

## How Can I Assess Critical Thinking with Objective Items?

Presented by:  
**Linda B. Nilson, Ph.D.**



## “Active” Critical Thinking Verbs by Level of Cognitive Operation in Bloom’s and Anderson & Krathwohl’s Taxonomies

---

### Application/Applying

apply	illustrate
break down	interpret
calculate	make use of
choose	manipulate
compute	operate
demonstrate	practice
determine	schedule
dramatize	sketch
employ	solve
give examples	use
utilize	

### Analysis/Analyzing

analyze	distill
calculate	distinguish
categorize	divide
classify	examine
compare	experiment
contrast	identify assumptions
criticize	induce
deduce	inspect
derive	investigate
differentiate	model
discriminate	probe
discuss	question
dissect	simplify
	test

### Synthesis/Creating

adapt	imagine
arrange	infer
assemble	integrate
build	invent
change	make up
collect	manage
compose	modify
conclude	originate
construct	organize
create	plan
design	posit
develop	predict
discover	prepare
estimate	produce
extend	propose
formulate	set up
forward	suppose
generalize	theorize

### Evaluation/Evaluating

agree	dispute
appraise	evaluate
argue	judge
assess	justify
award	prioritize
challenge	persuade
choose	rank
conclude	rate
convince	recommend
criticize	rule on
critique	score
debate	select
decide	support
defend	validate
discount	value
discredit	verify
disprove	weight

## DISCIPLINE-RELEVANT CT SKILLS/OUTCOMES

### Common CT Skills/Outcomes/Assessments in the Basic and Applied Sciences

#### *Which fit your prospective CT course?*

- Interpret quantitative relationships in graphs, tables, charts, etc.
- Analyze situations/data to identify problems.
- Identify and summarize the problem/question at issue (and/or the source's position).
- Categorize problems to identify the appropriate algorithms.
- Integrate information/data to solve a problem.
- Assess alternative solutions and implement the optimal one(s).
- Explain how new information can change the definition of a problem or its optimal solution.
- Evaluate hypotheses for consistency with established facts.
- Develop and justify one's own hypotheses, interpretations, or positions.
- Identify the limitations of one's own hypotheses, interpretations, or positions.
- Identify, analyze, and evaluate key assumptions and the influence of context.
- Evaluate the appropriateness of procedures for investigating a question of causation.
- Evaluate data for consistency with established facts, hypotheses, or methods.
- Separate factual information from inferences.
- Separate relevant from irrelevant information.
- Identify alternative positions/interpretations of the data or observations.
- Evaluate competing causal explanations.
- Explain the limitations of correlational data.
- Evaluate evidence and identify both reasonable and inappropriate conclusions.
- Identify and evaluate implications.
- Identify new information that might support or contradict a hypothesis.

#### *Any other CT skills/outcomes/assessments for your scientific field?*

- 
- 
-

**Common CT Skills/Outcomes/Assessments in Technical/Problem Solving Fields**  
(in addition to some of the above)

***Which fit your prospective CT course?***

- Separate relevant from irrelevant info.
- Analyze situations/data to identify problems.
- Categorize problems to identify the appropriate algorithms.
- Integrate information/data to solve a problem.
- Assess alternative solutions and implement the optimal one(s).
- Explain how new info can change the definition of a problem or its optimal solution.

***Any other CT skills/outcomes/assessments for your technical/problem-solving field?***

- 
- 
- 

**Common CT Skills/Outcomes/Assessments in Rhetorical Fields**  
(humanities, some areas in social sciences)

***Which fit your prospective CT course?***

- Determine the relevance of information for evaluating an argument or conclusion.
- Separate facts from opinions and inferences.
- Recognize flaws, inconsistencies, and logical fallacies in an argument.
- Evaluate competing interpretations, explanations, evidence, and conclusions.
- Communicate complex ideas effectively.

