



# WHITE PAPER

CONSEQUENTIAL VALIDITY:  
USING ASSESSMENT  
TO DRIVE INSTRUCTION

RICHARD PAUL  
AND LINDA ELDER

[ FOUNDATION  
FOR CRITICAL  
THINKING ]

## Using Assessment to Drive Instruction

The purpose of assessment in instruction is improvement. The purpose of assessing instruction for critical thinking is improving the teaching of discipline-based thinking (historical, biological, sociological, mathematical thinking...). It is to improve students' abilities to think their way through content, using disciplined skill in reasoning. The more particular we can be about what we want students to learn about critical thinking, the better can we devise instruction with that particular end in view.

### Critical Thinking

Nothing is more important in this process than our *conceptualization* of critical thinking. The goal should be a robust concept, one that students can learn to detail and explain, one that makes concrete sense of the target:

*Every student in every class at every moment being—INTELLECTUALLY engaged.*

Critical thinking is that mode of thinking—about any subject, content, or problem—in which the thinker improves the quality of his or her thinking by skillfully analyzing, assessing, and reconstructing it. Critical thinking is self-directed, self-disciplined, self-monitored, and self-corrective thinking. It presupposes assent to rigorous standards of excellence and mindful command of their use.

Critical thinking is the disciplined art of ensuring that you use the best thinking you are capable of in any set of circumstances.

When we think critically, we realize that in every domain of human thought, it is possible and important to question the parts of thinking, and the standards for thought. Routine questioning in the critical mind looks something like this:

Let's see, what is the most fundamental issue here? From what point of view should I approach this problem? Does it make sense for me to assume this? What may I reasonably infer from these data? What is implied in this graph? What is the fundamental concept here? Is this information consistent with that information? What makes this question complex? How could I check the accuracy of these data? If this is so, what else is implied? Is this a credible source of information? And so forth.

Episodes of critical thinking vary from the intellectually simple to the intellectually complex. They occur while reading, writing, speaking, listening, observing,

---

*We don't know what they will need to know.*

*We do know they will need to be skilled in finding out.*

---

and performing. They involve one or more elements of thought. They involve one or more standards of thought. They involve one or more traits of mind. They involve a little or a lot of content. They disclose systems or parts of systems.

### Intellectual Engagement

Students who are intellectually engaged are aware of, and routinely focus on:

- The *purpose* of instruction
- The *question* at issue
- The *information* relevant to the question
- The key *concept* they need to understand
- Whatever *inferences* they are making
- Whatever *assumptions* they are making
- The *implications* of their thinking
- The *point of view* within which they are thinking.

Such students are consciously and deliberately thinking their way through some body of content. In doing so, they routinely engage in critical reading, critical writing, critical listening, critical speaking, and, as necessary, critical observing or performing.

They strive to make their thinking clear, accurate, precise, relevant, deep, broad, logical, fair, and significant. They continue to develop their intellectual skills throughout a lifetime.

### Teaching for Intellectual Engagement

Faculty who understand critical thinking and the logic of their discipline realize that students are thinking critically when, and only when, they are consciously and deliberately thinking through some dimension of the logic of the discipline they are studying. And this requires that students approach each and every discipline *as a system of thought* (or as a system of systems of thought), not as a random set of bits and pieces of information to be rote memorized and

repeated on an exam or quiz. It requires that, at any given moment in class, the students recognize that there is a question on the floor, information being processed, concepts being used, assumptions being made, interpretations at work, implications embedded in the reasoning, and points of view being engendered.

### **Using Assessment As the Guiding Force in Instruction**

Given the importance of critical thinking in understanding and reasoning well within a discipline, instructional assessments must drive instruction toward the form and nature of intellectual engagement made possible through the tools of critical thinking. Unfortunately, standardized tests now widely used in critical thinking are not designed with this end in view. There is a significant disconnect between what these tests actually assess and what we want students to do while participating in, or studying for, a class.

### **What Are Typical Standardized “Critical Thinking” Tests Actually Testing?**

Most standardized critical thinking tests are testing for three or four of such concepts as: inference, induction, deduction, interpretation, analysis, synthesis, credibility, missing premises, analyzing arguments, avoiding equivocation, irrelevance, circularity, straw person, overgeneralization, excessive skepticism, etc... This reduces in some cases to a test of formal logic (deduction) or informal logic (fallacy recognition).

