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A Logical Basis for Measuring Critical Thinking Skills



We must go beyond Bloom's taxonomy to consider specific dispositions and abilities characteristic of critical thinkers.



The recent explosion of interest in critical thinking has occasioned an accompanying interest in assessing it on a large scale. This assessment requires an expanded definition of critical thinking.

Critical Thinking Defined

Although there are narrower concepts of critical thinking in some people's minds, I think that the one that is most generally employed is expressed in this definition: *Critical thinking is reflective and reasonable thinking that is focused on deciding what to believe or do.* Note that there are creative activities covered by this definition, including formulating hypotheses, questions, alternatives, and plans for experiments. Note also that, so defined, critical thinking is a practical activity because deciding what to believe or do is a practical activity.

Higher-Order Thinking Skills and Bloom's Taxonomy

How does critical thinking compare with higher-order thinking and Bloom's taxonomy? If these latter two approaches could do the job for us, there would be less reason to be interested in critical thinking.

As I have defined it and will be conceptualizing it, critical thinking is a much clearer concept than the currently popular *higher-order thinking skills*. In fact, *higher-order thinking skills* is so vague a term that it appears useless as a guide for the development of teaching, curriculums, and evaluation procedures. It has, however, had

one significant persuasive function: to remind us that there is much more cognitive stuff to be acquired in school than elementary reading, writing, and arithmetic and banks of memorized and soon-to-be-forgotten facts.

One possible conceptualization of higher-order thinking skills, Bloom's taxonomy, has served a similar function: reminding us that there is much more that schools could be doing than promoting memorization. Actually, I suspect that in the minds of many educators the top three levels of Bloom's taxonomy (analysis, synthesis, and evaluation), and perhaps also the next two lower levels (comprehension and application), *are* the higher-order thinking skills. So if it could provide useful guidance, Bloom's taxonomy could serve as a conceptualization of higher-order thinking skills.

Unfortunately, Bloom's taxonomy does not provide the guidance that we need. First of all, the concepts in the taxonomy are too vague as they stand. Take *analysis*, for instance. Analysis of a chemical compound, analysis of an argument, analysis of a word, analysis of an opponent's weaknesses in a basketball game, and analysis of the political situation in South Africa seem like such different activities that we might very well wonder just what we are supposed to teach under the label "analysis."

Second, as we might expect from the first difficulty, the taxonomy is not accompanied by criteria for judging the outcome of the activity. To teach

Figure 1. Goals for a Critical Thinking/Reasoning Curriculum¹

WORKING DEFINITION: *Critical thinking* is reasonable reflective thinking that is focused on deciding what to believe or do.²

Critical thinking so defined involves both dispositions and abilities

A. DISPOSITIONS:

1. Seek a clear statement of the thesis or question
2. Seek reasons
3. Try to be well-informed
4. Use credible sources and mention them
5. Take into account the total situation
6. Try to remain relevant to the main point
7. Keep in mind the original and/or basic concern
8. Look for alternatives
9. Be openminded
 - a. Consider seriously other points of view than one's own ("dialogical thinking")
 - b. Reason from premises with which one disagrees—without letting the disagreement interfere with one's reasoning ("suppositional thinking")
 - c. Withhold judgment when the evidence and reasons are insufficient
10. Take a position (and change a position) when the evidence and reasons are sufficient to do so
11. Seek as much precision as the subject permits
12. Deal in an orderly manner with the parts of a complex whole
13. Be sensitive to the feelings, level of knowledge, and degree of sophistication of others³

B. ABILITIES: (Classified under these categories: Elementary Clarification, Basic Support, Inference, Advanced Clarification, and Strategy and Tactics)

Elementary Clarification

1. Focusing on a question
 - a. Identifying or formulating a question
 - b. Identifying or formulating criteria for judging possible answers
 - c. Keeping the situation in mind
2. Analyzing arguments
 - a. Identifying conclusions
 - b. Identifying stated reasons
 - c. Identifying unstated reasons
 - d. Seeing similarities and differences
 - e. Identifying and handling irrelevance
 - f. Seeing the structure of an argument
 - g. Summarizing
3. Asking and answering questions of clarification and/or challenge, for example:
 - a. Why?
 - b. What is your main point?
 - c. What do you mean by _____?
 - d. What would be an example?
 - e. What would not be an example (though close to being one)?
 - f. How does that apply to this case (describe case, which might well appear to be a counterexample)?
 - g. What difference does it make?
 - h. What are the facts?
 - i. Is this what you are saying _____?
 - j. Would you say some more about that?

