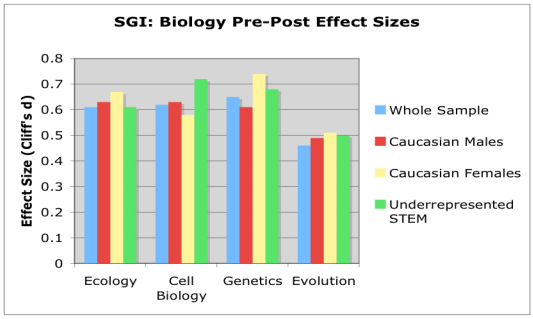


Why Issue-oriented Science?

- Integrates sciences & science with other subjects
- Realistic view of how science contributes to solving problems and the role of science in careers
- Real-world connections
- Use of science in daily life
- More authentic science, for ALL students
- Helps students learn science
- Improves student attitudes toward science

Development Process

- Iterative process of development, testing, expert review, evaluation, and revision developed and refined over 22 years of NSF funding
- Develop learning outcomes, assessments, and rough activities; pilot locally
- Refine activities and field-test nationwide; teachers receive PD; 1-2 cycles per unit
- Evaluate
  - Internal evaluation of usability for T and S
  - External evaluation of learning outcomes and pedagogy
  - External evaluation of scientific content



Small effect size Cliffs d = 0.147; medium effect size Cliffs d = 0.330; large effect size Cliffs d = 0.474 (Cliff, 1993; Romano et al, 2006).

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