In other cases, standardized critical thinking tests reduce to tests of psychological processes (often those found in Bloom’s Taxonomy), like analysis, synthesis, or evaluation. When the test focuses on these psychological process words, there are rarely any intellectual standards being used (like clarity, accuracy, precision, relevance,...) to assess these processes. Students are not expected to apply intellectual standards to these processes, when in fact application of such standards to the processes determine the very skill that should be assessed.

In other words, analysis, synthesis, and evaluation (to take the most popular categories said to be tested) can be done well or poorly. For example, consider the process of analysis. Analysis (in standardized tests) is “tested” through questions that fail to highlight the very elements that define the logic of intellectual systems within disciplines. Thus, the elements of thought—purpose, question, information, concept,

inference, assumption, implications, point of view—are not emphasized (as a system-creating network) in most standardized critical thinking tests (or, if so, in a very fragmented way). Therefore, when the student is given some set of tasks which are said to involve “analysis,” we don’t see how analysis is being assessed. We learn (when we get the student’s scores) whether or not he or she got the answer correct, but we still do not see how the elements of thought were treated on the test. In short, though some elements of thought are mentioned in some standardized critical thinking tests, the elements of thought AS A WHOLE (as an interrelated system) are ignored in the design of all current standardized critical thinking tests (with the exception of those tests devised by the fellows of the Foundation for Critical Thinking). This is a serious problem as these tests miscommunicate the very nature of high quality analysis. There is a similar problem in failing to recognize and define essential intellectual standards such as clarity, accuracy, precision, relevance,... In place of these standards (that admit of clear specification) students are typically given vague standards (for example, the injunction to be “systematic, objective, fair-minded, mature and truthseeking”). Thus, the assumption is made that students already know how to fulfill these (vague) standards, and any others important but not mentioned.

### **Holistic vs. Componential Assessment**

Many traditional standardized critical thinking assessments, as we have suggested, rely largely on formal or informal logic as their background theory for concepts and assumptions. They then assume that componential assessment focused on such parameters as deduction, induction, credibility, and/or a selection of logical fallacies (avoiding equivocation, irrelevance, circularity, straw person, overgeneralization, excessive skepticism) provides the appropriate information educators need to assess the critical thinking of students.

Another approach (coming from cognitive psychology) emphasizes a holistic approach to the assessment of “higher order” thinking skills (said to be an integrated whole, combining critical thinking, problem solving, analytic reasoning, and communication skills). The Collegiate Learning Assessment (CLA) is one of the most prominent of this group.

The CLA gives three reasons for its approach:

1. “Our notion of knowledge is shifting from the ability to recall information to the ability to find and use information.”

2. "...most college mission statements reference the need to improve higher-order skills."
3. "...advances in information technology have made information the primary instrument for citizens to access wants throughout the economy and society.... In this new environment, individual and collective choices become much more numerous, complex, and often are in conflict, requiring citizens to be able to sort them out."<sup>1</sup>

Well and good. But this position offers a narrow view of the importance of critical thought in human life. Its exclusive focus on "finding and using information" and on solving complex problems obscures the true foundations for critical thinking within disciplines. Though these two purposes for instruction are important in and of themselves, they represent only a part of what should be the focus of college instruction. They fail to offer a rich and robust approach to critical thinking through content. They fail to recognize the very heart of teaching a subject – helping students learn to reason with skill through the logic of the subject. They do not foster the notion that students must learn to think with discipline within the subjects they take using a broad range of critical thinking skills, abilities and traits.

The result is that the approach of the CLA is similar to that found in many textbooks, in which boxed items are labeled "Critical Thinking Problem." The assumption made is that critical thinking is only needed when one comes across a complex task—the simple and everyday tasks not requiring critical thinking at all.

### **We Must Foster Student Intellectual Engagement Within the Logic of the Disciplines**

All thinking occurs within, and across, disciplines and domains of knowledge and experience; yet few students learn how to think well within and across those domains. Though required to take many classes through many years of schooling, few students are able to think biologically, chemically, geographically, sociologically, anthropologically, historically, artistically, ethically, or philosophically. Despite the fact that students study literature, they do not think in a literary way as a result.

