Critical Thinking Faculty Institute 2017

Developing Your Critical Thinking Course:

Outcomes, Instruction, and Assessments

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Critical Thinking Faculty Institute 2017

Developing Your Critical Thinking Course

Part 1: Formulating Critical Thinking Outcomes and Planning Instructional Strategies

Outcomes for You - Part 1

- To explain what critical thinking (CT) is
- To identify what course content it can be applied to
- To write assessable CT student learning outcomes compatible with your discipline
- To select and adapt methods and strategies for teaching CT
- To avoid common teaching mistakes

Outcomes for You - Part 2

- To compose T/F, matching, multiple choice, and multiple T/F items that assess CT skills
- To design constructed response questions/ tasks that give sufficient direction, assess CT skills authentically, and enhance students' awareness of their thinking processes.
- To develop solid CT assessment rubrics.

Where CT doesn’t apply

- Lower-level thinking/learning: knowledge, remembering, recognizing, reproducing, simple (non-interpretive) comprehension /understanding
- “Cookbook” or “plug-&-chug” procedures and solutions

Where CT *Does* Apply

When a “claim” may or may not be valid, complete, or the best possible.

“Claim” = belief, value, assumption, interpretation, problem definition, theory, generalization, analysis, viewpoint, opinion, contention, hypothesis, solution, inference, decision, prediction, or conclusion – ***not*** a fact or term definition.

Why a “Claim” May Be Questionable

- Evidence is uncertain, ambiguous, or contradictory.
- Multiple respectable claims exist (issues of disagreement, debate, controversy).
- Source is suspect.
- Other reasons?

What content in your courses relies on “claims” that may or may not be valid, complete, or the best possible? (Look for areas of uncertainty.)

Many Different CT Frameworks

- Brookfield (focus on assumptions)
- Higher-level cognitive operations in Bloom's Taxonomy
- Perry's Stages of UG Cognitive Development
- Halpern (cognitive psychology)
- Wolcott (& Lynch), Steps to More Complex/ Critical Thinking
- Paul & Elder, Foundation for Critical Thinking
- Facione & Delphi Report (basis of CCTST)

Points of Overlap

- **CT** = interpretation/analysis + evaluation
- **CT** is difficult and unnatural; it takes time to learn.
- **CT** is not only cognition but also "character" (motivation).

For examples: Paul & Elder's "Intellectual Traits" of Character

- Intellectual humility
- Intellectual autonomy
- Intellectual integrity
- Intellectual courage
- Intellectual perseverance
- Confidence in reason
- Intellectual curiosity
- Fair-mindedness

Facione & Delphi Group's Dispositions Toward CT

- Wide-ranging inquisitiveness
- Desire to be well-informed
- Desire to use critical thinking
- Trust in reasoned inquiry
- Confidence in one's reasoning abilities
- Open-mindedness

- Flexibility in considering alternatives
- Understanding of others’ opinions
- Fair-mindedness
- Honesty with self about own biases, prejudices, stereotypes, egocentrism
- Prudence in suspending/altering views
- Willingness to revise views when warranted

Emotional Health to Counter "Psycho-logical Fallacies" (Nilson 1997)

- Assimilation
- Denial
- Displacement
- Externalization
- Projection
- Rationalization
- Regression
- Repression
- Selective Perception
- Selective Recall
- Sublimation
- Suppression
- Transference
- Withdrawal

- CT requires background knowledge of subject matter.
- CT requires explicit and intentional integration into a course for students to learn it.
- CT requires self-regulated learning (metacognition and meta-emotional awareness & control).

Halpern's Dispositions
(Self-Regulated Learning)

- Willingness to work and persist at complex tasks
- Conscious planning and follow-through and suppression of impulsive activity
- Open-mindedness and flexibility
- Willingness to self-correct and replace ineffective with effective strategies

Must Have CT Learning Outcomes

- Outcomes = statements of what students should *be able to do* by end of the day, week, unit, or course.
- "Performances" you can *observe* so you can assess and *set standards* for them – ***not*** internal states of mind like "know," "learn," "feel," "understand," "appreciate"

(Verbs in Supplementary Material)

General CT Skills

1. According to Facione

http://www.insightassessment.com/Products/Critical-Thinking-Skills-Tests/California-Critical-Thinking-Skills-Test-CCTST (Definitions in Supplementary Material)

- Interpretation
- Explanation
- Analysis
- Inference
- Evaluation
- Deduction
- Induction
- (Numeracy)

2. According to Halpern

- Verbal Reasoning (to identify and defend against persuasive techniques)
- Argument Analysis
- Scientific Reasoning (hypothesis testing)
- Statistical Reasoning (likelihood and probability)
- Decision Making and Problem Solving

Discipline-Relevant CT Skills/Outcomes

(Lists in Supplementary Material)

- Check those relevant to your course.
- Add more if necessary.
- Write some CT outcomes.
- Start sequencing them: In what order will students achieve them?

