

Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction

Executive Summary

“The Delphi Report”

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EXECUTIVE SUMMARY

CRITICAL THINKING: A STATEMENT OF EXPERT CONSENSUS FOR PURPOSES OF EDUCATIONAL ASSESSMENT AND INSTRUCTION

Including all Tables, Findings and Recommendations

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I -- The Critical Thinking Movement and CT Assessment

The eighties witnessed a growing accord that the heart of education lies exactly where traditional advocates of a liberal education always said it was -- in the processes of inquiry, learning and thinking rather than in the accumulation of disjointed skills and senescent information. By the decade's end the movement to infuse the K-12 and post-secondary curricula with critical thinking (CT) had gained remarkable momentum.

This success also raised vexing questions: What exactly are those skills and dispositions which characterize CT? What are some effective ways to teach CT? And how can CT, particularly if it becomes a campus-wide, district-wide or statewide requirement, be assessed? When asked by the individual professor or teacher seeking to introduce CT into her own classroom, such questions are difficult enough. But they take on social, fiscal, and political dimensions when asked by campus curriculum committees, school district offices, boards of education, and the educational testing and publishing industries.

Given the central role played by philosophers in articulating the value, both individual and social, of CT, in analyzing the concept of CT, in designing college level academic programs in CT, and in assisting with efforts to introduce CT into the K-12 curriculum, it is little wonder that the American Philosophical Association, through its Committee on Pre-College Philosophy, took great interest in the CT movement and its impact on the profession. In December of 1987 that committee asked this investigator to make a systematic inquiry into the current state of CT and CT assessment.

TABLE 1

**CONSENSUS STATEMENT REGARDING CRITICAL
THINKING AND THE IDEAL CRITICAL THINKER**

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, fair-minded 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.

As Table 1 suggests, a key result of inquiry is the articulation by a panel of CT experts of a conceptualization of CT in terms of two dimensions: cognitive skills and affective dispositions. Section II of this report describes the Delphi research methodology. Section III addresses the skill dimension of CT, and Section IV the dispositional dimension of CT. Fifteen recommendations pertaining to CT instruction and assessment are presented.

II -- Research Methodology and Purpose

This research employed the powerful qualitative research methodology known as the Delphi Method. The Delphi Method requires the formation of an interactive panel of experts. These persons must be willing to share their expertise and work toward a consensus resolution of matters of opinion. In all forty-six persons, widely recognized by their professional colleagues to have special experience and expertise in CT instruction, assessment or theory, made the commitment to participate in this Delphi project. (See Table 7.)

Beginning in Feb. 1988 and ending in November 1989, the Delphi panel participated in six rounds of questions which called for thoughtful and detailed responses. The panelists worked toward consensus by sharing their reasoned opinions and being willing to reconsider them in the light of the comments, objections and arguments offered by other experts. To circumvent undue influence arising from any given expert's professional status, each round of questions was initiated by the project director and all responses were coordinated through that person. The project director circulated to the entire panel direct quotations and synthesized responses, with the names of their authors removed. However, the panelists themselves, through the thoughtfulness and persuasiveness of their written responses, shaped the line of inquiry. (See Table 2.)

Roughly half the panelists were affiliated with Philosophy (52%), the others were with Education (22%), the Social Sciences (20%), or the Physical Sciences (6%). Participation in this research project does not imply that a person agrees with all the findings. Where consensus is reported a minority of panelists hold divergent views. Where near unanimity is reported a some panelists may not be in full accord with how the specifics are expressed. One expert asked to be excluded from supporting the findings, even though listed as a participant.

TABLE 2 PROJECT HISTORY

Round 1 (Feb. 11, 1988) and Round 2 (Mar. 14, 1988) initiated the Delphi process. In both rounds panelists were invited to nominate other CT experts to join in this research project. The experts reached consensus on the working assumption that "the concept of CT could be made operational to the extent that important parts of CT could be assessed validly and reliably." The experts agreed to begin their analysis of CT by "identifying the core elements of CT which might reasonably be expected at the freshman and sophomore general education college level." The rationale for this decision was that the college level theoretical construct of CT could reasonably be used to guide what might be said about CT at the K-12 level. Also the panelists noted that most of the participating experts had greater experience at the college level than in K-12 education.

Round 3 (May 4, 1988) was an open-ended invitation for experts to write their own list of the operations which they conceived of as central to CT. The first synthesis of this input was presented for expert review in Round 4 (Sept. 23, 1988). This synthesis focused on the skill dimension of CT. Round 4 invited responses regarding each skill and sub-skill identified, a proposed [and ultimately rejected] input/output model of CT operations, a list of closely related cognitive operations which might or might not be distinguished from CT, a general statement regarding what a skill is and how one is taught, and a list of caveats and cautions regarding CT instruction and assessment.

Round 5A (Feb. 28, 1989) reviewed the definitions and classification of CT cognitive skills in the light of expert responses to Round 4. Round 5B (also Feb. 28, 1989) proposed statements regarding the dispositional dimension of CT and about its possible normative connotations. Round 5C (Mar. 10, 1989) asked for specific recommendations regarding CT instruction and assessment, and offered a revision of the general statement on teaching and assessing a cognitive skill. Round 5 included several quotations culled from the panelists' earlier responses and invited comments and reactions.

The experts' comments regarding the various quotations included in each round added greatly to the project director's understanding of the experts' overall views. From these and the responses to specific Round 5A, 5B and 5C questions, the project director assembled a draft report of all Delphi findings, including recommendations. Round 6, (Sept. 25, 1989) circulated that draft and gave the CT experts the opportunity to express their views or make comments for inclusion in the final report, which went through its last revisions in Nov. 1989.

