Assessing Critical Thinking Skills

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What is "Critical" in Critical Thinking?

- κριτικός (Kritikos), relating to judging, fit for judging, skilled in judging, able to discern (Plato, Plutarch, Lucian, others).
- With the genitive of the object, for example: κριτικὸς ἐνθυμήσεων καὶ ἐννοιῶν καρδίας - able to judge the thoughts and intentions of the heart.

Attitude + Knowledge + Thinking Skills = Critical Thinking

“Proficiency in reading, writing, and arithmetic has traditionally been the entry-level threshold to the job market, but the new workplace requires more from its employees. Employees need to think critically, solve problems, innovate, collaborate, and communicate more effectively.”

— American Management Association, 2010 (quoted in Diane Halpern: Thought and Knowledge, page 5.)
Hart Research Associates Study: 2009*

- Intellectual and practical skills
- The ability to communicate effectively, orally and in writing (89%)
- Critical thinking and analytical reasoning skills (81%)
- The ability to analyze and solve complex problems (75%)
- Teamwork skills and the ability to collaborate with others in diverse group settings (71%)
- The ability to innovate and be creative (70%)
- The ability to locate, organize, and evaluate information from multiple sources (68%)
- The ability to work with numbers and understand statistics (63%)


Critical Thinking, Defined

“Critical thinking is the process of purposeful, reflective judgment. Critical thinking manifests itself in giving reasoned and fair-minded consideration to evidence, conceptualizations, methods, contexts, and standards in order to decide what to believe or what to do.” (Facione, 2010)

“The intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action.” (Scriven and Paul, 1987)
Critical Thinking, Defined

"Critical thinking is the use of those cognitive skills or strategies that increase the probability of a desired outcome. It is used to describe thinking that is purposeful, reasoned, and goal directed—the kind of thinking involved in solving problems, formulating hypotheses, calculating likelihoods, and making decisions when the thinker is using skills that are thoughtful and effective for the particular context and type of thinking task." (Halpern, 2014)

"Being a critical thinker involves more than cognitive activities such as logical reasoning or scrutinizing arguments for assertions unsupported by empirical evidence. Thinking critically involves our recognizing the assumptions underlying our beliefs and behaviors. It means we can give justifications for our ideas and actions. Most important, perhaps, it means we try to judge the rationality of these justifications. We can do this by comparing them to a range of varying interpretations and perspectives. We can think through, project, and anticipate the consequences of these actions that are based on these justifications. And we can test the accuracy and rationality of these justifications against some kind of objective analysis of the "real" world as we understand it." (Brookfield, 1987)

Critical Thinking Mindset: Eagerness and Skills

“A person with a strong disposition toward critical thinking has the consistent internal motivation to engage problems and make decisions by critical thinking. Operationally this means three things: The person consistently values critical thinking, believes that using critical thinking skills offers the greatest promise for reaching good judgments, and intends to approach problems and decisions by applying critical thinking skills as best he or she can. This combination of values, beliefs, and intentions forms the habits of mind that dispose the person toward critical thinking.”

— Peter Facione, Think Critically, Chapter 2.1
“Everyone thinks; it is our nature to do so. But much of our thinking, left to itself, is biased, distorted, partial, uninformed, or down-right prejudiced. Yet the quality of our life and that of what we produce, make, or build depends precisely on the quality of our thought. Shoddy thinking is costly, both in money and in quality of life. Excellence in thought, however, must be systematically cultivated”


**Critical Thinking Mindset:** Eagerness and Skills

**Universal Intellectual Standards:**

**Clarity:** Could you elaborate further on that point? Could you express that point in another way? Could you give me an illustration? Could you give me an example?

**Accuracy:** Is that really true? How could we check that? How could we find out if that is true?

**Precision:** Could you give me more details? Could you be more specific?

**Relevance:** How is that connected to the question? How does that bear on the issue?

**Depth:** How does your answer address the complexities in the question? How are you taking into account the problems in the question? Are you dealing with the most significant factors?

**Breadth:** Do we need to consider another point of view? Is there another way to look at the question? What would this look like from the point of view of X?

**Logic:** Does this really make sense? Does this follow from what you said? How does that follow?

**Fairness:** Are we considering all relevant viewpoints in good faith? Are we distorting some information to maintain our biased perspective? Are we more interested in our vested interests than the common good?

