



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



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Web Seminar Outline



- ActionBioscience.org
- Teaching with Science Issues
- Evaluating Online Science Resources



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Which category of issues are you most likely to use in your class? Stamp your answer(s)

Biodiversity	Environment	Genomics	Biotechnology	Evolution	New frontiers

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



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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



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educator
resources



lessons • articles
blog • media

THE BIOSCIENCE CHALLENGES: How do these issues affect your life?

click a topic below for peer-reviewed articles and links



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



Sample Pages

A typical article

<http://www.actionbioscience.org/environment/wolf.html>

Climate Change Threatens Penguins

Shaye Wolf

An ActionBioscience.org Original Article

[en español](#)

article highlights

Climate change is affecting most penguins in different ways. Global warming:

- jeopardizes the safety of penguin breeding areas
- harms their food supply
- causes increased chick and adult mortality

[read article](#) [learn more](#) [get involved](#) [educator resources](#)

Penguins—waddling wonders of the Southern Hemisphere

Penguins (order Sphenisciformes, family Spheniscidae) are flightless seabirds found almost entirely in the Southern Hemisphere. Although their wings have become useless for flight, they have become superbly adapted to swimming and diving. For example, Gentoo penguins can swim up to 35 km per hour— compared with 9 km per hour for the fastest Olympic swimmer. Emperor penguins can dive to depths of more than 520 m to find food—deeper than any other bird. Penguins must return to land or sea ice to rear their young, however, and they are renowned for their feats of endurance as parents. The



Macarshi Penguin (*Eudyptes chrysolophus*) on Hannah Point, Livingston Island, Antarctic Peninsula, sports colorful crests. Photo: Jerzy Strzelecki

Educator resources

<http://www.actionbioscience.org/educators/educator-resources.html>

Educator Resources

• [ActionBioscience.org education articles](#)

Read peer-reviewed articles on issues in bioscience education.

• [ActionBioscience.org lessons](#)

Use ready-to-go lessons written by educators to accompany this web site's articles.

• [ActionBioscience.org NSES correlation charts](#)

Plan lessons or readings using charts correlated to national standards.

• [ActionBioscience.org blog](#)

Blog about issues in educational technology for bioscience teaching and learning.

• [BioScience journal resources](#)

Find selected articles on education and biology topics from the prominent journal.

• [AIBS media library](#)

Download podcasts or videos of presentations by eminent scientists and educators at events sponsored by the American Institute of Biological Sciences (AIBS).

• [Submission guidelines for lesson writers](#)

Write lessons for ActionBioscience.org and earn an honorarium and professional development credits.





Let's pause for
questions from
the audience....



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Part 2

Teaching with Issues



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

What is an issue?

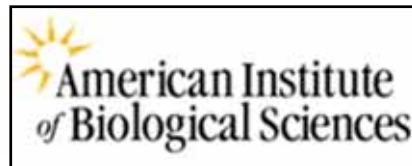


“An issue is a topic with no clearly-defined single outcome or answer, something about which reasonable people might be expected to disagree.”

Susan Lewis, Carroll College



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Standards & issues?



“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



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Barriers



“Factors that complicate teaching with current issues”

- Prior misunderstanding about science
- Prior misconceptions about issues



Previous learning can inhibit future comprehension



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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!



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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



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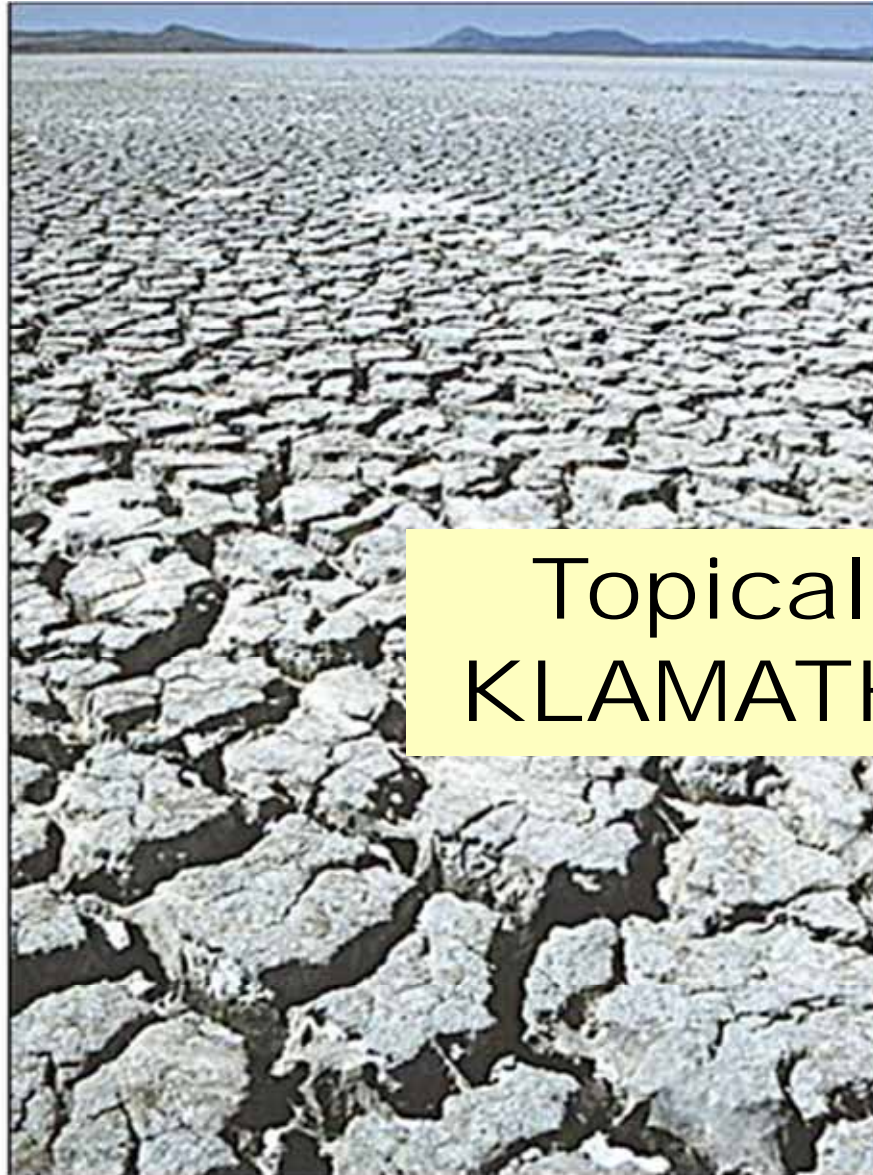