The experts articulated an ideal. It may be that no person is fully adept at all the skills and sub-skills the experts found to be central to CT. It may be that no person has fully cultivated all the affective dispositions which characterize a good critical thinker. It may be that humans compartmentalize their lives in ways that CT is more active and evident in some areas than in others. This gives no more reason to abandon the effort to infuse CT into the educational system than that knowing no friendship is perfect gives one reason to despair of having friends. The experts' purpose in putting the ideal before the education

community is that it should serve as a rich and worthy goal guiding CT assessment and curriculum development at all educational levels.

III -- The Cognitive Skill Dimension of Critical Thinking

FINDING: As indicated in Table 1, the experts find good critical thinking to include both a skill dimension and a dispositional dimension. The experts find CT to include cognitive skills in (1) interpretation, (2) analysis, (3) evaluation, (4) inference, (5) explanation and (6) self-regulation. Each of these six is at the core of CT. Associated with each are criteria by which its execution can be meaningfully evaluated. However, no attempt is made here to specify those criteria since ample criteriological discussions exist in the literature.

RECOMMENDATION 1: All CT instruction should aim at developing good critical thinkers -- persons who can integrate successful execution of various skills in the CT enhanced classroom with the confidence, inclination and good judgment to use these powerful tools in their other studies and in their everyday lives. Persons who have proficiency in CT skills but fail to use them appropriately are most unlikely to be regarded as good critical thinkers.

RECOMMENDATION 2: Those who seek to infuse CT into the educational system to be guided by a holistic conceptualization of what it means to be a good critical thinker. That some aspects of CT, particularly features within its skill dimension, are more readily targeted by existing educational assessment strategies should not distort the conceptualization of CT nor truncate full-blown CT instruction.

The experts characterize certain cognitive skills as **central** or **core** CT skills. The experts are not, however, saying that a person must be proficient at every skill to be perceived as having CT ability. The experts to be virtually unanimous (N>95%) on including **analysis**, **evaluation**, and **inference** as central to CT. Strong consensus (N>87%) exists that **interpretation**, **explanation** and **self-regulation** are also central to CT.

FINDING: There is consensus that one might improve one's own CT in several ways. The experts agree that one could critically examine and evaluate one's own reasoning processes. One could learn how to think more objectively and logically. One could expand one's repertoire of those more specialized procedures and criteria used in different areas of human thought and inquiry. One could increase one's base of information and life experience.

The experts do not regard CT as a body of knowledge to be delivered to students as one more school subject along with others. Like reading and writing, CT has applications in all areas of life and learning. Also as with reading and writing, CT instruction can occur in programs rich with discipline-specific content or in programs which rely on the events in everyday life as the basis for developing one's CT.

FINDING One implication the experts draw from their analysis of CT skills is this: "while CT skills themselves transcend specific subjects or disciplines, exercising them successfully in certain contexts demands domain-specific knowledge, some of which may concern specific methods and techniques used to make reasonable judgments in those specific contexts."

Although the identification and analysis of CT skills transcend, in significant ways, specific subjects or disciplines, learning and applying these skills in many contexts requires domain-specific knowledge. This domain-specific knowledge includes understanding methodological principles and competence to engage in norm-regulated practices that are at the core of reasonable judgments in those specific-contexts. The explicit mention of "evidential, conceptual, methodological, criteriological, or contextual" considerations in connection with **explanation** reinforces this point. Too much of value is lost if CT is conceived of simply as a list of logical operations and domain-specific knowledge is conceived of simply as an aggregation of information. Inquiry into the nexus of reasonable judgment and actual application can produce new appreciations of the necessity of robust concepts of both CT and domain-specific knowledge in education.

RECOMMENDATION 3: Since becoming adept at CT involves learning to use CT skills effectively in many different contexts, the experts insist that "one cannot overemphasize the value of a solid liberal education to supplement the honing of one's CT skills and the cultivating of one's CT dispositions."

CT skills can usefully be grouped and sub-classified in a number of legitimate ways. Hence, the sub-classification which resulted from this Delphi research should not be interpreted as necessarily excluding all others. Indeed, while declaring themselves to be in agreement with this sub-classification, various participating experts have also published their own sub-classifications. While characterizing each skill and sub-skill is important, creating arbitrary differentiations simply to force each and every sub-skill to become conceptually discrete from all the others is neither necessary nor useful. In practical contexts the execution of some skills or sub-skills may presuppose others.

Many of the CT skills and sub-skills identified are valuable, if not vital, for other important activities, such as communicating effectively. Also CT skills can be applied in concert with other technical or interpersonal skills to any number of specific concerns such as programming computers, defending clients, developing a winning sales strategy, managing an office, or helping a friend figure out what might be wrong with his car. In part this is what the experts mean by characterizing these CT skills as **pervasive** and **purposeful**.

Not every useful cognitive process should be thought of as CT. Not every valuable thinking skill is CT skill. CT is one among a family of closely related forms of higher-order thinking, along with, for example, problem-solving, decision making, and creative thinking. The complex relationships among the forms of higher-order thinking have yet to be examined satisfactorily.

TABLE 3

CONSENSUS LIST OF CT COGNITIVE SKILLS AND SUB-SKILLS

SKILL	SUB-SKILLS
1. Interpretation	Categorization Decoding Significance Clarifying Meaning
2. Analysis	Examining Ideas Identifying Arguments Analyzing Arguments
3. Evaluation	Assessing Claims Assessing Arguments
4. Inference	Querying Evidence Conjecturing Alternatives Drawing Conclusions
5. Explanation	Stating Results Justifying Procedures Presenting Arguments
6. Self-Regulation	Self-examination Self-correction

The Delphi experts find remarkable consensus on the descriptions of each of the skills and sub-skills. (See Table 4.) The examples associated with each sub-skill are intended as clarifications. Some readers might see in them suggestions of possible instructional or assessment strategies. Others might see in them the tools to initiate staff development conversations about the curricular implications. However, the panel's consensus has to do with the skill and sub-skill descriptions, and does not necessarily extend to the examples.

