

Welcome to CTE Summer Camp!

Astute Reasoning: Logic Skills for Students

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Astute Reasoning

logic skills for students-- how to encourage your students to be strong critics of bad reasoning while becoming shrewd analysts and acute synthesizers in their own reasoning.

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How is Astute Reasoning different from “Critical Thinking”?

- ◆ Critical Thinking is a big movement within academics and business.
- ◆ It’s basically a way to prompt people to think a lot about things they wouldn’t ordinarily think about.



Time to reconsider Critical Thinking

◆ Mortimer Adler:

American education in the twentieth century has been full of "buzzwords." They represent voguish panaceas that, originating locally, develop into nationwide manias. Sweeping the country for a short time, they die away leaving no memorable results. The most recent and most ill-conceived is the mania to develop programs of instruction in critical thinking, using manuals and other "how-to" devices, as if thinking could be taught in and of itself as an abstract skill.



Adler, on why “critical thinking programs” won’t work

- ◆ In some cases, that may be the right thing to do. But with regard to thinking, it is completely wrong. I would almost say that, for critical thinking, devising a special program to produce the desired result is a chimerical effort. It cannot be done.
- ◆ There is no such thing as thinking in and of itself. All the thinking any of us do is thinking about one subject matter or another, or it is the thinking we do in the process of performing other acts of the mind.



Good Schooling



- ◆ **Good schooling should involve a great deal of discussion, interchanges of questions and answers between teacher and student and between students with one another. Such discussion, if it is to be educationally profitable for all concerned, must involve them in thinking. It certainly should not be as thoughtless as cocktail-party chitchat, or like the unthinking exchange of opinions or prejudices in ordinary bull sessions.**

Educationally Profitable Discussion

- ◆ **Those engaged in educationally profitable discussion will be engaged in agreeing or disagreeing, arguing when they disagree, and giving reasons for disagreements. They will be making and defending generalizations, or challenging generalizations made by others. They will be judging by weighing evidence pro and con, or by examining the validity of reasons for making one claim or another concerning what is true or false, more or less probable. They will be asking and answering questions about the consistency or inconsistency of things asserted or denied, about their presuppositions and their implications, and about the inferences involved therein.**



All this is obviously critical thinking on the part of those engaged in discussing, as well as those engaged in reading, writing, speaking, listening, calculating, providing, testing, observing, measuring, and trying to draw conclusions from what has been found by observation and measurement. All of the words just used are participles of verbs that signify acts of the mind in thinking. These acts can be performed either poorly or well. They are performed well only by those who have acquired skill in performing them, skill that in each case is possessed as a good habit of performance.

Let's call it something else here: astute reasoning



- ◆ **How are such intellectual habits of skill developed? Exactly in the same way that all bodily habits of skill are developed: by coaching, not by didactic instruction using textbooks that state the rules to be followed.**

A Principle of Teaching

You can't teach
what you
don't grasp
yourself.



Part I

1. Do you believe that the ability to reason can be taught? **G**
2. Do you believe that the ability to reason is a separate skill that ought to be or is taught independently of your discipline? **G**
3. Do you believe that the ability to reason is a lifelong, developmental skill? **G**
4. What do you think are your students' intellectual or cognitive skills? What do you think are their weaknesses? How would you go about finding out more precisely what they are? **SG**



Part II



1. Do you believe that opportunities for increasing reasoning skills present themselves often or rarely? **G**
2. Do you believe your reasoning skills have improved over your lifetime? Specifically, since you began college? Since you began teaching? **SG**
3. When did your biggest leaps in acquiring reasoning skill take place? Can you explain why? Do you think you are like everyone else in this regard, or, do you think you are unique? **SG**

Part III

1. What do you want your students to be able to do with their minds? What do these abilities have to do with your course, a major in your discipline, your discipline in general? **G**
2. What sorts of mental aptitudes or temperamental profiles seem to be the ones that most successful practitioners of your discipline or scholars in your field have? **SG**
3. Do you want your students to become good inquirers or researchers in your field? What needs to be done in your field in this regard? **SG**



