Using Case Studies to Teach Science

Faculty Development Workshop
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If history were taught in the form of stories, it would never be forgotten.

-Rudyard Kipling, The Collected Works
Why bother?!

CONTEXT
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!!!!!!!

The bigger picture

Individual factoids
Critical thinking is like Mark Twain’s quip about the weather—everybody talks about it, but nobody does anything about it.

-Clyde Freeman Herreid
History of Case Study Teaching

• Law and business schools
• Medical school rounds
• Ethics courses
Some Characteristics of a Good Discussion Case

1. Short (1-3 pages)
2. Controversial (ethics): Multiple possible answers (open case)
3. Dilemma to be solved (medical case): one answer (closed case)
4. Contemporary
5. Real
6. Relevant to students
7. Dialogue
8. Interesting characters
Types of Case Studies

1. Historical cases: How scientists work
   Examples:
   a. Semmelweis observed a correlation between handwashing and mortality rates among women in a hospital maternity ward
   b. Warren and Marshall: ulcers caused by bacterium

2. Scientific inquiry
   Examples:
   a. Does a traditional Native American remedy relieve itch from poison ivy?
   b. How do PCBs wind up in remote Alaskan lakes?

3. Science or Pseudoscience?
   Example: The “Mozart Effect”

4. Effects of science on society and society on science
   a. Autism, measles, and the MMR vaccine
   b. Tainted taco shells

5. Ethical dilemmas

What do we want students to be able to do for the next 60 years of their lives?

1. Consider claims made in the news, on blogs, Facebook, by politicians, etc.
2. Look at the logic of the argument
3. Consider consequences of a course of action
   • Is it true?
   • Why should I believe this?
   • What is the evidence?
   • Is there counterevidence that should be considered?

Ways to Approach Case Studies

1) Lecture Method
2) Small groups
   a) Problem based learning (several class periods)
   b) Interrupted case study (one class period)
   c) Jigsaw (expert or stakeholder teams and mixed teams)
3) Whole-Class Discussion Method
   a) Direct case method
   b) Role-playing
   c) Debates (pro/con team research; switch sides to present)
   d) Trials
   e) Public hearings

Direct Case Method

1. 2-3 paragraphs outlining the case
2. Series of questions to complete at home.
3. Class discussion (after turning in question sheet)
Results

• Improved reading skills
• Improved data analysis skills
• Improved critical thinking skills
• Improved retention
• Increased interest in topic
Looking for Previously Written Case Studies?

• National Center for Case Study Teaching in Science
  – Wide selection of searchable cases
  – Teaching notes available
  – Workshop sessions available for writing your own cases
  – You can contribute your own case studies to the collection
  – [http://sciencecases.lib.buffalo.edu/cs/](http://sciencecases.lib.buffalo.edu/cs/)