TABLE 4

**CONSENSUS DESCRIPTIONS
CORE CT SKILLS AND SUB-SKILLS**

1. INTERPRETATION: To comprehend and express the meaning or significance of a wide variety of experiences, situations, data, events, judgments, conventions, beliefs, rules, procedures or criteria.

1.1 CATEGORIZATION:

* to apprehend or appropriately formulate categories, distinctions, or frameworks for understanding, describing or characterizing information.

* to describe experiences, situations, beliefs, events, etc. so that they take on comprehensible meanings in terms of appropriate categorizations, distinctions, or frameworks.

For example: to recognize a problem and define its character without prejudice to inquiry; to determine a useful way of sorting and sub-classifying information; to make an understandable report of what one experienced in a given situation; to classify data, findings or opinions using a given classification schema.

1.2 DECODING SIGNIFICANCE:

* to detect, attend to, and describe the informational content, affective purport, directive functions, intentions, motives, purposes, social significance, values, views, rules, procedures, criteria, or inferential relationships expressed in convention-based communication systems, such as in language, social behaviors, drawings, numbers, graphs, tables, charts, signs and symbols.

For example: to detect and describe a person's purposes in asking a given question; to appreciate the significance of a particular facial expression or gesture used in a given social situation; to discern the use of irony or rhetorical questions in debate; to interpret the data displayed or presented using a particular form of instrumentation.

1.3 CLARIFYING MEANING:

* to paraphrase or make explicit, through stipulation, description, analogy or figurative expression, the contextual, conventional or intended meanings of words, ideas, concepts, statements, behaviors, drawings, numbers, signs, charts, graphs, symbols, rules, events or ceremonies.

* to use stipulation, description, analogy or figurative expression to remove confusing, unintended vagueness or ambiguity, or to design a reasonable procedure for so doing.

For example: to restate what a person said using different words or expressions while preserving that person's intended meanings; to find an example which helps explain something to someone; to develop a distinction which makes clear a conceptual difference or removes a troublesome ambiguity.

2. ANALYSIS: To identify the intended and actual inferential relationships among statements, questions, concepts, descriptions or other forms of representation intended to express beliefs, judgments, experiences, reasons, information, or opinions.

2.1 EXAMINING IDEAS:

* to determine the role various expressions play or are intended to play in the context of argument, reasoning or persuasion.

* to define terms.

* to compare or contrast ideas, concepts, or statements.

* to identify issues or problems and determine their component parts, and also to identify the conceptual relationships of those parts to each other and to the whole.

For example: to identify a phrase intended to trigger a sympathetic emotional response which might induce an audience to agree with an opinion; to examine closely related proposals regarding a given problem and to determine their points of similarity and divergence; given a complicated assignment, to determine how it might be broken up into smaller, more manageable tasks; to define an abstract concept.

2.2 DETECTING ARGUMENTS:

* given a set of statements, descriptions, questions or graphic representations, to determine whether or not the set expresses, or is intended to express, a reason or reasons in support of or contesting some claim, opinion or point of view.

For example, given a paragraph, determine whether a standard reading of that paragraph in the context of how and where it is published, would suggest that it presents a claim as well as a reason or reasons in support of that claim; given a passage from a newspaper editorial, determine if the author of that passage intended it as an expression of reasons for or against a given claim or opinion; given a commercial announcement, identify any claims being advanced along with the reasons presented in their support.

2.3 ANALYZING ARGUMENTS:

* given the expression of a reason or reasons intended to support or contest some claim, opinion or point of view, to identify and differentiate: (a) the intended main conclusion, (b) the premises and reasons advanced in support of the main conclusion, (c) further premises and reasons advanced as backup or support for those premises and reasons intended as supporting the main conclusion, (d) additional unexpressed elements of that reasoning, such as intermediary conclusions, unstated assumptions or presuppositions, (e) the overall structure of the argument or intended chain of reasoning, and (f) any items contained in the body of expressions being examined which are not intended to be taken as part of the reasoning being expressed or its intended background.

For example: given a brief argument, paragraph-sized argument, or a position paper on a controversial social issue, to identify the author's chief claim, the reasons and premises the author advances on behalf of that claim, the background information used to support those reasons or premises, and crucial assumptions implicit in the author's reasoning; given several reasons or chains of reasons in support of a particular claim, to develop a graphic representation which usefully characterizes the inferential flow of that reasoning.

3. EVALUATION: To assess the credibility of statements or other representations which are accounts or descriptions of a person's perception, experience, situation, judgment, belief, or opinion; and to assess the logical strength of the actual or intended inferential relationships among statements, descriptions, questions or other forms of representation.

3.1 ASSESSING CLAIMS:

* to recognize the factors relevant to assessing the degree of credibility to ascribe to a source of information or opinion.

* to assess the contextual relevance of questions, information, principles, rules or procedural directions.

* to assess the acceptability, the level of confidence to place in the probability or truth of any given representation of an experience, situation, judgment, belief or opinion.

For example: to recognize the factors which make a person a credible witness regarding a given event or credible authority on a given topic; to determine if a given principle of conduct is applicable to deciding what to do in a given situation; to determine if a given claim is likely to be true or false based on what one knows or can reasonably find out.

3.2 ASSESSING ARGUMENTS:

* to judge whether the assumed acceptability of the premises of a given argument justify one's accepting as true (deductively certain), or very probably true (inductively justified), the expressed conclusion of that argument.

* to anticipate or to raise questions or objections, and to assess whether these point to significant weakness in the argument being evaluated.

* to determine whether an argument relies on false or doubtful assumptions or presuppositions and then to determine how crucially these affect its strength.

