Critical Thinking Across the Curriculum

Prepared by Ryan Falcioni for the Faculty Success Center @ Chaffey College (9/18/09)
Workshop Topics

- Why are we here?
- What is critical thinking?
- How/Why did critical thinking develop?
- What are some of the tools of critical thinking?
- How can we cultivate critical thinking across the disciplines?
- A little icebreaker.
The Critical Thinking Crisis?

- "Many 17-year-olds do not possess the 'higher-order' intellectual skills we should expect of them. Nearly 40 percent cannot draw inferences from written material; only one-fifth can write a persuasive essay; and only one-third can solve a mathematics problem requiring several steps."


- The situation is even more grim today.
CT Crisis hits Chaffey?

- 1% of our students assess at the collegiate level in English, Math and Reading.
- Over 90% need remediation in English.
  - Yet 57% self-rate their reading skills and 49% their writing skills as “good” or “excellent”.
  - 51% state that they have not had experience in writing essays or reports.
  - 30% report that they do not read at all.
  - 42% read less than 2 hours per week.
- Over 60% of our students received a C or lower in their last math class.
- Average Reading Level (6th grade).
What is Critical Thinking?

- Isn’t all thinking critical?
- How is CT different than other varieties of thinking?
- There is no solid definition of CT.
  - Some focus on CT as the application of logic.
  - For others, CT is the cultivation of intellectual virtues.
  - Many have a “problem solving” view of CT.
Some proposed definitions

- **A neat definition**: “reasonable, reflective thinking that is focused on deciding what to believe or do” (Norris and Ennis)

- **A not so neat definition**: "We understand critical thinking to be purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based. CT is essential as a tool of inquiry. As such, CT is a liberating force in education and a powerful resource in one's personal and civic life. While not synonymous with good thinking, CT is a pervasive and self-rectifying human phenomenon. The ideal critical thinker is habitually inquisitive, well-informed, trustful of reason, open-minded, flexible, fairminded in evaluation, honest in facing personal biases, prudent in making judgments, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit. Thus, educating good critical thinkers means working toward this ideal. It combines developing CT skills with nurturing those dispositions which consistently yield useful insights and which are the basis of a rational and democratic society." (Facione)

- A few more attempts.
A few common CT skills/goals

- Understand the logical connections between ideas
- Identify, construct and evaluate arguments
- Detect inconsistencies and common mistakes in reasoning
- Solve problems systematically
- Identify the relevance and importance of ideas
- Reflect on the justification of one's own beliefs and values

Identify vital questions, problems, or issues and evaluate the plausibility of a solution.

Analyze, compose, and assess the validity of an argument.

Compute and analyze multiple representations of quantitative information, including graphical, formulaic, numerical, verbal, and visual.

Compare, contrast and analyze scientific CONCEPTS and scientific observation.

Select, analyze and evaluate the accuracy, credibility, relevance and reasonableness of information and its sources.
A few questions?

- Any questions for me yet?
- How do you develop critical thinking in your classes?
- Are there areas of critical thinking that are absent in your curriculum?
- What areas of critical thinking would you like more help with?
The first known primate was a shrew-like creature which appeared about 85 million years ago.

It took almost 80 million years for the first hominids to appear.

It was five million more years before the first “human” appeared (in the genus *homo*).

It took two million years until *homo sapiens* arrived (roughly 200,000 years ago).

Some argue for a new designation of *homo criticus sapiens* for modern man.

http://www.criticalthinking.org/files/Ancient%20Greece%20and%20Rome.ppt
A very brief history of CT cont...

- CT has been a part of the human experience since the emergence of *homo sapiens*.
- We see it emerge as a formal intellectual enterprise in the writings of Pre-Socratic thinkers (650-450 BCE).
  - They are the first historical examples of questioning the natural world without appeal to myth or superstition.
  - They utilized/developed the tools of reason in attempting to understand the world.
A bit more history

- Socrates builds upon the foundations of logic and argumentation and believed that CT is most valuable in the service of becoming a virtuous person.
  - It is this ethical component of CT that seems to be at the heart of ancient philosophy.
  - One has a moral duty to question established knowledge.
  - One has a moral duty to think for themselves and to pursue the truth with all of their ability.
  - The ability to think rationally (and morally) is what separates us from the animals.
- The “Socratic Method” is still a primary tool of CT.
  - The best way to learn is through dialectic (rigorous questioning aimed at clearing up conceptual and moral confusions).
A little bit more history