Basic Teaching Principles

- Address misconceptions about CT and subject matter early. *Ask your students what they think CT is.*
  - Negative?
  - Purely critical?
  - Anti-the-way-things-are?

- Teach some CT theory and vocab.
  - Operational terms/thinking verbs
    (Definitions in Supplementary Material)
  - Logical fallacies: practice identifying and avoiding. List at http://utminers.utep.edu/omwilliamson/ENGL1311/fallacies.htm

- Ask CT questions and assign CT tasks that match your outcomes and content = low/no-stakes ***practice*** with your or peer ***feedback***. (List in Supplementary Material)

- Methods for ***practice*** with ***feedback***:
  - Class discussions (cases, arguments)
  - Debates, structured controversy
  - Inquiry-guided activities (interpret raw data, figure out how to solve problems)
  - Journaling, other writing-to-learn exercises

- Simulations and role plays with debriefing discussions or papers
- Drafts of papers, presentations, projects
- Brookfield's in-class CT exercises https://static1.squarespace.com/static/5738a0ccd51cd47f81977fe8/t/5750ef2d62cd947608165cf2/1464921912225/Developing_Critical_Thinkers.pdf pp. 17-44

- To ***advance*** students' CT skills

  1) give them increasingly complex material to interpret/analyze/evaluate over time.

OR

2) move them through a stages model:

- Perry at http://www.cse.buffalo.edu/~rapaport/perry.positions.html or http://perrynetwork.org/?page_id=2%3E
- Wolcott at http://www.wolcottlynch.com/
- Paul & Elder at http://www.criticalthinking.org/pages/critical-thinking-development-a-stage-theory/483

- Have students observe and articulate their reasoning.
  - After every CT question/task, ask

    “How did you arrive at your response?”
  - Assign reflective writing to identify beliefs and misconceptions that may interfere with clear reasoning, such as

    “What part of the learning experience challenged what you thought about the subject? Did you find yourself resisting it? If so, how did you overcome your resistance?”

Mistakes to Avoid

- Low-level questions/tasks
- Claims without ambiguous evidence, uncertainty, or controversy
- Insufficient wait time for responses
- No feedback
- No reflection or self-regulation

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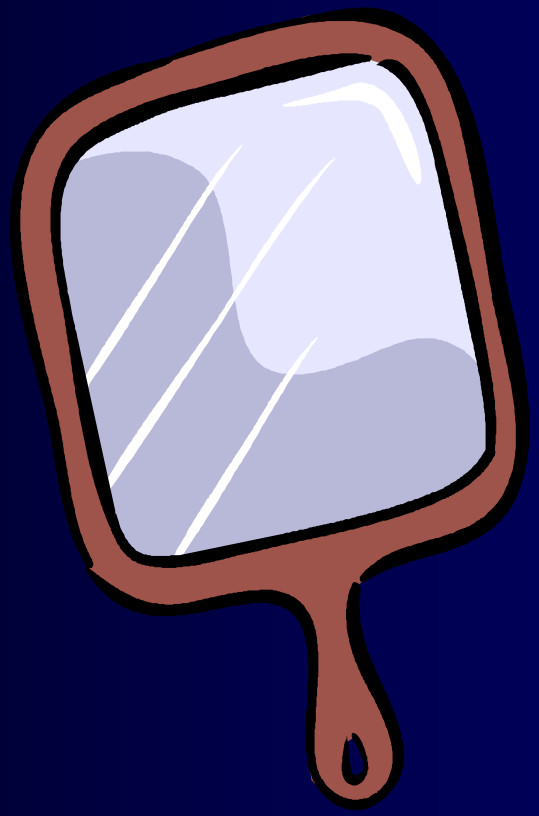
Part 2: Assessing Critical Thinking Skills

Outcomes for You - Part 2

- To compose T/F, matching, multiple choice, and multiple T/F items that assess CT skills
- To design constructed response questions/ tasks that give sufficient direction, assess CT skills authentically, and enhance students' awareness of their thinking processes.
- To develop solid CT assessment rubrics.

Assessments Should *Mirror* Outcomes.

Outcome



Assessment

That is ….

If you want your students to be able to do X, Y, and Z, have them do X, Y, and Z to assess whether they can.