***Any other CT skills/outcomes/assessments for your rhetorical field?***

- 
- 
-

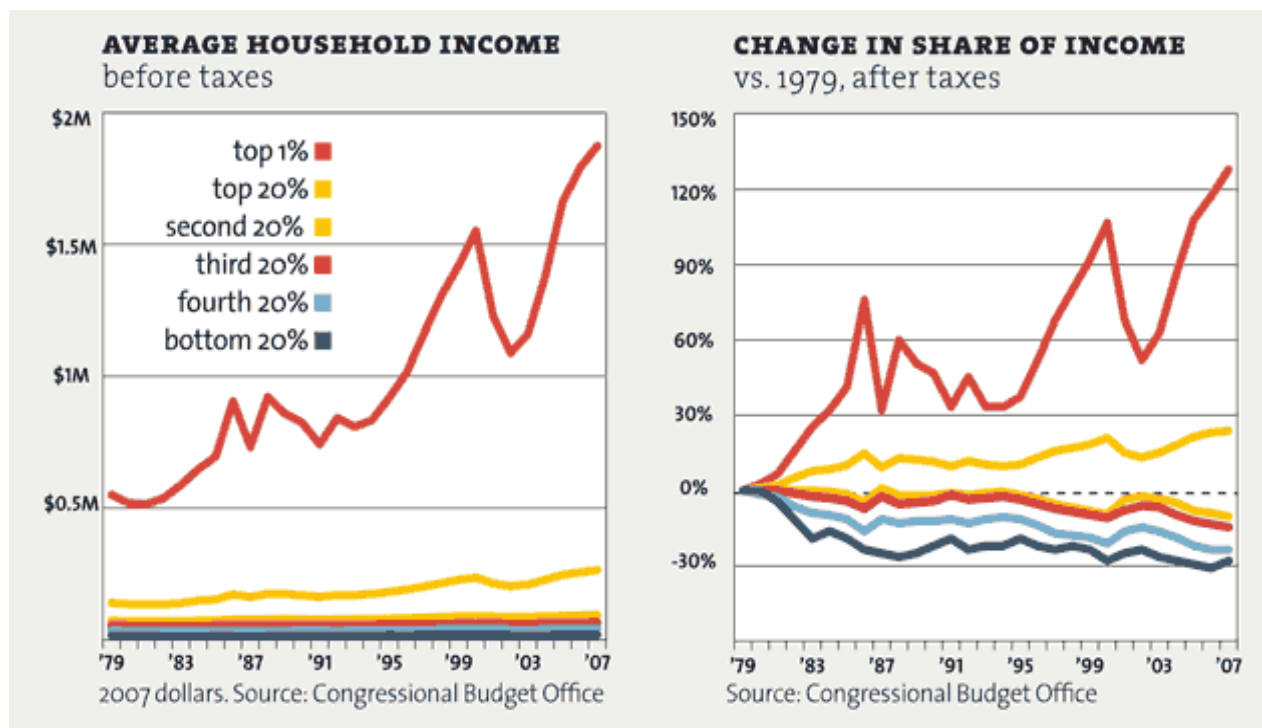
## Common CT Skills/Outcomes/Assessments Distinctive to the Arts

### ***Which fit your prospective CT course?***

- Identify alternative artistic interpretations.
- Determine how well an artistic interpretation is supported by evidence contained in a work.
- Recognize the salient features or themes in works of art.
- Evaluate work of art according to criteria.
- Compare and contrast different works to provide evidence of change or growth.
- Infer the historical context (time, place, artist, motivation, etc.) of a work of art from its characteristics, and justify the inferences.
- Create a respectable piece of art.

### ***Any other CT skills/outcomes/assessments for the arts?***

- 
- 
-



The following items are **multiple true/false**. To the left of each statement, put "T" if it is true and "F" if it is false.