- For Plato and Aristotle, thinking critically was also essential for citizenship.
  - When people do not think for themselves they are easily led.
  - George Carlin on critical thinking
- Aristotle is often credited with the first attempts at naturalistic science.
  - He developed the first formal systems of logic.
  - Aristotelian logic is still the foundation of CT.
  - Discussed the cultivation of intellectual virtues.
- It is the mark of an educated mind to be able to entertain a thought without accepting it. - Aristotle
- Michael Shermer on skepticism, critical thinking and science
Time for a little logic

- We will attempt to do some basic logic and argumentation here.
- These exercises can also be used in the classroom.
- Hopefully this will be a relatively painless process.
Racism and sexism are wrong because all people deserve equal respect.

It is immoral to use rabbits in cosmetic experiments because causing pain is immoral, and animals such as rabbits are capable of feeling pain.

People need to pass a driving test to get a license to drive a car. People should also have to take a test and get a license before they can become a parent. After all, parenting is a greater responsibility and requires more skill than driving. (Boss)
Logical Fallacies

- Informal fallacies occur when an argument is logically incorrect, yet is still compelling in some way.
  - Fallacy News
  - Fallacy of equivocation
  - Slippery Slope
  - Appeal to force
  - *Ad hominem*
  - Appeal to inappropriate authority
  - Popular appeal
  - Hasty generalization
  - Fallacy of ignorance
  - Begging the question
  - Irrelevant conclusion
  - Naturalistic fallacy
  - Red Herring
Fun with Fallacies

- Rush Limbaugh on War
- Jeremy Glick vs Bill O'Reilly
- Religious Propaganda 1984 Or Bust
- Michael Moore vs. Bill O'Reilly Pt. 1 of 2
- Michael Moore vs. Bill O'Reilly Pt. 2 of 2
- Jon Stewart on Crossfire (part 1)
- Jon Stewart on Crossfire (part 2)
The Bible says, ‘women are to be silent in the churches; utterance is not permitted to them.’ Therefore, women should not speak in the churches.

From past experience, all lemons are sour. Therefore, the lemons on this tree are also sour.

Most people disapprove of extra-marital affairs. So extra-marital affairs are wrong.

You want to be rich in a short time. So you should invest in the stock market.

Divide the students into two groups. One group identifies an object in the room (e.g. chair, mobile phone) and asks the other group to provide a definition. The first group is responsible for criticizing the definition and the second group will continue to modify the definition to deal with objections from the first group.

(http://philosophy.hku.hk/think/misc/ex-public-1.pdf)
Group Participation Time

- Work in groups of 3-4.
- Discuss an assignment that you currently use that involves critical thinking.
  - What elements of critical thinking does it involve?
  - What can be done to improve it?
- Develop a new CT assignment for one of your courses.
Promoting CT in the classroom

- Ask frequent open-ended questions and provide a substantial wait time (several, potentially awkward, seconds) for students to formulate responses.
  - Make sure to maintain wait times and expect/require answers. This trains students to activate “cognitively complex discourse” (Tobin).

- Be diligent in creating and tolerating conflict/dissonance.
  - A bit of psychological discomfort can be motivating (Frager).
More Ways to Promote CT

- Have students journal about what they learned and what they are confused about after each class session (2 minutes).
  - This “classroom assessment” gives you immediate feedback.
  - **The single most important thing you can do?**

- Bring in historical and philosophical information about the development of knowledge in math and science.

Some Helpful Resources

- [http://www.criticalthinking.org](http://www.criticalthinking.org)
  – The website of the Foundation for Physical Thinking

- [http://philosophy.hku.hk/think/critical](http://philosophy.hku.hk/think/critical)
  – A critical thinking resource page from Hong Kong University.

- [http://www.austhink.org/critical](http://www.austhink.org/critical)
  – A directory of online critical thinking sites

- [http://mcckc.edu/longview/ctac/index.htm](http://mcckc.edu/longview/ctac/index.htm)
  – The website of a Critical Thinking Across the Curriculum project at Longview CC.
Bibliography

- Frager, Alan. "Conflict: The key to critical reading instruction." Paper presented at annual meeting of The Ohio Council of the International Reading Association Conference, Columbus, Ohio, October 1984. 18pp. [ED 251 806]


- A Nation at Risk, the National Commission on Excellence in Education (1983)