NSDL/NSTA Web Seminar:
Thinking Like a Scientist: Teaching and Learning with Current Science Issues

Tuesday, January 12, 2010

Resources from this web seminar are listed at:
http://www.diigo.com/list/nsdlworkshops/web-seminar-bioscience-issues
Today’s NSDL Experts

Presenter:
Oksana Hlodan
Editor in Chief, ActionBioscience.org
AIBS

Guest Educator:
Brian Shmaefsky
Lone Star College, Kingwood, TX
President Elect: SCST
Web Seminar Outline

- ActionBioscience.org
- Teaching with Science Issues
- Evaluating Online Science Resources
Which category of issues are you most likely to use in your class? Stamp your answer(s)

<table>
<thead>
<tr>
<th>Biodiversity</th>
<th>Environment</th>
<th>Genomics</th>
<th>Biotechnology</th>
<th>Evolution</th>
<th>New frontiers</th>
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Type any specific issues here:
Poll Question

Where do you get your handouts or teaching materials when you incorporate issues in a lesson?

A. Newspapers
B. Magazines
C. Web site about issues
D. Video clip/news video
E. Podcast

Other? Write responses in the chat

http://nsdl.org
ActionBioscience.org
free access, educational use reprints

- Articles/interviews focus on issues in the biosciences
- Written by scientists and educators
- Peer-reviewed
- Ready-to-go lessons
- Correlated to NSES
- Links to “learn more” and “get involved” web pages
- Spanish mirror site
- Blog on educational technology for science teachers

http://nsdl.org
THE BIOSCIENCE CHALLENGES: How do these issues affect your life?

- biodiversity: Why preserve life’s variety?
- environment: How fragile is our planet?
- genomics: What does the genome reveal?
- biotechnology: How is biotech changing the world?
- evolution: What is life’s history on Earth?
- new frontiers: Why is it the age of biology?

FEATURED ARTICLES

- the future of marine fish resources
- investigating food-borne illness
- premarital genetic testing
- ethical issues in genetic engineering

ANGUISH OF DISCOVERY?

The English physician and naturalist Erasmus Darwin died in 1802, approximately seven years before Charles Darwin’s birth. Nonetheless, he provided the philosophical framework and intellectual
Let’s pause for questions from the audience....

http://nsdl.org
Part 2
Teaching with Issues

- extinction
- genetic privacy
- nanotechnology
- invasive species
- fossil dating
- forensics
- designer babies
- biopiracy
- transgenics
- pandemics
- cloning
- dead zones
- pharmacogenetics
- climate change
- genetically modified
- biofuels
- stem cells

http://nsdl.org
What is an issue?

“An issue is a topic with no clearly-defined single outcome or answer, something about which reasonable people might be expected to disagree.”

Susan Lewis, Carroll College
“Investigations should derive from questions and issues that have meaning for students.”

Sources of investigations:
- current events
- sci/tech-related problems

NSES, Science as Inquiry, Content Standard A
“Factors that complicate teaching with current issues”

• Prior misunderstanding about science
• Prior misconceptions about issues

Previous learning can inhibit future comprehension
Concerns

“Issues affecting accuracy & pedagogy”

• Immediate relevancy to student
• Perceived paradigm of science
  • Religious & moral values
• Interpretations of scientific method
  • View of science as an opinion
• Argumentum ad authority

Mutual miscalculation in the classroom brings on chaos!

http://nsdl.org
Strategies

“Using issues in the classroom”
• Use a case studies approach
• Applicable to concrete facts in the curriculum
• Examples:
  • Energy drinks - cell respiration
  • Transgenic GMOs - gene expression
  • Global climate change - photosynthesis
  • Endocrine disruptors – cell membrane
  • Sociobiology – evolution
Let’s pause for questions from the audience....
Which issue?

Topical

• Aquatic exotics- what’s the fuss?
• Use biocontrol instead of chemicals?
• Should food labels specify GM content?
• Genetic research threatens liberties?
• Allow ski-doos in protected areas?
• Klamath Basin 1900’s-present

http://nsdl.org
Topical Issue: KLAMATH BASIN
Which issue?

Historical

- Recombinant controversy of the 1960s
- Gene therapy fiasco of the 80s
- Regulation of chlorofluorocarbons, 70s
- Biosphere 2 as model of environment
- Spotted Owl debate in Pacific NW
- Darwin’s nose
Historical Issue:
DARWIN’S NOSE

Darwin's nose = relating a historical issue to belief in the false science of physiognomy

http://nsdl.org
What’s a good issue?

- Connection to course objectives
- Real rather than fabricated
- Contemporary relevance
- Controversial/problem-based
- Data supported
- Illustrates the process of science
Assessment?

- Understanding the issue
- Comprehension of the science behind the issue

Read article by teacher Susan Lewis, “Issue-Based Teaching in Science Education”
[http://www.actionbioscience.org/education/lewis.html](http://www.actionbioscience.org/education/lewis.html)

[http://nsdl.org](http://nsdl.org)
Let's pause for questions from the audience....
Thinking Like a Scientist: Teaching and Learning with Current Science Issues

PART 3
EVALUATING ONLINE SOURCES

Oksana Hlodan
Editor-in-chief, ActionBioscience.org
American Institute of Biological Sciences

NSDL/NSTA Web Seminar, Jan. 12, 2010

http://nsdl.org
Why encourage students to evaluate web sites?
Number of web sites:

over 100,000,000

Netcraft, Nov. 2006

http://nsdl.org
Fewer than 10% of students check the accuracy of online information.