Which of the following statements is/are valid conclusions you can draw from the graphs above:

- \_\_\_ 1. From 1979 to 2007, household income inequality increased among the bottom 20%, fourth 20%, and third 20% of the U.S. population.
- \_\_\_ 2. From 1979 to 2007, the change in the share of income dropped for all but the top 1%.
- \_\_\_ 3. In terms of income, both the top 20% and top 1% benefited from the bull market in technology.
- \_\_\_ 4. The graphs supply evidence in support the trickle-down theory that President Ronald Reagan espoused.
- \_\_\_ 5. The graphs supply evidence of increasing polarization between the highest-income classes and the rest of society.
- \_\_\_ 6. The graphs supply evidence that the wealth of the bottom 80% dropped from 1979 to 2007.

Which of the following statements is/are valid conclusions you can draw from the graphs above?

- \_\_\_ 7. One graph analyzes income data before taxes and the other after taxes. They show that taxes have the effect of redistributing income from the higher paid to the lower-paid households.
- \_\_\_ 8. Because the share of income dropped for most households, the U.S. economy has less money flowing through the system.

\_\_\_ 9. The stock market crash of 2000 most lowered the household income of the top 1%.

\_\_\_ 10. From 1979 to 2007, the sector that lost the largest share of household income was the bottom 20%.