* to judge between reasonable and fallacious inferences;

* to judge the probative strength of an argument's premises and assumptions with a view toward determining the acceptability of the argument.

* to determine and judge the probative strength of an argument's intended or unintended consequences with a view toward judging the acceptability of the argument;

* to determine the extent to which possible additional information might strengthen or weaken an argument.

For example: given an argument to judge if its conclusion follows either with certainty or with a high level of confidence from its premises; to check for identifiable formal and informal fallacies; given an objection to an argument to evaluate the logical force of that objection; to evaluate the quality and applicability of analogical arguments; to judge the logical strength of arguments based on hypothetical situations or causal reasoning; to judge if a given argument is relevant or applicable or has implications for the situation at hand; to determine how possible new data might lead logically to the further confirmation or disconfirmation of a given opinion.

4. INFERENCE: To identify and secure elements needed to draw reasonable conclusions; to form conjectures and hypotheses; to consider relevant information and to deduce the consequences flowing from data, statements, principles, evidence, judgments, beliefs, opinions, concepts, descriptions, questions, or other forms of representation.

4.1 QUERYING EVIDENCE:

- * in particular, to recognize premises which require support and to formulate a strategy for seeking and gathering information which might supply that support.

- * in general, to judge that information relevant to deciding the acceptability, plausibility or relative merits of a given alternative, question, issue, theory, hypothesis, or statement is required, and to determine plausible investigatory strategies for acquiring that information.

For example: when attempting to develop a persuasive argument in support of one's opinion, to judge what background information it would be useful to have and to develop a plan which will yield a clear answer as to whether or not such information is available; after judging that certain missing information would be germane in determining if a given opinion is more or less reasonable than a competing opinion, to plan a search which will reveal if that information is available.

4.2 CONJECTURING ALTERNATIVES:

- * to formulate multiple alternatives for resolving a problem, to postulate a series of suppositions regarding a question, to project alternative hypotheses regarding an event, to develop a variety of different plans to achieve some goal.

- * to draw out presuppositions and project the range of possible consequences of decisions, positions, policies, theories, or beliefs.

For example: given a problem with technical, ethical or budgetary ramifications, to develop a set of options for addressing and resolving that problem; given a set of priorities with which one may or may not agree, to project the difficulties and the benefits which are likely to result if those priorities are adopted in decision making.

4.3 DRAWING CONCLUSIONS:

- * to apply appropriate modes of inference in determining what position, opinion or point of view one should take on a given matter or issue.

- * given a set of statements, descriptions, questions or other forms of representation, to deduce, with the proper level of logical strength, their inferential relationships and the consequences or the presuppositions which they support, warrant, imply or entail.

- * to employ successfully various sub-species of reasoning, as for example to reason analogically, arithmetically, dialectically, scientifically, etc.

- * to determine which of several possible conclusions is most strongly warranted or supported by the evidence at hand, or which should be rejected or regarded as less plausible by the information given.

For example: to carry out experiments and to apply appropriate statistical inference techniques in order to confirm or disconfirm an empirical hypothesis; given a controversial issue to examine informed opinions, consider various opposing views and the reasons advanced for them, gather relevant information, and formulate one's own considered opinion regarding that issue; to deduce a theorem from axioms using prescribed rules of inference.

5. EXPLANATION: To state the results of one's reasoning; to justify that reasoning in terms of the evidential, conceptual, methodological, criteriological and contextual considerations

upon which one's results were based; and to present one's reasoning in the form of cogent arguments.

5.1 STATING RESULTS:

* to produce accurate statements, descriptions or representations of the results of one's reasoning activities so as to analyze, evaluate, infer from, or monitor those results.

For example: to state one's reasons for holding a given view; to write down for one's own future use one's current thinking about an important or complex matter; to state one's research findings; to convey one's analysis and judgment regarding a work of art; to state one's considered opinion on a matter of practical urgency.

5.2 JUSTIFYING PROCEDURES:

* to present the evidential, conceptual, methodological, criteriological and contextual considerations which one used in forming one's interpretations, analyses, evaluation or inferences, so that one might accurately record, evaluate, describe or justify those processes to one's self or to others, or so as to remedy perceived deficiencies in the general way one executes those processes.

For example: to keep a log of the steps followed in working through a long or difficult problem or scientific procedure; to explain one's choice of a particular statistical test for purposes of data analysis; to state the standards one used in evaluating a piece of literature; to explain how one understands a key concept when conceptual clarity is crucial for further progress on a given problem; to show that the prerequisites for the use of a given technical methodology have been satisfied; to report the strategy used in attempting to make a decision in a reasonable way; to design a graphic display which represents the quantitative or spatial information used as evidence.

5.3 PRESENTING ARGUMENTS:

* to give reasons for accepting some claim.

* to meet objections to the method, conceptualizations, evidence, criteria or contextual appropriateness of inferential, analytical or evaluative judgments.

For example: to write a paper in which one argues for a given position or policy; to anticipate and to respond to reasonable criticisms one might expect to be raised against one's political views; to identify and express evidence and counter-evidence intended as a dialectical contribution to one's own or another person's thinking on a matter of deep personal concern.

6: SELF-REGULATION: Self-consciously to monitor one's cognitive activities, the elements used in those activities, and the results deduced, particularly by applying skills in analysis and evaluation to one's own inferential judgments with a view toward questioning, confirming, validating, or correcting either one's reasoning or one's results.

6.1 SELF-EXAMINATION:

* to reflect on one's own reasoning and verify both the results produced and the correct application and execution of the cognitive skills involved.

* to make an objective and thoughtful meta-cognitive self-assessment of one's opinions and reasons for holding them.

* to judge the extent to which one's thinking is influenced by deficiencies in one's knowledge, or by stereotypes, prejudices, emotions or any other factors which constrain one's objectivity or rationality.