They study poetry, but do not think poetically. They

do not know how to think like a reader when reading, nor how to think like a writer while writing, nor how to think like a listener while listening. Consequently they are poor readers, writers, and listeners. They use words and ideas, but do not know how to think ideas through, and internalize foundational meanings. They take classes but cannot make connections between the logic of a discipline and what is important in life. Even the best students often have these deficiencies.

This is the problem which our assessment strategies should target. Testing should drive instruction to "correct" for these difficulties.

Recognizing, then, that to study well and learn any subject is to learn how to think with discipline within that subject, to think within its logic, to:

- raise vital questions and problems within it, formulating them clearly and precisely,
- gather and assess information, using ideas to interpret that information insightfully,
- come to well-reasoned conclusions and solutions, testing them against relevant criteria and standards;
- adopt the point of view of the discipline, recognizing and assessing, as need be, its assumptions, implications, and practical consequences;
- communicate effectively with others using the language of the discipline and that of educated public discourse; and
- relate what one is learning in the subject to other subjects and to what is significant in human life.

Recognizing all this, we need to devise assessment strategies and tests which forward this agenda. When we do, students will become self-directed, self-disciplined, self-monitored, and self-corrective thinkers. They will give assent to rigorous standards of thought and take mindful command of their use. This brings us to very specific ways of studying and learning. Our concept of intellectual engagement is not vague and ill-defined. Rather, it is clear and specific, and thus allows us to design specific tests to assess for the presence of this engagement.

<sup>1</sup> Roger Benjamin, et. al. "Holistic Tests in a Sub-score World: The Diagnostic Logic of the Collegiate Learning Assessment," <http://www.cae.org/content/pdf/WhitePaperHolisticTests.pdf>, August 2007."

## Intellectually Engaged Students:

- make sure they thoroughly understand class requirements, how the course will be taught and what will be expected of them. They ask questions about the grading policies and for advice on how best to prepare for class.
- become active learners. They arrive at class prepared to work ideas into their thinking by active reading, writing, speaking, and listening.
- think of each subject they study as a form of thinking (If they are in a history class, their goal is to think historically; in a chemistry class to think chemically; etc...)
- become a questioner. They engage themselves in lectures and discussions by asking questions. They realize that if they don't ask questions, they will probably not discover what they do and do not know.
- look for interconnections. They perceive content in every class as a SYSTEM of interconnected ideas, never a random list of things to memorize. They do not memorize like a parrot. They study like a detective, always relating new learning to previous learning.
- think of their instructor as their coach. They think of themselves as a team member trying to practice the thinking exemplified by their instructor. For example, in an algebra class, they think of themselves as going out for the algebra team, as it were, and their teacher as demonstrating how to prepare for the games (tests).
- think about the textbook as the thinking of the author. They see their job as thinking the thinking of the author. For example, they look for opportunities to role-play the author. They explain the main points of the text to other students, as if they were the author.
- think of class time as a time in which they PRACTICE thinking (within the subject) using the fundamental concepts and principles of the course. They don't sit back passively, waiting for knowledge to fall into their heads like rain into a rain barrel. They know it won't.
- relate content whenever possible to issues and problems and practical situations in their life. If they can't connect it to their lives, they realize they don't really know it.
- figure out what studying and learning skills they are not good at. They practice those skills whenever possible. They recognize their weaknesses and work to decrease them. They recognize that identifying weaknesses is a strength.
- frequently ask themselves "Can I explain this to someone not in class?" (If not, then I haven't learned it well enough.)
- seek to find the key concept of the course during the first couple of class meetings. For example, in a Biology course, they try explaining what biology is in their own words. Then relate that definition to each segment of what they learn afterwards. They recognize that fundamental ideas are the basis for all others.
- routinely ask questions to fill in the missing pieces in their learning. "Can I elaborate and explain this? Can I give an example of that? If I don't have examples, I am not connecting what I am learning to my life."
- test themselves before coming to class by trying to summarize, orally or in writing, the main points of the previous class meeting. They realize that if they cannot summarize main points, they haven't learned them (and something is amiss).
- learn to test their thinking using intellectual standards? "Am I being clear? Accurate? Precise? Relevant? Logical? Am I looking for what is most significant?"
- use writing as a way to learn by writing summaries in their own words of important points from the textbook or other reading material. They make up test questions. They write out answers to their own questions.
- frequently evaluate their listening. "Am I actively listening for main points? Can I summarize what the instructor is saying in my own words? Can I explain what is meant by key terms?"
- frequently evaluate their reading. "Am I reading the textbook closely? Am I asking questions as I read? Am I distinguishing what I understand from what I don't understand?"