Part IV The Moment of Truth



1. What are YOUR intellectual or cognitive strengths and weaknesses? Are there areas of logic or reasoning that you would like to be clearer about? **SG, then G**
2. What troubled you the most when you were first learning the basic concepts and content of your discipline? What troubles you most now about its premises, paradigms, assumptions, agendas, methodologies, conclusions, results, and applications? What have you done or what do you do about these troubles? **SG, then G**

A Guide for Question 1, Part IV: Basic Logic Terms and Concepts Checklist

1. Criteria for interpreting speech/writing as an argument versus a non-argument.
2. How to criticize arguments according to their genres.
3. The difference between abductive, deductive and inductive reasoning.
4. The meaning of the terms “valid,” “sound” and “cogent” as logicians use them.
5. The difference between contingent, self-contradictory and tautologous statements
6. The difference between valid and invalid arguments; sound and unsound arguments.

More Logic Concepts

7. Using counterexamples to refute invalid arguments.
8. Commonly occurring informal fallacies and how to identify and avoid them.
9. How to distinguish a good argument you don't agree with from an opinion with which you disagree.
10. How specific deductive forms of argument are used to derive scientific conclusions. (e.g., modus tollens, disjunctive syllogism)
11. What makes inductive arguments strong or weak.
12. How statistics can be manipulated to make bad arguments seem good and good arguments seem bad.
13. How to offer constructive counterarguments

A Guide for Question 2, Part IV: Troublesome aspects of your discipline: beginning with the status of facts

Facts	What counts as a fact in this discipline/topic/field? What does not or might not count? In terms of specific accepted facts, how long have these been "facts"? Who first adopted these "facts" and by what process? Has there been any dispute about the status of these facts? Did these facts replace others which are now discounted?
Concepts	
Discourse about a topic	
Text about a topic	

Cont'd., the status of concepts

Facts	
Concepts	What elements does this concept address? How far-reaching or narrow in the application of this concept? Is this concept about a relationship, a principle, a rule of operation? How so? Has this concept been generally accepted by the community or scholars in this field or is it disputed, refuted or devalued by other concepts?
Discourse about a topic	
Text about a topic	

Cont'd., the status of discourse about a topic

Facts	
Concepts	
Discourse about a topic	Who is the speaker? What is his or her political, social, cultural, economic, religious, philosophical, or personal perspective in general? Is this perspective strong enough to bias his or her discourse and if so, how so? What is the context of this discourse? Is the discourse in response to someone else's discourse? Who, what, when and how does this discourse treat the issue in distinction from the source he/she is responding to?
Text about a topic	

Cont'd., the status of text about a topic

Facts	
Concepts	
Discourse about a topic	
Text about a topic	Who is the author? Who sponsored the author? If the text is published, who published it? Who has reviewed the text prior to publication? What are the generally accepted criteria for publishing this text? What are the political, social, cultural, economic, religious, philosophical or personal perspectives/biases/agendas of the author? Are these indicated in the text directly? Indirectly? What is the context of the publication of this text? Does this text conform in style, content and purpose with other texts about this topic? How is it the same and how is it different from other texts?