* to reflect on one's motivations, values, attitudes and interests with a view toward determining that one has endeavored to be unbiased, fair-minded, thorough, objective,

respectful of the truth, reasonable, and rational in coming to one's analyses, interpretations, evaluations, inferences, or expressions.

For example: to examine one's views on a controversial issue with sensitivity to the possible influences of one's personal bias or self-interest; to review one's methodology or calculations with a view to detecting mistaken applications or inadvertent errors; to reread sources to assure that one has not overlooked important information; to identify and review the acceptability of the facts, opinions or assumptions one relied on in coming to a given point of view; to identify and review one's reasons and reasoning processes in coming to a given conclusion.

6.2 SELF-CORRECTION:

* where self-examination reveals errors or deficiencies, to design reasonable procedures to remedy or correct, if possible, those mistakes and their causes.

For example: given a methodological mistake or factual deficiency in one's work, to revise that work so as to correct the problem and then to determine if the revisions warrant changes in any position, findings, or opinions based thereon.

IV -- The Dispositional Dimension of Critical Thinking

As is evident, particularly in the descriptions of self-examination and self-correction, there are dispositional components to critical thinking. Indeed each cognitive skill, if it is to be exercised appropriately, can be correlated with the cognitive disposition to do so. In each case a person who is proficient in a given skill can be said to have the aptitude to execute that skill, even if at a given moment the person is not using the skill. But there was a great deal more many experts wished say in regard to the personal traits, habits of mind, attitudes or affective dispositions which seem to characterize good critical thinkers.

FINDING: Although the language here is metaphorical, one would find the panelists to be in general accord with the view that there is a critical spirit, a probing inquisitiveness, a keenness of mind, a zealous dedication to reason, and a hunger or eagerness for reliable information which good critical thinkers possess but weak critical thinkers do not seem to have. As water strengthens a thirsty plant, the affective dispositions are necessary for the CT skills identified to take root and to flourish in students.

RECOMMENDATION 4: Modeling that critical spirit, awakening and nurturing those attitudes in students, exciting those inclinations and attempting to determine objectively if they have become genuinely integrated with the high quality execution of CT skills are, for the majority of panelists, important instructional goals and legitimate targets for educational assessment. However, the experts harbor no illusions about the ease of designing appropriate instructional programs or assessment tools.

Procedural, Laudatory and Normative Uses of the Term "CT"

The experts are in consensus regarding the list of affective dispositions which characterize good critical thinkers. (See Table 5.) However, whether or not these affective dispositions are part of the meaning of "CT" in the way that the cognitive skills are, was an issue which divided the experts from the first. It became evident that various experts mean different things when they used the term "CT" in reference to its possible dispositional components.

The deepest division is between the nearly two-thirds majority who hold that the term "CT" includes in its meaning a reference to certain affective dispositions and the roughly one-third minority who hold that "CT" refers only to cognitive skills and dispositions, but not to affective dispositions. The majority (61%) maintain that the affective dispositions constitute part of the meaning of "CT." They argue that these dispositions flow from, and are implied by, the very concept of CT, much as the cognitive dispositions are. These experts argue that being adept at CT skills but habitually not using them appropriately disqualifies one from being called a critical thinker at all. Thus, in addition to using "CT" in its procedural sense, these panelists also use "CT" in its *laudatory* sense. They find it sensible to say, "This person is a critical thinker, but this other person is so mentally lazy, close-minded, unwilling to check the facts and unmoved by reasonable arguments that we simply cannot call him a critical thinker."

The laudatory use of "CT" can suggest approval of how well a person applies her CT skills or it can convey praise for the person because the person has the proper affective dispositions. While the two-thirds majority was eloquent regarding the importance of finding ways to instill affective dispositions in students, in the final analysis they were unable to persuade the other third of their expert colleagues to view these dispositions as essential to the concept of CT. The majority was, however, persuasive in bringing about virtual unanimity regarding using the affective dispositions to describe the paradigm critical thinker.

The minority (30%) insist on using "CT" in a strict *procedural* sense, that is as referring only to a certain judgmental process. They distinguish sharply between what is true of critical *thinking* from what is true of good critical *thinkers*. Their primary concern is with the CT skills. They argue that good critical thinkers are people who have those skills and certain valuable habits as well. If they are good critical thinkers, then they use their CT skills appropriately because good critical thinkers also have some or all of the affective dispositions listed in Table 5. But those dispositions are not what is meant by "CT." They argue that one would not want to say a sophist is not a critical thinker simply because the sophist uses CT skills for deceptive or self-interested ends. The sophist, they would maintain, is a critical thinker -- but not an good one (in an ethical sense). The strict proceduralists do not find it sensible deny that a person is a critical thinker simply because the person, while skilled in CT, fails to check the credibility of sources, gives up too soon when asked to work a challenging problem, lacks confidence in using reason to approach everyday problems, or ignores painful facts. These experts hold that such a person, because of his CT skills, should be called a critical thinker -- but not a good one, (in terms of his effective use of those skills).

As suggested above, there are two senses of the term "good" which might be operating when one uses the phrase "good critical thinker." One sense applies to the thinker's effectiveness and responds to the question, "How well is this person using CT?" The second sense applies to the thinker's morality and responds to the question, "Is this person's use of CT ethical?" The sense of "good" the experts intended became clear:

FINDING: It is an inappropriate use of the term to deny that someone is engaged in CT on the grounds that one disapproves ethically of what the person is doing. What "CT" means, why it is of value, and the ethics of its use are best regarded as three distinct concerns.