Basic Support

4. Judging the credibility of a source; criteria:

a. Expertise	e. Use of established procedures
b. Lack of conflict of interest	f. Known risk to reputation
c. Agreement among sources	g. Ability to give reasons
d. Reputation	h. Careful habits
5. Observing and judging observation reports; criteria:
 - a. Minimal interfering involved
 - b. Short time interval between observation and report
 - c. Report by observer, rather than someone else (i.e., not hearsay)
 - d. Records are generally desirable. If report is based on a record, it is generally best that:
 - 1) The record was close in time to the observation
 - 2) The record was made by the observer
 - 3) The record was made by the reporter
 - 4) The statement was believed by the reporter, either because of a prior belief in its correctness or because of a belief that the observer was habitually correct
 - e. Corroboration
 - f. Possibility of corroboration
 - g. Conditions of good access
 - h. Competent employment of technology, if technology is useful
 - i. Satisfaction by observer (and reporter, if a different person) of credibility criteria (#4 above)

Inference

6. Deducing, and judging deductions
 - a. Class logic—Euler circles
 - b. Conditional logic
 - c. Interpretation of statements
 - 1) Double negation
 - 2) Necessary and sufficient conditions
 - 3) Other logical words: "only," "if and only if," "or," "some," "unless," "not," "not both," etc.
7. Inducing, and judging inductions
 - a. Generalizing
 - 1) Typicality of data: limitation of coverage
 - 2) Sampling
 - 3) Tables and graphs

- b. Interfering explanatory conclusions and hypotheses
 - 1) Types of explanatory conclusions and hypotheses
 - a) Causal claims
 - b) Claims about the beliefs and attitudes of people
 - c) Interpretations of authors' intended meanings
 - d) Historical claims that certain things happened
 - e) Reported definitions
 - f) Claims that something is an unstated reason or unstated conclusion
 - 2) Investigating
 - a) Designing experiments including planning to control variables
 - b) Seeking evidence and counter-evidence
 - c) Seeking other possible explanations
 - 3) Criteria: Given reasonable assumptions
 - a) The proposed conclusion would explain the evidence (essential)
 - b) The proposed conclusion is consistent with known facts (essential)
 - c) Competitive alternative conclusions are inconsistent with known facts (essential)
 - d) The proposed conclusion seems plausible (desirable)
8. Making and judging value judgments
 - a. Background facts
 - b. Consequences
 - c. *Prima facie* application of acceptable principles
 - d. Considering alternatives
 - e. Balancing, weighing, and deciding

Advanced Clarification

9. Defining terms, and judging definitions; three dimensions
 - a. Form
 - 1) Synonym
 - 2) Classification
 - 3) Range
 - 4) Equivalent expression
 - 5) Operational
 - 6) Example—non-example
 - b. Definitional strategy
 - 1) Acts
 - a) Report a meaning ("reported" definition)
 - b) Stipulate a meaning ("stipulative" definition)
 - c) Express a position on an issue ("positional" including "programmatic" and "persuasive" definition)
 - 2) Identifying and handling equivocation
 - a) Attention to the context
 - b) Possible types of response:
 - i) The definition is just wrong (the simplest response)
 - ii) Reduction to absurdity—According to that definition, there is an outlandish result
 - iii) Considering alternative interpretations—On this interpretation, there is this problem; on that interpretation, there is that problem
 - iv) Establishing that there are two meanings of key term, and a shift in meaning from one to the other
 - c. Content

10. Identifying assumptions

- a. Unstated reasons
- b. Needed assumptions; argument reconstruction

Strategy and Tactics

11. Deciding on an action
 - a. Define problem
 - b. Select criteria to judge possible solutions
 - c. Formulate alternative solutions
 - d. Tentatively decide what to do
 - e. Review, taking into account the total situation, and decide
 - f. Monitor the implementation
12. Interacting with others
 - a. Employing and reacting to "fallacy" labels (including:

1) Circularity	12) Conversion
2) Appeal to authority	13) Begging the question
3) Bandwagon	14) Either/or
4) Glittering term	15) Vagueness
5) Namecalling	16) Equivocation
6) Slippery slope	17) Straw person
7) Post hoc	18) Appeal to tradition
8) Non sequitur	19) Argument from analogy
9) Ad hominem	20) Hypothetical question
10) Affirming the consequent	21) Oversimplification
11) Denying the antecedent	22) Irrelevance
 - b. Logical strategies
 - c. Rhetorical strategies
 - d. Presenting a position, oral or written (argumentation)
 - 1) Aiming at a particular audience and keeping it in mind
 - 2) Organizing (common type: main point, clarification, reasons, alternatives, attempt to rebut prospective challenges, summary—including repeat of main point)

Notes

¹ This is only an overall content outline. It does not incorporate suggestions for level, sequence, repetition in greater depth, emphasis, or inclusion in subject matter area (which might be either exclusive or overlapping).

² Elaboration of the ideas in this set of proposed goals may be found in my "Rational Thinking and Educational Practice," in ed. Jonas F. Soltes, *Philosophy and Education: Eighth Yearbook of the National Society for the Study of Education, Part 1* (Chicago: NSSE, 1981); also my "A Conception of Rational Thinking," in ed. Lerold Coombs, *Philosophy of Education 1979* (Bloomington, Ill: Philosophy of Education Society, 1980). A note on terminology: the term "rational thinking" as used in these articles is what I mean here by "critical thinking/reasoning." In deference to popular usage and theoretical considerations as well, I have abandoned the more narrow appraisal-only sense of "critical thinking" that I earlier advocated.