Assessment Guidelines

- Each outcome deserves assessment: formative (informal/ungraded/low-stakes) or summative (formal/graded).
- Assess authentically: real-life skills, knowledge, situations.
- Align cognitive levels of assessments with those of outcomes and teaching.

- Before you assess *summatively,* assess *formatively* to:
  - Give students *practice with feedback* from you, peers, or computer program.
  - Get frequent *feedback for yourself* on their progress.

- Don’t move on until almost all students have made acceptable progress.
- Set performance standards of “acceptable/unacceptable” for formative assessments and points/ grades for summative assessments.

Assessment Instruments

- Objective items

  = fill-in-the-blank (completion), T/F, matching, multiple choice, multiple T/F

- (Student-)Constructed responses

  = writing assignments, essay test questions, oral or multimedia presentations, programs, projects, research reports, designs, artistic works or performances, portfolios, etc.

Most Types of Objective Items Can *Require and Assess* …

- Interpretation
- Generalization
- Inference
- Problem solving
- Conclusion drawing
- Comprehension
- Application
- Analysis
- Synthesis
- Evaluation

Fill-in-the-Blank/Completion

- Focus on memorization (which you may want) – *not CT*

True/False

- Can assess CT ***IF*** “stimulus-based”; see multiple choice and multiple true/false below.

Matching Items

Homogenous items within set−every option plausible for every item in list

- *“Match each theory with its originator.”*
- *Cause with effect*
- *Definition with term*
- *Achievement/work with person/author*
- *Foreign word with translation*

- *Pictures of objects with names*
- *Symbol with concept*
- *Organ/equipment/tool/apparatus with use or function*
- *Labeled parts in a picture with function*
- *Processes, sequences* (less known /used)

To Assess CT, Have Students Match …

- *Causes with* likely effects
- *Concepts with* new examples *of them*
- New, hypothetical problems *with tools, concepts, or approaches needed to solve them*

Suskie, L. (2009). *Assessing student learning* (2nd ed.). San Francisco: Jossey-Bass.

Guidelines for Writing Matching Items

- Imperfect match between columns: *"Some options may be used more than once, and others, not at all."*
- Short options (1-3 words, phrase)
- Up to 15-17 items, all on 1 page
- List options alphabetically, numerically, or chronologically.

What two sets of items could you have your students match to assess their CT skills?

Guidelines for Writing Multiple Choice Items

- Avoid phraseology and distracters that would prevent a knowledgeable student from answering the item correctly.
- Avoid giving clues that would help a poorly prepared student answer the item correctly. (Suskie, 2009)

More specifically:

- List options alphabetically, numerically, chronologically.
- Make all distracters plausible, grammatically parallel, and just as long as correct response.
- Create distracters from elements of correct response.

- Use sparingly:
  - ***no***, ***not***, ***never***, ***none***, ***except***
- Use generously – not just when correct:
  - all of the above
  - none of the above

Multiple True/False

- Each option below stem is a T/F item.
- Superior flexible, efficiency, reliability
- Easier and quicker to develop
- More challenge, no process-of-elimination
- Stem <u>must</u> be clear.

To Assess CT, Compose:

... **a** ***series*** of multiple choice or multiple T/F items (or both) around a new*, realistic ***stimulus*** that students must interpret/analyze accurately to answer the items correctly.

** New to the students*

Possible Stimuli

- *Text:* claim, statement, passage, mini-case, quote, report, text-based data set, description of an experiment
- *Graphic:* chart, graph, table, map, picture, model, diagram, drawing, schematic, spreadsheet

Guidelines for Writing Stimulus-Based Items

- New stimulus, but students must have ***prior practice*** in the CT skills assessed
- Minimize interlocking items
- Be creative with stimulus!

(Examples in Supplementary Material)

What stimuli could you use for a series of multiple choice or multiple T/F items to assess your students' CT skills?

Write a series of multiple T/F items for it.

Strengths and Limitations of Stimulus-Based Items

+ Assess more CT skills more efficiently than constructed responses

- Can*not* assess abilities to communicate, create, organize, define problems, or conduct research. *Only constructed responses can.*

What are Constructed Responses?

Students generate a product:

e.g., answer to question, essay, paper, report, project, portfolio, design, oral or multimedia presentation, artistic work or performance, or demonstration (e.g., of technical problem solving).

– For CT, students should also reflect and report on how they did it.