Dispositions of the Good Critical Thinker

FINDING: To the experts, a good critical thinker, the paradigm case, is habitually disposed to engage in, and to encourage others to engage in, critical judgment. She is able to make such judgments in a wide range of contexts and for a wide variety of purposes. Although perhaps not always uppermost in mind, the rational justification for cultivating those affective dispositions which characterize the paradigm critical

thinker are soundly grounded in CT's personal and civic value. CT is known to contribute to the fair-minded analysis and resolution of questions. CT is a powerful tool in the search for knowledge. CT can help people overcome the blind, sophistic, or irrational defense of intellectually defective or biased opinions. CT promotes rational autonomy, intellectual freedom and the objective, reasoned and evidence-based investigation of a very wide range of personal and social issues and concerns.

The majority (61%) regard the dispositions listed in Table 5 as part of the conceptualization of CT. The consensus (83%) is that good critical thinkers can be characterized as exhibiting these dispositions.

TABLE 5

AFFECTIVE DISPOSITIONS OF CRITICAL THINKING

APPROACHES TO LIFE AND LIVING IN GENERAL:

- * inquisitiveness with regard to a wide range of issues,
- * concern to become and remain generally well-informed,
- * alertness to opportunities to use CT,
- * trust in the processes of reasoned inquiry,
- * self-confidence in one's own ability to reason,
- * open-mindedness regarding divergent world views,
- * flexibility in considering alternatives and opinions,
- * understanding of the opinions of other people,
- * fair-mindedness in appraising reasoning,
- * honesty in facing one's own biases, prejudices, stereotypes, egocentric or sociocentric tendencies,
- * prudence in suspending, making or altering judgments,
- * willingness to reconsider and revise views where honest reflection suggests that change is warranted.

APPROACHES TO SPECIFIC ISSUES, QUESTIONS OR PROBLEMS:

- * clarity in stating the question or concern,
- * orderliness in working with complexity,
- * diligence in seeking relevant information,
- * reasonableness in selecting and applying criteria,
- * care in focusing attention on the concern at hand,
- * persistence though difficulties are encountered,
- * precision to the degree permitted by the subject and the circumstance.

RECOMMENDATION 5: Just as with the cognitive dimension of CT, when conceiving of the education or assessment of critical thinkers, it is important to consider ways of developing materials, pedagogies, and assessment tools that are effective and equitable in their focus on these affective dispositions. The cultivation of these dispositions is particularly important to insure the use of CT skills outside the narrow instructional setting. Persons who have developed these affective dispositions are much more likely to apply their CT skills appropriately in both their personal life and their civic life than are those who have mastered the skills but are not disposed to use them.

In setting forth the concept of the paradigm critical thinker, the Delphi experts intend to express a goal toward which all might strive. These virtues require a measure of maturity and personal development

not commonly found in college sophomores or twelfth graders. Yet to delay embarking on the practices and disciplines which will lead to these virtues would be an even more profound mistake.

RECOMMENDATION 6: From early childhood people should be taught, for example, to reason, to seek relevant facts, to consider options, and to understand the views of others. It is neither impractical nor unreasonable to demand that the educational system teach young people the habits of mind which characterize the good critical thinker, reinforce those practices, and move students well down the path toward their attainment.

Several pedagogical and assessment implications follow from the dispositional dimension of CT, implications which might not be apparent if educators focused only on the skill dimension of CT. The **education** of good critical thinkers is more than **training** students to execute a set of cognitive skills. For example, in terms of pedagogy, modeling how to evaluate critically that information which students would normally accept uncritically and encouraging them to do the same can do wonders for developing their confidence in their CT ability. With this confidence students are much more likely to try thinking for themselves. Just as instruction should not focus on skills only, assessment which focus on skills only may give a misleading or incomplete picture of someone's strengths as a critical thinker.

The CT Goal

RECOMMENDATION 7: Because CT helps students with a wide range of educational, personal and civic concerns in a rational way, the academic goal of CT instruction, regardless of the educational level, should be furthering students in the development of their CT cognitive skills and affective dispositions.

Either to transform CT into one subject field among others, or to narrow the range of CT applications strictly to domain-specific subject content, would be to truncate its utility, misapprehend its nature and diminish its value. Within the overall curriculum the goal of learning CT can be clearly distinguished from the goal of learning domain-specific content. While these two goals can be distinguished, the experts do not deny one of the best ways to learn CT is within a subject context.

RECOMMENDATION 8: Direct instruction in CT and assessment of CT should be an explicit parts of any course granted approval for purposes of satisfying CT requirements, whether that course is a CT course *per se* or a course in a given subject field. The primary academic criterion in the evaluation of a proposed instructional program for purposes of achieving the CT goal should be whether the program will further the development of students' CT skills and dispositions.

TABLE 6

CONSENSUS STATEMENT ON TEACHING AND ASSESSING CT SKILLS

A CT skill, like any skill, is the ability to engage in an activity, process or procedure. In general, having a skill includes being able to do the right thing at the right time. So, being skilled at CT involves knowing, perhaps implicitly or without the ability to articulate this knowledge, both a set of procedures and when to apply those procedures. Being skilled also involves having some degree of proficiency in executing those procedures and being willing to do so when appropriate. Reflecting

on and improving one's CT skills involves judging when one is or is not performing well, or as well as possible, and considering ways of improving one's performance. Learning CT involves acquiring the ability to make such self-reflective judgments.

Skills, particularly CT cognitive skills, can be taught in a variety of ways, such as by making the procedures explicit, describing how they are to be applied and executed, explaining and modeling their correct use, and justifying their application. Teaching cognitive skills also involves exposing learners to situations where there are good reasons to exercise the desired procedures, judging their performance, and providing the learners with constructive feedback regarding both their proficiency and ways to improve it. Instruction might start with situations that are artificially simple, but should culminate in situations that are realistically complex. Particularly in the case of CT, the learners must contribute a solid measure of personal effort, attention, practice, desire, and, as they learn how, self-monitoring. Teaching skills involves motivating learners to achieve higher levels of proficiency and, particularly in the case of CT, independence. It also involves coaching learners on how they can achieve those goals.