If, as the above implies, intellectually engaged students actively pursue knowledge, understanding, and insight in these ways, the question becomes how should we assess students so as to encourage and reward students for adopting this orientation?

## Teach and Test So That Students Use Seminal Ideas as the Core of Their Learning to Think Through Content

Once again, we can delineate a specific characteristic of student engagement, when that engagement serves the central goals of instruction. This characteristic is a powerful organizing idea behind the instruction.

Consider the following possible (initial) formulations:

- **Mathematics** as learning to think quantitatively
- **Economics** as the study of “who gets what, when, and how”
- **Algebra** as arithmetic with unknowns
- **Sociology** as the study of human conformity to group norms
- **Anthropology** as the physical and historical study of humans in light of their evolution from non-cultural into cultural animals
- **Physics** as the study of mass and energy and their interaction
- **Chemistry** as the study of elementary substances and the manner in which they react with each other
- **Philosophy** as the study of ultimate questions with a view to living an examined life
- **Biochemistry** as the chemistry of life processes in plants and animals
- **Science** as the attempt to learn through quantifiable observations and controlled experimentation
- **Theology** as the study of theories of spiritual reality
- **Ethics** as the study of principles to be used in contributing to the good of, and avoiding unnecessary harm to, humans and other sentient creatures
- **Art** as the application of skill and judgment to matters of taste and beauty (as in poetry, music, painting, dance, drama, sculpture, or architecture)
- **Professions** as ways of earning a living through the skilled and artful use of knowledge in everyday life

When instruction is structured in this way, getting at the core concepts in the disciplines they study plays a crucial role in student acquisition of knowledge and understanding.

## Assessment Instruments Offered Through the Foundation for Critical Thinking

The Foundation for Critical Thinking offers assessment instruments which share in the same general goal:

to enable educators to gather evidence relevant to determining the extent to which instruction is fostering student critical thinking (in the process of learning content). To this end, the fellows of the Foundation recommend:

1. that academic institutions and units establish an oversight committee for critical thinking.
2. that this oversight committee utilize a combination of assessment instruments (the more the better) to generate incentives for faculty (by providing faculty with as much evidence as feasible of the actual state of instruction for critical thinking).

### The following instruments are available to generate evidence relevant to critical thinking teaching and learning:

1. **Course Evaluation Form:** provides evidence of whether, and to what extent, students perceive faculty as fostering critical thinking in instruction (course by course). Machine scoreable.
2. **Critical Thinking Subtest: Analytic Reasoning:** provides evidence of whether, and to what extent, students are able to reason analytically. Machine scoreable (*currently being developed*).
3. **Critical Thinking: Concepts and Understandings:** provides evidence of whether, and to what extent, students understand the fundamental concepts embedded in critical thinking (and hence tests student readiness to think critically). Machine scoreable.
4. **Fair-mindedness Test:** provides evidence of whether, and to what extent, students can reason effectively between conflicting view points (and hence tests student ability to identify strong and weak arguments for conflicting positions in reasoning). Machine scoreable (*currently being developed*).
5. **Critical Thinking Reading and Writing Test:** Provides evidence of whether, and to what extent, students can read closely and write substantively (and hence tests student ability to read and write critically). Short Answer.
6. **International Critical Thinking Test:** provides evidence of whether, and to what extent, students are able to analyze and assess excerpts from textbooks or professional writing. Short Answer.
7. **Commission Study Protocol for Interviewing Faculty Regarding Critical Thinking:** provides

evidence of whether, and to what extent, critical thinking is being taught at a college or university (Can be adapted for High School). Based on the *California Commission Study*. Short Answer.

8. **Foundation for Critical Thinking Protocol for Interviewing Faculty Regarding Critical Thinking:** provides evidence of whether, and to what extent, critical thinking is being taught at a college or university (can be adapted for High School). Short Answer.
9. **Foundation for Critical Thinking Protocol for Interviewing Students Regarding Critical Thinking:** provides evidence of whether, and to what extent, students are learning to think critically at a college or university (can be adapted for High School). Short Answer. For a complementary DVD copy of a sample student interview, email us at [cct@criticalthinking.org](mailto:cct@criticalthinking.org)

All of the above assessment instruments can be used as part of pre- and post- assessment strategies to gauge development over various time periods.

