

Using Case Studies to Teach Science

Faculty Development Workshop
October 23, 2012

*Donna L. Pattison, PhD
Instructional Professor
Department of Biology & Biochemistry*

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

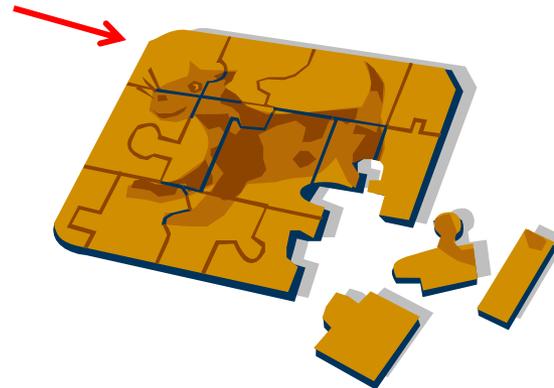
-Rudyard Kipling, *The Collected Works*



Why bother?!

CONTEXT
CONTEXT
CONTEXT
!!!!!!!

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 Cases 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

Herreid, C. et al. (2012) Science Stories: Using Case Studies to Teach Critical Thinking. NSTA Press.

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?

Herreid, C. et al. (2012) Science Stories: Using Case Studies to Teach Critical Thinking. NSTA Press.

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

Herreid, C. et al. (2007) Start with a Story: The Case Study Method of Teaching College Science. NSTA Press.

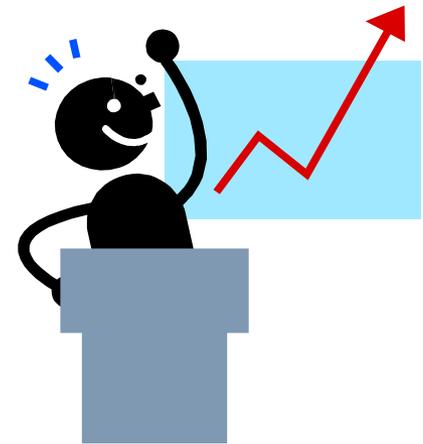
Direct Case Method

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/>