In theory there are several ways persons can be judged to be more or less proficient in a given CT skill or at the integrated use of related CT skills. One way is to observe a person over time performing those activities, processes or procedures generally regarded as presupposing that skill for proper execution. One then makes a judgment regarding the degree to which the person possesses the general skill in question. A second way is to compare the outcomes (if any) that result from executing a given skill against some set of criteria. A third way is to query persons and receive their descriptions of the procedures and judgments they are using as they exercise that skill, would use if they were to perform that skill, or did use when they performed that skill. A fourth way is to compare the outcomes (if any) that result from performing another task against some set of criteria, where the performance of that other task has been shown to correlate strongly with exercising the skill of interest. However, that such correlations exist between any other task and CT, or any of its sub- skills, has yet to be established in the research literature.

Each of the four ways of CT assessment has limitations as well as strengths. No matter which ways are used, it is important to ensure that the assessment conditions foster an attitude in which the subjects are disposed to use their skills as well as they can, and are not constrained or inhibited from doing so. In our view it is highly advantageous to gather evidence regarding CT performance in many situations, using several assessment methods, so as to compile a composite picture of the subject and to cross check the results of any one way of assessment.

The CT Curriculum

Given that CT has, in many cases, become a college general education requirement, secondary schools can be expected to begin to develop college preparatory CT programs. However, the value of CT extends well beyond its importance as a university-level inquiry tool. CT is vitally important in the personal and civic life of all members of society. A significant percentage of the citizenry will not graduate from high school, or if they graduate, will not have the benefit of post-secondary education.

RECOMMENDATION 9: Thus, CT instruction should not be reserved only for those who plan to attend college. Nor should it be deferred until college, since it is not likely to be effective if it were.

RECOMMENDATION 10: Explicit attention to the fostering of CT skills and dispositions should be made an instructional goal at all levels of the K-12 curriculum. The cultivation of CT dispositions and an insistence on giving and evaluating

reasons, should be an integral part of elementary school education. In middle schools and high schools, instruction on various aspects and applications of CT should be integrated into all subject area instruction. Specific courses in CT and an advanced placement examination program in CT for college bound students should be developed. Although for good reasons at the post- secondary level CT programs are generally associated with departments of philosophy, no academic unit should be restricted in principle from participating in an institution's CT program, provided that the overall institutional program in CT equips students to apply CT to a broad range of educational, personal and civic subjects, issues and problems.

There is growing evidence of the successes, both scientific and economic, of those industrialized democracies which emphasize demanding academic assessment and set firm educational standards for career and professional advancement. Assessment that counts is unquestionably a key factor in promoting academic achievement

RECOMMENDATION 11: Thus, minimum CT proficiency expectations should be set for each educational level, including promotion in grade, high school graduation, college entrance, and graduate school admission.

The CT Assessment

The development of valid and reliable assessment strategies from which teachers can draw reasonable inferences about students' CT, in contrast to their domain-specific knowledge or other academic abilities (such as reading or writing), is essential. CT assessment strategies, whether for use in the individual classroom or for broader purposes, must not simply reward arriving at correct answers. They must, however, recognize achieving correct answers by way of good CT. The challenge of CT assessment is not to let what is easily measured restrict our sense of the fullness of CT. It would be shameful if those assessment instruments which focus only on CT skills drove our CT curricular design and caused the dispositional components of good CT to be neglected.

RECOMMENDATION 12: In evaluating the acceptability of a CT assessment strategy or instrument one should consider content validity, construct validity, reliability, and fairness.

(1) Content Validity: The strategy or instrument should be based on an appropriate conceptualization of CT and a clear understanding of which aspects of CT the assessment targets. Each task or question should be evaluated to insure that correctly responding to that item is not a matter of rote learning or information recall. Whether for the classroom or for broader educational purposes, CT assessment should include strategies for targeting CT's dispositional dimension as well as its cognitive skills dimension.

(2) Construct Validity: In acceptable CT assessment each task or question should have been evaluated to insure that students who answer correctly do so on the basis of good CT and that inadequate or wrong responses are the result of weak or inadequate CT. Entire strategies or specific items on which good CT leads to wrong answers, or poor CT to right answers, should not be used.

(3) Reliability: In acceptable CT assessment each task or question should have been evaluated to insure that good critical thinkers generally do better on that item than weak critical thinkers. If different persons are involved in evaluating the results, for example grading essays or judging presentations, the

evaluations of the different judges should be cross-checked to assure that their findings are reliable, that is, generally consistent with one another. However, it is an open question whether the levels of achievement associated with the different CT sub-skills and affective dispositions are positively correlated. Empirical research on how the sub-skills correlate with each other and with various dispositions has yet to be undertaken. Thus, at this time, due caution should be exercised regarding how to interpret technical measures of test-form reliability in the case of paper and pencil CT assessment instruments.

(4) Fairness: CT assessment should not unfairly disadvantage or advantage groups of students on the grounds of reading ability, domain-specific knowledge [broadly understood as including the evidential, conceptual, methodological, criteriological, contextual considerations, or familiarity with technical vocabulary], gender or age related life experience, ethnicity or socioeconomic status, differences in social norms, or differences in cultural assumptions. CT assessment locates CT tasks and questions in some assumed context, either subject-specific, everyday life, or fictional. Thus, guaranteeing that all students, regardless of their individual backgrounds, will come to the CT assessment on a perfectly equal basis in terms background knowledge, reading ability, life experiences, etc. is impossible. However, examining the assessment strategy or instrument to be sure that these factors do not *unfairly* influence the results is prudent and reasonable. Although one cannot eliminate the influence of these variables, one may be able to neutralize or control for their affects.