For example, using the **Course Evaluation Form:** we can provide faculty with information on whether, and to what extent, students perceive them as teaching for critical thinking.

Using the **Critical Thinking Subtest: Analytic Reasoning:** we can provide faculty with evidence of whether, and to what extent, students are able to reason analytically.

Using the **Critical Thinking: Concepts and Understandings:** we can provide faculty with evidence of whether, and to what extent, students understand the fundamental concepts embedded in critical thinking (and hence are “ready” to think critically).

Using the **Fair-mindedness Test:** we can provide faculty with evidence of whether, and to what extent, students can reason effectively between conflicting view points (and hence whether students are able to identify strong and weak arguments for conflicting positions in reasoning).

Using the **Critical Thinking Reading and Writing Test:** we can provide faculty with evidence of whether, and to what extent, students can read closely and write substantively (and hence the extent to which students can read and write critically).

Using the **International Critical Thinking Test:** we can provide faculty with evidence of whether, and to what extent, students are able to analyze and assess excerpts from textbooks or professional writing.

Using the **Commission Study Protocol for Interviewing Faculty Regarding Critical Thinking:** we can provide faculty with evidence of whether, and to what extent, critical thinking is being taught college- or university-wide, or school-wide.

Using the **Foundation for Critical Thinking Protocol for Interviewing Faculty Regarding Critical Thinking:** we can provide faculty with evidence of whether, and to what extent, critical thinking is being taught college, university, or school-wide.

Using the **Foundation for Critical Thinking Protocol for Interviewing Students Regarding Critical Thinking:** we can provide faculty with evidence of whether, and to what extent, students are learning to think critically at a college, university, or high school.

### Consequential Validity

All of the above assessment instruments, when used appropriately and graded accurately, should lead to a high degree of consequential validity. In other words, the use of the instruments should cause teachers to teach in such a way as to foster critical thinking in their various subjects. Put another way, for students to perform well on the various instruments, teachers will need to design instruction so that students can perform well on them. Students cannot become skilled in critical thinking without learning (first) the concepts and principles that underlie critical thinking and (second) applying them in a variety of forms of thinking: historical thinking, sociological thinking, biological thinking, etc. Students cannot become skilled in analyzing and assessing reasoning without practice in it. However, when they have routine practice in paraphrasing, summarizing, analyzing, and assessing, they will develop skills of mind requisite to the art of thinking well within any subject or discipline, not to mention thinking well within the various domains of human life.

## The Foundation for Critical Thinking

The Foundation for Critical Thinking seeks to promote essential change in education and society through the cultivation of fair-minded critical thinking, thinking predisposed toward intellectual empathy, humility, perseverance, integrity, and responsibility. A rich intellectual environment is possible only with critical thinking at the foundation of education. Why? Because only when students learn to think through the content they are learning in a deep and substantive way can they apply what they are learning in their lives. Moreover, in a world of accelerating change, intensifying complexity, and increasing interdependence, critical thinking is now a requirement for economic and social survival. Contact us to learn about our publications, videos, workshops, conferences, and professional development programs.

## About the Authors

Dr. Linda Elder is an educational psychologist who has taught both psychology and critical thinking at the college level. She is the President of the Foundation for Critical Thinking and the Executive Director of the Center for Critical Thinking. Dr. Elder has a special interest in the relation of thought and emotion, the cognitive and the affective, and has developed an original theory of the stages of critical thinking development. She has authored and co-authored a series of articles on critical thinking including a column on critical thinking for the *Journal of Developmental Education*. She has co-authored four books on critical thinking. She is a dynamic presenter.



Dr. Richard Paul is a major leader in the international critical thinking movement. He is Director of Research at the Center for Critical Thinking, and the Chair of the National Council for Excellence in Critical Thinking, author of over 200 articles and seven books on critical thinking. Dr. Paul has given hundreds of workshops on critical thinking and made a series of eight critical thinking video programs for PBS. His views on critical thinking have been canvassed in *New York Times*, *Education Week*, *The Chronicle of Higher Education*, *American Teacher*, *Educational Leadership*, *Newsweek*, *U.S. News and World Report*, and *Reader's Digest*.



**For more information about the authors or the foundation, please go to [www.criticalthinking.org](http://www.criticalthinking.org)**