³ Item 13 under "Dispositions" is not strictly speaking a critical thinking disposition. Rather it is a social disposition that is desirable for a critical thinker to have.

higher order thinking skills, we need criteria for making such judgments. Both students and teachers need such criteria.

Although there are numerous other objections to the taxonomy (Ennis, 1981a; Furst, 1981; Nelson, 1981; Seddon, 1978), the reservations I have expressed are enough to give us pause. In any case the taxonomy was not intended to be a statement of educational objectives. It was intended to be a system for classifying educational objectives.

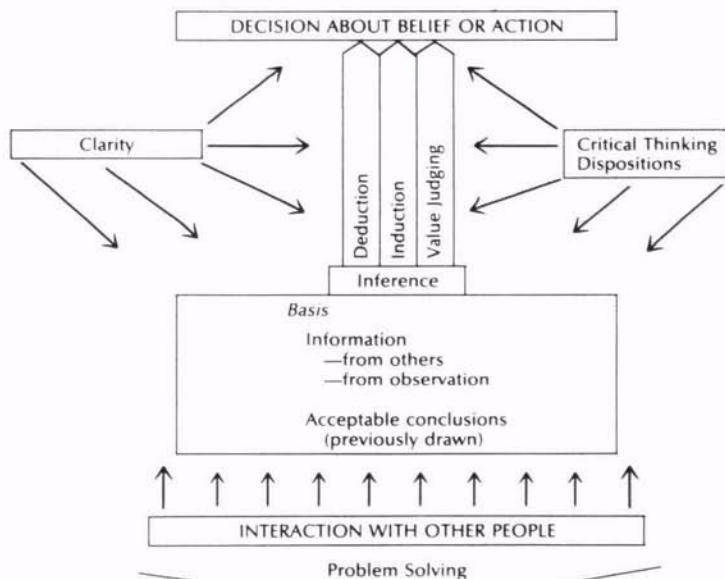
I do not claim that critical thinking exhausts the idea of higher-order thinking skills, at least in part because

that idea is so vague. But I believe that critical thinking incorporates a good deal of the directly practical side of higher-order thinking. Deciding what to believe or do is a practical higher-order thinking enterprise, and most practical higher-order thinking activity is focused on deciding what to believe or do.

Even if you disagree about this, I hope you will accept critical thinking as comprising at least a significant portion of higher-order thinking and worthy of our extended attention in the schools. So I shall proceed with some details of a conception of critical thinking that I have developed over a number of years.

“Deciding what to believe or do is a higher-order thinking enterprise, and most practical higher-order thinking activity is focused on deciding what to believe or do.”

Figure 2. The Process of Deciding What to Believe or Do



Graphics by John Schmitz

area (which might be either exclusive or overlapping). These complex topics must be addressed in application of the outline to curriculum, teaching, and evaluation decisions.

The list of dispositions includes such things as being open-minded, paying attention to the total situation, seeking reasons, and trying to be well-informed. These are self-explanatory and, I trust, obviously desirable.

The four general sets of abilities that are constitutive of critical thinking are clarity-related abilities (loosely divided into elementary and advanced sets), inference-related abilities, abilities related to establishing a sound basis for inference, and abilities involved in going about decision making in an orderly and useful way, often called problem solving. When combined with the critical thinking dispositions, these four categories are intended to cover comprehensively the process of deciding what to believe or do. We have or seek a basis (information or the conclusion of some previous thinking process). From this we infer to a conclusion, which is a decision about a belief or action. (It might even be a decision to suspend judgment.) In this problem-solving process we should be clear about what is going on. This overall relationship is exhibited in Figure 2, which shows the basis on which one *infers* a decision, the whole *problem-solving* process requiring emphasis on *clarity* and the critical thinking *dispositions*. All of this takes place in a context of interaction with *others*.

This four-fold analysis of the abilities involved in arriving at a decision about belief or action (basis, inference, clarity, problem solving) is the foundation for the multiple-choice, large-scale critical thinking assessment efforts currently under way in Connecticut and California. Attention to critical thinking dispositions has not yet been included in these efforts, though I hope that it can be included by using sampling techniques and intensive interviews. Interaction with others is, to a small extent, included in

the multiple-choice tests through the requirement of communication (reading and listening). It is also included in the combined writing and thinking assessment that is going on in both states.

There is progress, but there is yet much to be done. □

I used a narrower appraisal-only definition of "critical thinking" in the 1962, 1980, and 1981 items, but have since broadened this definition for practical reasons.

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Dispositions and Abilities

A first step in an analysis for purposes of curriculum decisions, teaching, and evaluation is to break up critical thinking into dispositions and abilities. I have tried to give a comprehensive specification of critical thinking dispositions and abilities in Figure 1, "Goals for a Critical Thinking/Reasoning Curriculum," which I have elaborated elsewhere (Ennis, 1962, 1980, 1981b, 1985).¹ Although the critical thinking dispositions and abilities are listed separately for purposes of planning and discussion, they are integrated in the actual process of deciding what to believe or do.

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