CT² Points of Assessment: Classes

• Pre and Post California Critical Thinking Skills Tests
• CT Artifacts
• Additional questions for CT² classes on Evaluation of Instructor forms
• Transferable Skills NQEP module
• ETS Proficiency Profile (Freshmen and Seniors)
• Clemson Educational Profile

Critical Thinking Tests

Higher Education: General-Content, Multi-Aspect*


The California Critical Thinking Skills Test (CCTST): http://www.insightassessment.com

The California Critical Thinking Dispositions Inventory (CCTDI): http://www.insightassessment.com


Collegiate Learning Assessment+ (CLA+). http://www.collegiatelearningassessment.org/

The Critical Thinking Assessment Test (CAT): http://www.tntech.edu/cat/using/


*Adapted from: AN ANNOTATED LIST OF ENGLISH LANGUAGE CRITICAL THINKING TESTS: Robert H. Ennis and Geoffrey Scott Chattin, University of Illinois UC
Critical Thinking Tests

The California Critical Thinking Skills Test (CCTST)

The California Critical Thinking Skills Test (CCTST) is an objective measure of the core reasoning skills needed for reflective decision making concerning what to believe or what to do. The CCTST is designed to engage the test taker’s reasoning skills. Multiple choice items use everyday scenarios, appropriate to the intended test taker group. Each item requires that the test taker make an accurate and complete interpretation of the question. Any specialized information needed to respond correctly is provided in the question itself.

The test items range in difficulty and complexity. Different questions progressively invite test takers to analyze or to interpret information presented in text, charts, or images; to draw accurate and warranted inferences; to evaluate inferences and explain why they represent strong reasoning or weak reasoning; or to explain why a given exploitation of an inference is strong or weak.

The instrument is typically administered in 45-50 minutes; the length of the instrument is set to permit maximum performance within the range of possible effort for the intended test taker group.

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Critical Thinking Tests

Higher Education: General-Content, Multi-Aspect*

Inference:

Elements of a situation and determine how those parts interact.

Gather information from charts, graphs, diagrams, spoken language and documents.

Analytical reasoning skills enable people to identify assumptions, reasons and claims, and to examine how they interact in the context of a problem. They involve the use of deductive and inductive reasoning to draw conclusions or make judgments based on evidence. Analytical reasoning skills are necessary for problem solving, critical thinking, and decision making.

Deduction.

The must excel in the sustained, focused and integrated application of core reasoning skills including analysis, interpretation, and strong inference.

Overall:

Reasoning Skills Scale Descriptions

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Evaluative reasoning skills enable us to assess the credibility of sources of information and the claims they make. And, we use these skills to determine the strength or weakness of arguments. Applying evaluation skills we can judge the quality of analyses, interpretations, explanations, inferences, options, opinions, beliefs, ideas, proposals, and decisions. Strong explanation skills can support high quality evaluation by providing the evidence, reasons, methods, criteria, or assumptions behind the claims made and the conclusions reached.

Deduction: Decision making in precisely defined contexts where rules, operating conditions, core beliefs, values, policies, principles, procedures and terminology completely determine the outcome depends on strong deductive reasoning skills. Deductive reasoning moves with exacting precision from the assumed truth to a set of beliefs to a conclusion which cannot be false if those beliefs are true. Deductive validity is rigorously logical and clear-cut. Deductive validity leaves no room for uncertainty, unless one alters the meanings of words or the grammar of the language.

Induction: Decision making in contexts of uncertainty relies on inductive reasoning. We use inductive reasoning skills to draw inferences about what we think must probably be true based on analogies, case studies, prior experience, statistical analyses, simulations, hypotheticals, and familiar circumstances and patterns of behavior. As long as there is the possibility, however remote, that a highly probable conclusion might be mistaken, the reasoning is inductive. Although it does not yield certainty, inductive reasoning can provide a solid basis for confidence in our conclusions.
Critical Thinking Tests

The Critical Thinking Assessment Test (CAT)
The CAT instrument, developed at Tennessee Tech, is a unique tool designed to assess and promote the improvement of critical thinking and real-world problem solving skills. The instrument is the product of extensive development, testing, and refinement with a broad range of institutions, faculty, and students across the country. The National Science Foundation has provided support for many of these activities.