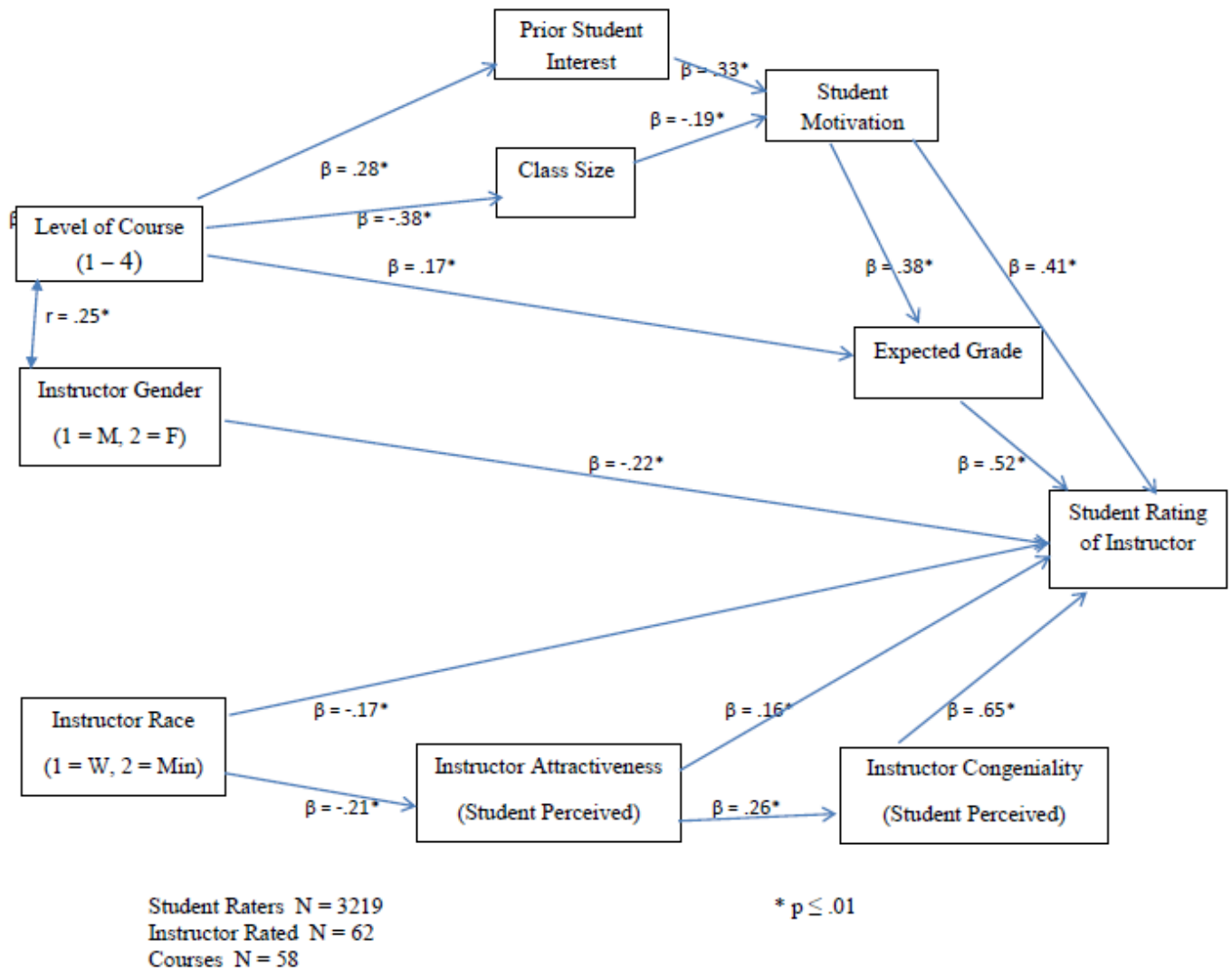


Figure 1

The following four items are **multiple choice**. Mark the letter of the correct answer.

- The diagram above shows the results of a large study. What is the study's unit of analysis?
  - Student raters
  - Instructors rated
  - Courses
  - None of the above

2. What is the sample size of the study?
  - a. 3281
  - b. 3277
  - c. 3219
  - d. 120
  - e. 62
  - f. 58
  
3. What does " $p \leq .01$ " mean?
  - a. The probability that the result is by chance is .01% or less.
  - b. The probability that the result is by chance is 1% or less.
  - c. The probability that the result is by chance is 1 in 10 or less.
  - d. The true population value of  $\beta$  is the sample  $\beta \pm .01$ .
  - e. None of the above
  
4. Which of the following is the **best** label for Figure 1?
  - a. Effects of Instructor Variables on Student Rating of Instructor
  - b. Effects of Instructor Variables on Student Variables
  - c. Effects of Course Variables on Student Rating of Instructor
  - d. Causal Model of the Effects of Instructor and Student Variables
  - e. Causal Model of Major Determinants of Student Rating of Instructor
  - f. Causal Model of the Effects of Student Variables on Instructor Variables

The following items are **multiple true/false**. To the left of each statement, put "T" if it is true and "F" if it is false.

Which of the following statements are valid conclusions you can draw from the diagram above?

- \_\_\_ 5. Class size mediates some of the effect of level of course on student motivation.
- \_\_\_ 6. Students perceive more attractive instructors as more congenial.
- \_\_\_ 7. Students perceive minority instructors as less attractive but more congenial than white instructors.
- \_\_\_ 8. Students' prior interest and class size significantly affect student learning.
- \_\_\_ 9. The instructor variables have stronger effects on student rating of instructor than do the student variables.
- \_\_\_ 10. The model has four dependent variables: student motivation, expected grade, instructor congeniality, and student rating of instructor.
- \_\_\_ 11. Female instructors tend to teach more lower-level courses than do male instructors.
- \_\_\_ 12. Instructors teaching smaller classes are likely to have more motivated students.



## Selected Bibliography (Partially Annotated) on Critical Thinking

Abrami, P. C., Bernard, R. M., Borokhovski, E., Wade, A., Surkes, M. A., Tamim, R., & Zhang, D. (2008). Instructional interventions affecting critical thinking skills and dispositions: A stage 1 meta-analysis. *Review of Educational Research, 78*(4), 1102-1134. Available at [http://www.jstor.org/stable/40071155?seq=1#page\\_scan\\_tab\\_contents](http://www.jstor.org/stable/40071155?seq=1#page_scan_tab_contents)

Main finding: To develop critical skills in students in a course, instructors must have the explicit goal of developing those skills as well as training in ways to do so. Critical thinking does not progress by accident or within the typical course.

Abrami, P. C., Bernard, R. M., Borokhovski, E., Waddington, D. I., Wade, C. A., & Persson, T. (2014). Strategies for teaching students to think critically: A meta-analysis. *Review of Educational Research*. Available at <http://rer.sagepub.com/content/early/2014/09/25/0034654314551063.full>  
Main finding: List of activities that are most effective in promoting critical thinking skills.