The fairness criterion applies both to discipline-neutral and discipline-specific CT assessment. Within curricular programs discipline-specific CT assessment is encouraged, since it is possible for one to be *fair* in one's presumptions regarding subject-specific criteria, methodologies, concepts, evidence, information and terminology. The challenge of such assessment is to factor out the discipline content in order to access the strength or weakness of the CT. It is worth noting that discipline-neutral CT assessment makes similar assumptions regarding the everyday contexts which form its topic content.

RECOMMENDATION 13: CT assessment should occur frequently, and it should be used diagnostically as well as summatively. Different kinds of instruments should be employed, depending on which aspect of CT is being targeted and where students are in their learning -- the introductory stage, the practice stage, the integration stage or the generalized transfer stage. Although the veteran CT instructor is able to assess students continuously, CT assessment should be made explicit to reinforce its worth in the eyes of the students, their families, and the public. It should be made explicit to support the goals of educators seeking to improve the curriculum. And it should be made explicit to properly inform educational policy formation.

The CT Instructor

RECOMMENDATION 14: Teaching CT is most effective if the instructor models CT dispositions and the proper use of CT skills in the very process of instruction. Regardless of the subject area, students should be encouraged to be curious, to raise objections, ask questions, point out difficulties in the instructor's position. These objections and questions should be clarified, interpreted, and examined objectively. Students should be given reasons for doing things a certain way, rather than being dogmatically told how to do them. Instruction should bridge the gap between the subject and the student's own experience. In the case of CT instruction, the topics of discussion should not be restricted to factual matters or academic subjects, but should include issues which have normative, moral, ethical or public policy dimensions.

The ideal CT instructor will integrate instruction in CT in a variety of subject areas. She will teach specific CT skills directly using these subjects as content for the application of those skills. She will help students elaborate, transfer and generalize these skills to a variety of contexts. She will create a classroom and school environment which is supportive of CT. She will model CT in her teaching and her interactions with colleagues. She will provide her students with thought-provoking subjects to learn about, and projects to undertake. She will engage students in social activities requiring them to reflect on, articulate, share and discuss justifications, explanations and contrasts in how they executed various CT tasks. She will evaluate each student's progress, achievement or proficiency in CT continuously.

RECOMMENDATION 15: For CT to infuse the K-12 and college curriculum, teacher "training" should give way to teacher "education." If teachers are to model CT, so must those who have an instructional role in teacher preparation or staff development. In all instruction, and particularly in CT instruction, both faculty and leaders of faculty development should model CT. They should foster the students' confidence in their own powers of reason, rather than dependency on rote learning. They should nurture in students open-mindedness, attention to alternatives, and as much precision of thought as the subject and circumstances permit.

TABLE 7

PARTICIPATING CRITICAL THINKING EXPERTS

Jonathan Adler	Philosophy	Brooklyn College
David Annis	Philosophy	Ball State University
Arnold Arons	Physics	University of Washington
James Bell	Psychology	Howard Community College, MD
Barry K. Beyer	Education	George Mason University
Charles Blatz	Philosophy	University of Toledo
Rob Brady	Philosophy	Stetson University
Neil Browne	Economics	Bowling Green State University
Rex Clemmenson	CT Assessment	American College Testing (ACT)
Arthur L. Costa	Education	Sacramento State University
Stan Dundon	Philosophy	Cal. Polytechnic University, SLO
Robert H. Ennis	Education	University of Illinois
James B. Freeman	Philosophy	Hunter College, CUNY
Jack Furlong	Freshman Studies	Transylvania University
Eugene Garver	Critical Thinking	Saint John's University
H. Scott Hestevold	Philosophy	University of Alabama
David Hitchcock	Philosophy	McMaster University
John Hoaglund	Philosophy	Christopher Newport College
Kenneth Howe	Education	University of Colorado
Ralph H. Johnson	Philosophy	University of Windsor
Stuart Keeley	Psychology	Bowling Green State University
Anthony Lawson	Zoology	Arizona State University
Matthew Lipman	Philosophy	Montclair State College
David S. Martin	Education	Gallaudet University
John Martin	Philosophy	University of Cincinnati
Gary Matthews	Philosophy	U. Massachusetts, Amherst
Stuart Miller	Psychology	Towson State University
Brooke Noel Moore	Philosophy	CSU Chico
Wayne Neukberger	Assmt. and Eval.	Oregon Department of Education
Stephen Norris	Education	Memorial U. of Newfoundland
Richard Parker	Philosophy	CSU, Chico
Richard D. Parry	Philosophy	Agnes Scott College
Richard Paul	Philosophy	Sonoma State University

Philip Pecorino	Social Sciences	Queensborough Comm. College
William Rapaport	Computer Science	SUNY Buffalo
Pasqual Schievella	Council of Critical Analysis,	Port Jefferson, NY
Zack Seech	Behavioral Science	Palomar College
Anita Silvers	Philosophy	San Francisco State University
Richard Stiggins	Northwest Regional Educational Laboratory,	Portland
Robert J. Swartz	Philosophy	U. Massachusetts, Boston
Steven Tigner	Philosophy	University of Toledo
Carol Tucker	CT Assessment	ETS, Princeton, NJ
Perry Weddle	Philosophy	Sacramento State University
Robert Wengert	Philosophy	University of Illinois
Mark Weinstein	Institute for CT	Montclair State College
Peter Winogard	Education	University of Kentucky

END

The complete Delphi report, including appendices, comes to 80 pages. It is entitled *Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction*, is published by The California Academic Press, 217 La Cruz Ave., Millbrae, CA 94030. It is also available in ERIC as Doc. No. ED 315 423, principle investigator, Peter A. Facione.