Which issue?



Topical

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



Topical Issue: KLAMATH BASIN



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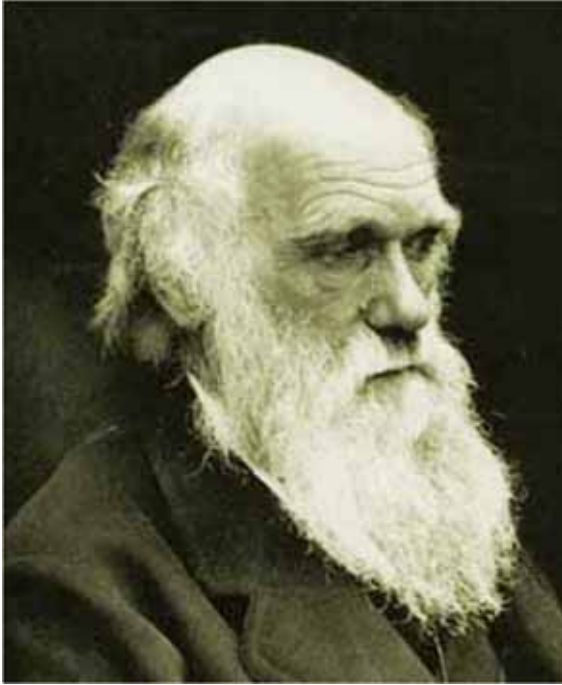


Which issue?



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



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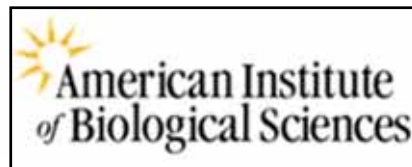
What's a good issue?



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



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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>



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questions from
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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



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Why encourage students

evaluate web sites?



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Number of web sites:

over 100,000,000

Netcraft, Nov. 2006



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**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



<http://nsdl.org>





Internet
research
skills
=
Scientific
research
skills

What is the #1 evaluation criteria that you want your students to remember when they are surfing for information?



Author credentials	Peer reviewed	Domain (.edu, .com, .gov, etc.)	Supported by references
Linked from a credible site	No corporate sponsorship	First-hand information	Stamp your answer!



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The 5 Ws



Who?



What?

When?

Where

?

Why?



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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



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WHO? 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.	Y=2 S=1 N=0
WHAT? 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.	Y=2 S=1 N=0
WHEN? 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.	Y=2 S=1 N=0
WHERE? 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 web sites that link to this one are quality sites (good sites usually review their suggested links).	Y=2 S=1 N=0
WHY? 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 web sites and compare.	Y=2 S=1 N=0
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

<http://www.infosearcher.com/infosearcher/articles/evaluatingweb1.pdf>



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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/>



<http://nsdl.org>





Oksana Hlodan
ohlodan@aibs.org

THANK
YOU!



Brian Shmaefsky
Brian.r.shmaefsky@lonestar.edu



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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>



<http://nsdl.org>





Next in the NSDL Web Seminar Series:

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

February 17, 2010



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2. Plate Tectonics: Layered Earth
3. Energy: Thermal Energy, Heat, and Temperature
4. Universe: The Sun as a Star

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By Subject	By Grade Level	By State Standards
<ul style="list-style-type: none"> Earth & Space Science Life Science Physical Science 	<ul style="list-style-type: none"> Elementary Middle School High School College 	Select your state to begin: <input type="text" value="Choose a state"/>



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Free Learning Resources


[Solar System: A Look at the](#)

<http://learningcenter.nsta.org>



<http://www.elluminate.com>

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