Bloom, B., & Associates. (1956). *Taxonomy of educational objectives*. New York: David McKay. Models at <http://www.edpsycinteractive.org/topics/cognition/bloom.html> and <http://www.celt.iastate.edu/teaching-resources/effective-practice/revised-blooms-taxonomy/>

Braun, N. M. (2004). Critical thinking in the business curriculum. *Journal of Education for Business, 79*(4), 232-236.

Nora Braun of Augsburg College points out that in the business world, making decisions is a daily occurrence. Discussions, debates, and guided questioning are some of the techniques that should be used in business courses to classify and evaluate the enormous quantity of available information.

Brookfield, S. D. (2013). Webpage with access to resources and activities for teaching critical thinking. [http://stephenbrookfield.com/Dr.\\_Stephen\\_D.\\_Brookfield/Workshop\\_Materials.html](http://stephenbrookfield.com/Dr._Stephen_D._Brookfield/Workshop_Materials.html)

In-class exercises at

[http://www.stephenbrookfield.com/Dr.\\_Stephen\\_D.\\_Brookfield/Workshop\\_Materials\\_files/Developing\\_Critical\\_Thinkers.pdf](http://www.stephenbrookfield.com/Dr._Stephen_D._Brookfield/Workshop_Materials_files/Developing_Critical_Thinkers.pdf), pp. 17-44.

Brookfield, S. D. (2012). *Teaching for critical thinking: Tools and techniques to help students question their assumptions*. San Francisco: Jossey-Bass. Chapter 1, What is critical thinking? available at [http://stephenbrookfield.com/Dr.\\_Stephen\\_D.\\_Brookfield/Articles\\_and\\_Interviews\\_files/Ch%201%20What%20is%20Critical%20Thinking.pdf](http://stephenbrookfield.com/Dr._Stephen_D._Brookfield/Articles_and_Interviews_files/Ch%201%20What%20is%20Critical%20Thinking.pdf)

Brookfield, S. D. (1997). Assessing critical thinking. *New Directions for Adult and Continuing Education*, No. 75, Fall, 17-29.

Browne, M. N., & Keeley, S. M. (2010). *Asking the right questions: A guide to critical thinking* (9th ed.). Prentice Hall, NJ.

The authors highlight the applicability of critical thinking skills to life experiences extending far beyond the classroom. Critical thinking habits and attitudes are transferrable to consumer, medical, legal, and general ethical choices, to the benefit of the thinker.

Burbach, M., Matkin, G., & Fritz, S. (2004). Teaching critical thinking in an introductory leadership course utilizing active learning strategies: A confirmatory study. *College Student Journal, 38*(3), 482-493.

Although educators disagree on the definition of critical thinking, they do concur that critical thinking should be the main goal of a course. This study in an introductory level college leadership course finds that students improve their critical thinking skills through active learning.

Facione, P. A. (2015 update). Critical thinking: What it is and why it counts. Available at [http://www.insightassessment.com/pdf\\_files/what&why2006.pdf](http://www.insightassessment.com/pdf_files/what&why2006.pdf)

Facione, P. A. (2011). *Think critically*. Upper Saddle River, NJ: Prentice Hall.  
Written from a philosophical perspective, this critical thinking textbook emphasizes the application of critical thinking to the real world and offers positive examples of critical thinking. Chapters cover inductive, deductive, comparative, ideological, and empirical reasoning.

Facione, P. A. (1990). Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction. Research Findings and Recommendations. Available at <http://files.eric.ed.gov/fulltext/ED315423.pdf>

Facione, N. C., & Facione, P. A. (2008). *Critical thinking and clinical judgment in the health sciences: An international teaching anthology*. Millbrae, CA: California Academic Press.

Facione, N. C., & Facione, P. A. (2007). *Thinking and reasoning in human decision making*. Millbrae, CA: California Academic Press.

Facione, N. C., & Facione, P. A. (2001). Analyzing explanations for seemingly irrational choices. *International Journal of Applied Philosophy*, 15(2), 267-86.