The CAT instrument is designed to assess a broad range of skills that faculty across the country feel are important components of critical thinking and real-world problem solving. The test was designed to be interesting and engaging for students. All of the questions are derived from real-world situations. Most of the questions require short answer essay responses, and a detailed scoring guide helps ensure good scoring reliability.
Critical Thinking Tests

The Critical Thinking Assessment Test (CAT)
Skills Assessed by CAT Instrument

Evaluating Information
- Separate factual information from inferences.
- Interpret numerical relationships in graphs.
- Understand the limitations of correlational data.
- Evaluate evidence and identify inappropriate conclusions.

Creative Thinking
- Identify alternative interpretations for data or observations.
- Identify new information that might support or contradict a hypothesis.

Learning and Problem Solving
- Separate relevant from irrelevant information.
- Integrate information to solve problems.
- Learn and apply new information.
- Use mathematical skills to solve real-world problems.

Communication
- Communicate ideas effectively.

Q. What did you like most about the CAT Test Scoring Session?

Critical Thinking Tests
Assessments: CCTST vs. CAT

- California Critical Thinking Skills Test (CCTST)
  - 34 multiple-choice questions
  - 45 minutes
  - Online or paper
  - Graded immediately (online)
  - Multi-Lingual Versions
  - $10 per test

- Critical Thinking Assessment Test (CAT)
  - Essay: 15 questions
  - One hour
  - Paper and pencil
  - Faculty graded
  - Faculty development potential
  - $9.95 per test and $300 annual fee

** Students are tested during the first and final weeks of classes

Assessments: ETS® Proficiency Profile

As the only integrated test of general education skills, the ETS Proficiency test assesses four core skill areas: critical thinking, reading, writing and mathematics – in a single test that the Voluntary System of Accountability (VSA) has selected as a gauge of general education outcomes.

Clemson University uses the ETS Proficiency Profile test to:

- Function as "bookends" in the CT2 assessment process
- Measure and document program effectiveness as merit requirements for accreditation and program funding
- Assess student proficiency in core academics skill areas to identify strengths, weaknesses, and opportunities to improve curriculum and instruction
- Compare student performance against program or more than 300 institutions nationwide
- Conduct trend and benchmark analyses to evaluate program improvement efforts and overall learning outcomes

Clemson University began in Fall 2011 to administer the ETS Proficiency Profile to all incoming freshmen. These same students are tested when they are seniors and we will be able to longitudinally track their progress. This provides us with a level of insight into the "value-added" aspect of a Clemson education never possible before.

ETS Proficiency Profile Standard Form

The Standard form of the ETS Proficiency Profile test is intended to provide information about individual students as well as groups of students. It consists of 108 questions, divided into two sections of 54 questions each. The two sections may be administered either in a single two-hour testing session or in two separate, one-hour testing sessions. The Standard form includes:

- 27 questions testing critical-thinking skills
- 27 questions testing reading skills
- 27 questions testing writing skills
- 27 questions testing mathematics skills

Additionally, students taking the Standard form can earn a Certificate of Achievement based on how well they perform.
Assessments: ETS® Proficiency Profile

ETS Proficiency Profile: Abbreviated Form

The Abbreviated form of the ETS Proficiency Profile test is intended to provide information about groups of at least 30 students. It is administered in a single 40-minute testing session. The Abbreviated form does not provide information about individual students.

The Abbreviated form is created by dividing the Standard Form into three smaller forms of 36 questions each. The three Abbreviated Forms are packaged in alternating sequence, so that each version is taken by one-third of the students. The 108 questions in the Standard Form are assigned to the three Abbreviated Forms to make each of them a miniature version of the Standard Form.

Each of the three Abbreviated Forms includes:
- Nine questions measuring critical thinking skills
- Nine questions measuring reading skills
- Nine questions measuring writing skills
- Nine questions measuring mathematics skills

Artifacts

- Defined: Artifact - noun ˈär-tə-fakt
  - something created by humans usually for a practical purpose; especially: an object remaining from a particular period
- Each course submits at least one type of artifact
- Can submit different artifacts
- Many classes have specific assignments that will be designated as the critical thinking artifact
- Random sample from each course is scored
- Scoring is performed by CT Faculty Scholars using the AAC&U Critical Thinking VALUE Rubric
- Examples:
  - Essay
  - Project
  - Critique
  - Video
  - Poster Presentation
  - Portfolio
- Artifacts: AAC&U Critical Thinking VALUE Rubric
Artifacts: “Visual Essay”

Thank You!
Please visit our web site for further information:
http://www.clemson.edu/thinks