Constructed Responses Can *Require* and *Assess* …

- Interpretation
- Generalization
- Inference
- Problem defining
- Problem solving
- Conclusion drawing
- Organization
- Research

- Communication
- Comprehension
- Application
- Analysis
- Synthesis
- Creation
- Evaluation

Well-Designed Constructed Response Prompt for CT

- = Question or task assessing one or more of your CT outcomes
- Non-standardized answers/products
- Professional judgment needed for assessment

- Well-defined and focused; OK to recommend types of thinking and content to use.
- Situate the question or task in a relevant, real-world problem or situation.

Examples of Poor and Improved Constructed Response Prompts

- VAGUE: To what factors have historians attributed the decline of the Roman Empire?
- IMPROVED: Some people argue that the United States is following the same path of decline as the Roman Empire. Write a critical examination of this claim analyzing how the United States is and is not declining due to similar factors.

- VAGUE, LOW-LEVEL: What should a nurse do when a patient has a bad reaction to an immunotherapy injection?
- IMPROVED; PROBLEM-FOCUSED: After the first injection of an immunotherapy program, you notice a large, red wheal on your patient’s arm. Then the patient begins coughing and expiratory wheezing. What series of interventions should you implement? Justify your interventions and their sequence.

- LOW-LEVEL: What is the relationship between education and income? To what extent has it changed recently?
- IMPROVED PARADOX-FOCUSED: The education of the working and middle classes has been increasing for decades while their income has been flat or decreasing for the past decade. How can you resolve this trend and the well-established positive relationship between education and income? (Consider other factors that may affect income.)

- VAGUE, LOW-LEVEL: What will happen to the hydrosphere, the geosphere, and the biosphere if a large amount of sulfur dioxide is released into the atmosphere?

- IMPROVED; PROBLEM-FOCUSED: Some geoscientists maintain that the mega-magna chamber below Yellowstone National Park is leaking increasing amounts of sulfur dioxide into the atmosphere and will cause a mass extinction within 70,000 years. They rest this claim on the mass extinction that happened 250 million years ago. Why or why not do you accept this claim? To what extent are the hydrospheric, atmospheric, and biospheric conditions comparable to those 250 million years ago?

Possible Reflective Meta-Assignments

- *How did you arrive at your response/solution?*
- *How did you define the task/problem, decide which principles/concepts to apply, develop alternative approaches and solutions, and assess their feasibility, trade-offs, and worth?*
- *How did you conduct your design/problem-solving/research process (steps, strategies, problems, how overcome)?*
- *Skills used or improve? Future use?*

- *Evaluate your strategies, performance, and success in achieving your goals.*
- *Goals/strategies for revision?*
- *Learning value of task? What would you do differently?*
- *What challenged your thinking? Did you find yourself resisting it? If so, how did you overcome your resistance?*
- *What advice would you give next year's students about this assignment (prep, strategies, pitfalls, value)?*

Think of a relevant, real-world problem or situation for your students to solve or resolve.

Choose an appropriate reflective meta-assignment (assignment “wrapper”) to raise your students’ awareness of their thinking while solving or resolving it.

To Assess CT Questions and Tasks

- ***Analytical Rubric* =** an assessment/grading tool that lays out specific expectations for a piece of work and describes each level of performance quality on the selected assessment criteria/skills.

For Rubrics, Accept That:

- You can’t assess/grade student work on every criterion/skill you can think of.
- Students can’t work on improving their performance on every criterion/skill. *They don’t even know what those criteria/skills are.*
- You must chose <u>just a few</u> criteria/skills.

Step 1 : Choose CT Criteria Based on Your Outcomes.

- What CT skills/outcomes are most important for students to demonstrate in a given assignment or essay?
- What CT skills/outcome is it supposed to assess?

Step 2: Define Levels and Their Values.

- Number or range of points for each level
- Grades (A, B, C, etc. or 4.0. 3.7, 3.3, etc.)
- Descriptive levels (e.g., high, average, low mastery; exemplary, competent, developing, unacceptable)
- Combination

Step 3: Describe the Performance for Each Level on Each Criterion.

- Usually in a table in sentences, phrases, or lists; “all or most…” alternative.
- Write out descriptions of each level of performance on each assessment criterion. (See Examples of Critical Thinking Rubrics.)

Step 4: Use Rubric to Teach.

- Distribute and explain your rubric to students as part of assignment or essay test instructions.
- Teach analysis and evaluation: Best to have students in groups use rubric to grade models of varying quality.

Step 5: Use Rubric to Assess.

- Have students submit rubric with their work.
- Mark relevant descriptors on rubric and write comments on work, *as time permits*.
- Demand any grade challenges in *writing* with *justifications* within a tight time limit.