Facione, P. A., & Facione, N. C. (2007). Talking critical thinking. *Change: The Magazine of Higher Education*, 39(March-April), 38-44.

Facione, P. A., Facione, N. C., & Giancarlo, C. (2000). The disposition toward critical thinking: Its character, measurement, and relationship to critical thinking skills, *Journal of Informal Logic*, 20(1), 61-84.

Fisher, A. (2001). *Critical thinking: An introduction*. New York: Cambridge University Press.  
Fisher aims to teach the basic skills or competencies displayed in good critical thinkers: the ability to interpret, analyze and evaluate ideas and arguments.

Hale, J. (2011). Analyzing the thinking process: Interview with Diane Halpern at <http://psychcentral.com/blog/archives/2011/04/24/analyzing-the-thinking-process-interview-with-diane-halpern/>  
Highlight of Halpern's approach to critical thinking

Halpern, D. F. (2003). *Thought and knowledge: An introduction to critical thinking* (4<sup>th</sup> ed.). Mahwah, NJ: Lawrence Erlbaum Associates.

Halpern, D. F. (1999). Teaching for critical thinking: Helping college students develop the skills and dispositions of a critical thinker. *New Directions for Teaching and Learning*, No.80, Winter, 69-74.

Diane Halpern, a professor of psychology at California State University, proposes a four-part model to teach critical thinking. The model includes strategies to help students recognize when a certain thinking skill is needed and metacognitively monitor their thinking processes.

Insight Assessment. (2013). California Critical Thinking Skills Tests® Scales, Description. Available at <http://www.insightassessment.com/Products/Products-Summary/Critical-Thinking-Skills-Tests/California-Critical-Thinking-Skills-Test-CCTST>

Insight Assessment. (2013). Sample items from the California Critical Thinking Skills Test® (CCTST®) at [https://www.insightassessment.com/Resources/node\\_1487](https://www.insightassessment.com/Resources/node_1487)

Macpherson, K. (1999). The development of critical thinking skills in undergraduate supervisory management units. *Assessment & Evaluation in Higher Education*, 24(3), 273-284.

Nilson, L. B. (1997). Critical thinking as an exercise in courage. *The National Teaching and Learning Forum*, (6)2, 1-4.

This article reviews many of the logical fallacies that interfere with critical thinking and goes beyond in revealing how “psycho-logical” fallacies – that is, psychological defense mechanisms – also obstruct critical thinking. In other words, critical thinking depends upon mental/emotional health.

Nosich, G. M. (2009). *Learning to think things through: A guide to critical thinking across the curriculum* (4<sup>th</sup> ed.). Upper Saddle River, NJ: Pearson/Prentice Hall.

Built on Richard Paul's model of critical thinking, this book is written for students to help them learn how to think critically in any subject matter, with an emphasis on the elements of reasoning, standards, and critical thinking processes. It presents instruction and exercises that actively involve students in their own learning, highlight the power and relevance of the discipline of the course, and make connections to other fields.

Paul, R., & Elder, L. (2013). Critical thinking: Teaching students how to study and learn, Part III. *Journal of Developmental Education*, 26(3), 36-37. Available at <http://www.criticalthinking.org/pages/how-to-study-and-learn-part-three/515>

Richard Paul, director of research and professional development at the Center for Critical Thinking at Sonoma State University, has written extensively in the field of critical thinking. He and Linda Elder have co-authored many articles on critical thinking which “prove” by polls and surveys taken that educators generally do not know what critical thinking is, or how to teach it. Three templates provided in this article are well written and would be beneficial in most classes. They help students analyze the logic of articles, essays, or chapters. Each template consists of eight questions asking the main purpose, the key question, the most important information, the main references or conclusions, the key idea, the main assumptions of the material, the implications, and the main point of view. By using these templates when reading an article or chapter, students will better understand critical thinking as a process that enable s them to identify and evaluate information. Specifically, a critical thinking approach to reading equips students to know:

- how to analyze the logic of an article, essay, or chapter
- how to figure out the logic of a textbook
- how to evaluate an author’s reasoning.