University of Connecticut and Clemson University, 2005
http://www.newliteracies.uconn.edu/ies.html
Teaching Internet Comprehension to Adolescents
Internet research skills = Scientific research skills

http://nsdl.org
What is the #1 evaluation criteria that you want your students to remember when they are surfing for information?

<table>
<thead>
<tr>
<th>Author credentials</th>
<th>Peer reviewed</th>
<th>Domain (.edu, .com, .gov, etc.)</th>
<th>Supported by references</th>
</tr>
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<tbody>
<tr>
<td></td>
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<td></td>
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<tr>
<td>Linked from a credible site</td>
<td>No corporate sponsorship</td>
<td>First-hand information</td>
<td></td>
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</tbody>
</table>

Stamp your answer!
The 5 Ws

Who?
What?
When?
Where?
Why?
Student Activity

- Distribute evaluation worksheets
- Pick a newsy issue, e.g., GM corn
- Have students search different domains: .com, .edu, .org, .gov
- Discuss evaluation results with class

http://nsdl.org
<table>
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<th>WHO?</th>
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<tr>
<td>Does the author have good credentials, e.g., expertise, relevant education? Look for the author bio or link to the bio. If it's not provided, do a search on the author. If author is an organization, check its mission statement or purpose.</td>
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<td>Y=2  S=1  N=0</td>
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<tr>
<th>WHAT?</th>
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<tr>
<td>Is the content credible (seems trustworthy)? Examine the purpose, facts, and sources. Consider if info is first or second-hand. See if facts and sources are documented (references, citations). Check links to see if they lead to quality pages.</td>
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<tr>
<td>Y=2  S=1  N=0</td>
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<tr>
<td>Is it clear when the info was posted or updated? Look for dates in the copyright, near the page title, home page, etc. Try a few suggested links to see if they still work.</td>
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<td>Y=2  S=1  N=0</td>
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<tr>
<td>Is the sponsor/producer credible for the topic presented? Look in “about us,” “contact us,” or home page. Ensure sponsorship is stated. Do a search to see if other websites that link to this one are quality sites (good sites usually review their suggested links).</td>
</tr>
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<td>Y=2  S=1  N=0</td>
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</tbody>
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<th>WHY?</th>
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<tbody>
<tr>
<td>Should I use the info on this site/page? Consider whether the site/page is better than others for what you need. If you're not sure, check the same info on a few other websites and compare.</td>
</tr>
<tr>
<td>Y=2  S=1  N=0</td>
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| TOTAL POINTS: |
Additional Evaluation Resources

Kathy Shrock’s Guide for Educators
http://school.discovery.com/schrockguide/eval.html

Albany University Tutorial
http://library.albany.edu/usered/webeval/

Widener University Tutorial & Activities
http://www.widener.edu/libraries/wolfgram/evaluate

Web Evaluation by Pam Berger
Issues/Case Study Resources

BioQUEST
LifeLines OnLine Project investigative cases.
http://www.bioquest.org/lifelines/

McGraw-Hill case studies
» Bioethics and law scenarios
http://www.mhhe.com/biosci/genbio/olc_linkedcontent/bioethics_cases/
» Ecology and environment case studies
http://www.mhhe.com/biosci/pae/environmentalscience/casestudies/

National Center for Case Study Teaching in Science
http://ublib.buffalo.edu/libraries/projects/cases/case.html

University of Delaware: Problem-Based Learning Clearinghouse
https://chico.nss.udel.edu/Pbl/

The Web-based Inquiry Science Environment (WISE)
http://wise.berkeley.edu/

ActionBioscience.org
http://www.actionbioscience.org/
THANK YOU!

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http://nsdl.org
Learn about new tools and resources, discuss issues related to science education, find out about ways to enhance your teaching at:
http://expertvoices.nsdl.org/learningdigitalK12

Resources from this web seminar are listed at:
http://www.diigo.com/list/nsdlworkshops/web-seminar-bioscience-issues
Next in the NSDL Web Seminar Series:

*Teaching Biotechnology: New Tools and Resources for the STEM Career Pipeline*

February 17, 2010
Welcome to Your Professional Development

The Learning Center is NSTA's e-professional development portal to help you address your classroom needs and busy schedule. You can gain access to more than 3,300 different resources that cater to your preference for learning. Over 925 resources, such as journal articles, science objects and web seminars are available for free. A suite of practical tools such as My Library, My Transcript, and My Professional Development Plan and Portfolio tool help you organize, personalize, and document your growth over time. It is desired, you may review an archived Web Seminar overview of the NSTA Learning Center, or download the “How to Guide” PDF (2.7 MB).

Explore Learning Opportunities

- By Subject
  - Earth & Space Science
  - Life Science
  - Physical Science

- By Grade Level
  - Elementary
  - Middle School
  - High School
  - College

- By State Standards

Search Go

Most Popular Science Objects

- Viewed
- Enrolled

1. Energy: Different Kinds of Energy
2. Plate Tectonics: Layered Earth
4. Universe: The Sun as a Star

Multimedia Overview

View Overview of the NSTA Learning Center
Flash Player Required

Free Learning Resources

Solar System
A Look at the

http://learningcenter.nsta.org
National Science Teachers Association
Dr. Francis Q. Eberle, Executive Director
Zipporah Miller, Associate Executive Director
Conferences and Programs
Al Byers, Assistant Executive Director e-Learning

NSTA Web Seminars
Paul Tingler, Director
Jeff Layman, Technical Coordinator