Part V Action Item Relative to Students



1. Do you encourage and recognize your students' reasoning abilities? How? **SG; G**

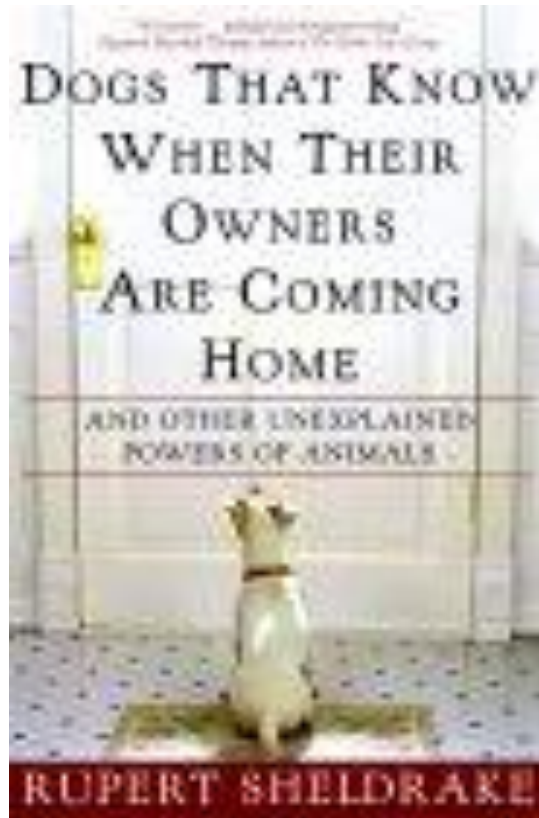
Assignments

- ◆ Assignments that promote critical thinking often demand that students deal with negative results, discordances, and discrepancies. **The temporary result of a well-devised assignment that fosters reasoning skills is cognitive dissonance. The long-term result is better organization of thoughts or structures of thought.**

Deal with the principle of non-contradiction:

- ◆ The Principle: A given entity cannot both be A and not-A simultaneously. In other words, to claim that some object has an attribute or predication and to also claim that it has a different attribute or predication that would obviate the first yields a logical impossibility.
- ◆ **The Assignment:** *Find two sources that yield conflicting information about or interpretations of TOPIC X. Summarize the differences in the information/interpretations. Devise a plan about how to come to terms with these differences.*

Appropriate regard for context



- ◆ **The Assignment:**
Locate a text that is biased toward a particular agenda or ideology. Explain and justify how you would use this text to make a point for or against the agenda or ideology.

Analyze differences in the perspectives of different cultures or historical periods to draw a bead on the one you are studying

- ◆ **The Assignment:** *Compare the views of two or more authorities on a TOPIC X whose perspectives arise from widely divergent cultures or historical periods. Analyze the differences between their views. Why and how would you attempt to refute one or the other in favor of another? Analyze your criteria for accepting or rejecting these views.*



Compare disciplinary perspectives in order to clarify your discipline's perspective.



The Assignment: *Analyze how a social scientist, a natural scientist, an artist, a fiction writer, mathematician, business person, or other would interpret PHENOMENON X (for example, a fractal design, a photograph, the American Flag.)*

Treat negative results with TLC.

- ◆ **The Assignment:**
Suppose that your expectations are not met as to how a given situation may turn out (a speculation based on a principle discussed in class, a lab experiment, etc.) What should you do with this information?



Analyze mistakes in reasoning: let your students know this is par for the course in your discipline.

- ◆ **The Assignment:** *Among the following arguments, choose which argument reasons from evidence to conclusion best and which is reasoned least well. Explain the flaw(s) in the argument that is not reasoned well. (Instructor provides two or more arguments for comparison.)*



Some Resources for You:

- ◆ The role of questioning
<http://www.criticalthinking.org/University/univclass/roleofquest.html>
- ◆ The fallacy files <http://gncurtis.home.texas.net/index.html>
- ◆ University of Chattanooga <http://www.utc.edu/Teaching-Resource-Center/critical.html#strategies>
- ◆ helping students to assess their thinking
<http://www.criticalthinking.org/University/cthistory.html>
- ◆ Bibliography <http://www.criticalthinking.org/University/cthistory.html>
- ◆ A critical thinking glossary of terms and concepts
<http://www.criticalthinking.org/University/gloss/intro.html>
- ◆ critical thinking consortium/Foundation for Critical Thinking
<http://www.criticalthinking.org/default.html>
- ◆ Mortimer Adler – why critical thinking programs don't work
<http://radicalacademy.com/adlercritthinkingpro.htm>

Thank you for your attention!



We appreciate your participation. Please evaluate this workshop.