The authors focus on critical thinking as a process and encourage readers to work through the templates so they can help students learn to analyze and assess information in written materials. These techniques transfer quite easily to other topics and disciplines. They first appeared in:

Paul, R., & Elder, L. (2001). *The thinker's guide to how to study and learn*. Dillon Beach, CA: Foundation for Critical Thinking.

Many other teaching resources are available free at [www.criticalthinking.org](http://www.criticalthinking.org), and these are especially important:

<http://www.criticalthinking.org/pages/our-concept-and-definition-of-critical-thinking/411>

<http://www.criticalthinking.org/pages/a-sample-assignment-format/438>

<http://www.criticalthinking.org/pages/critical-thinking-development-a-stage-theory/483>

<http://www.criticalthinking.org/pages/the-state-of-critical-thinking-today/523>

<http://www.criticalthinking.org/pages/universal-intellectual-standards/527>

<http://www.criticalthinking.org/pages/valuable-intellectual-traits/528>

<http://www.criticalthinking.org/pages/study-of-38-public-universities-and-28-private-universities-to-determine-faculty-emphasis-on-critical-thinking-in-instruction/598>

Pierce, W. (2007). Titles and annotations of documents from Prince George Community College.

Available at <http://academic.pg.cc.md.us/~wpeirce/MCCCTR/annotat1.html>

In addition to links to ideas for critical thinking assignments and activities, there is a valuable site with examples of critical thinking rubrics and advice for developing one's own:

<http://academic.pg.cc.md.us/~wpeirce/MCCCTR/Designingrubricsassessingthinking.html>

Pierce, W. (2007). WWW links to resources for teaching reasoning and critical thinking. Available at

<http://academic.pg.cc.md.us/~wpeirce/MCCCTR/links~1.html>

While a compilation this old has some broken links, those that are still alive are very good.

Perry, W. G. (1968). *Forms of intellectual and ethical development in the college years: A scheme*. New York: Holt, Rinehart & Winston. Models at [http://home.ubalt.edu/ub02Z36/Perry\\_Stages\\_ACRL-MD.pdf](http://home.ubalt.edu/ub02Z36/Perry_Stages_ACRL-MD.pdf), <http://www.cse.buffalo.edu/~rapaport/perry.positions.html>, [http://perrynetwork.org/?page\\_id=2%3E](http://perrynetwork.org/?page_id=2%3E)

Roth, M. S. (2010, January 3). Beyond critical thinking. *Chronicle of Higher Education*. Available at <http://chronicle.com/article/Beyond-Critical-Thinking/63288/>

Roth observes that the teaching of critical thinking tends to focus on criticism – seeing through or undermining statements — and cautions against creating a class of self-satisfied debunkers. When critical thinking means being a critical unmasker, students may become too good at showing how things do not make sense, which may diminish their capacity to find or create meaning and direction in the books they read and the world in which they live. Roth endorses finding ways to teach students to open themselves to the emotional and cognitive power of history and literature, even though these fields may initially rub them the wrong way or seem foreign. He concludes that we should allow students to see the value-laden practices of a particular culture so they can understand how these values are legitimated. We should also encourage them to cultivate the willingness and ability to learn from material they might otherwise reject or ignore.

Seesholtz, M., & Polk, B. (2009, October 10). Two professors, one valuable lesson: How to respectfully disagree. *Chronicle of Higher Education*. Available at <http://chronicle.com/article/Two-Professors-One-Valuable/48901/>

The authors team-taught a course that demonstrated critical thinking through civil discourse: how to engage in a civil debate with the goal of advancing understanding of another's point of view, how to evaluate the validity of that viewpoint, and how to benefit from the new perspectives it opens.

Tremblay, K. R., Jr., & Downey, E. P. (2004). Identifying and evaluating research-based publications: Enhancing undergraduate student critical thinking skills. *Education*, 124(4), 734-740.

Kenneth Tremblay, a faculty member in the Department of Design and Merchandising and School of Social Work at Colorado State University, reports the results of a study conducted on undergraduate students in a research methods course involving critical thinking. In response to a series of questions, students selected and developed an idea, gathered research-based publications, and read and evaluated the literature. In the evaluation process, students developed critical thinking skills as well as inductive and deductive logic reasoning skills.

Willingham, D. T. (2007). Critical thinking: Why is it so hard to teach? *American Educator*, Summer, 8-19. Available at [http://www.aft.org/sites/default/files/periodicals/Crit\\_Thinking.pdf](http://www.aft.org/sites/default/files/periodicals/Crit_Thinking.pdf)

According to Willingham, no specific set of critical thinking skills actually exists. He believes that techniques can be taught, but they work poorly if taught in a stand-alone way. Students must have some content or domain knowledge before they can apply any technique. Otherwise, it is difficult to get beyond the “surface structure” of a problem and to know when to look more deeply. Willingham argues that the assessments of critical thinking programs used in the last 25 years are limited or flawed, but most show that skilled teaching/coaching and plenty of opportunity for students to practice techniques, especially across dissimilar material, can increase critical thinking abilities.

Wolcott, S. L. (Forthcoming in 2015). Steps for better thinking. Currently under revision; to be available at <http://www.wolcottlynch.com/>

The site provides a stage-based model of critical thinking, teaching tools, working papers, and an online tutorial in teaching critical thinking.

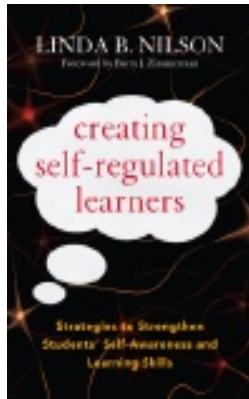
Critical thinking rubrics online:

- AACU’s Critical Thinking VALUE Rubric at <http://www.aacu.org/value/rubrics/critical-thinking>
- St. Philip’s College QEP Critical Thinking Rubric at <http://course1.winona.edu/shatfield/air/QEPrubricpilots042007jo.pdf>
- Facione & Facione’s Holistic Critical Thinking Scoring Rubric at <http://course1.winona.edu/shatfield/air/critical%20thinking%204.pdf>
- Northeastern Illinois University’s General Education Critical Thinking Rubric at <http://course1.winona.edu/shatfield/air/Critical%20Thinking-long.pdf>
- The College of Wooster’s Critical Thinking Sample Rubrics, Domain Specific [http://www3.wooster.edu/teagle/critical\\_rubrics.php](http://www3.wooster.edu/teagle/critical_rubrics.php)
- St. Petersburg College’s Assessment Rubric for Critical Thinking (ARC) Scenarios <http://www.spcollege.edu/criticalthinking/students/rubrics.htm>

Compiled by Linda Nilson, April 2015

Books for Teachers, Administrators, and Policymakers in Higher Education

## LATEST BOOKS BY LINDA B. NILSON



### ***Creating Self-Regulated Learners***

*Strategies to Strengthen Students' Self-Awareness and Learning Skills*

**Linda B. Nilson**

Foreword by **Barry J. Zimmerman**

180 pages, 6" x 9",  
Cloth: 978 1 57922 866 8  
Price: \$95.00  
Published: September 2013

Paper: 978 1 57922 867 5  
Price: \$27.50  
Published: September 2013

Ebook: 978 1 57922 869 9  
Price: \$21.99  
Published: October 2013

*Note: E-Books require Adobe Digital Editions or Bluefire Reader.*



### ***Specifications Grading***

*Restoring Rigor, Motivating Students, and Saving Faculty Time*

**Linda B. Nilson**

Foreword by **Claudia J. Stanny**

184 pages, 6" x 9",  
Cloth: 978 1 62036 241 9  
Price: \$95.00  
Published: October 2014

Paper: 978 1 62036 242 6  
Price: \$29.95  
Published: October 2014

Ebook: 978 1 62036 244 0  
Price: \$23.99  
Published: March 2015

*Note: E-Books require Adobe Digital Editions or Bluefire Reader.*