Implementing Critical Thinking with Signature Assignments

Salt Lake Community College

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How to Use This Guide

This is a print version of an online resource. Do not read this guide front to back.

Section 1: Read this section if you are unsure about what critical thinking is, how to teach it, how to make great assignments that demand it, and how to measure it.

Section 2: Read this section for instructions about how to decide which critical thinking skills matter to you and your discipline, how to build your signature assignments, and how to build your rubrics.

Section 3: Do not “read” this section! It contains lengthy reference appendices that should only be accessed if needed. You will access these from links in sections 1 and 2.

Section 4: This section contains templates (and links to the original files) for your signature assignments and rubrics.
Section 1: Introduction to Critical Thinking

Introduction

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3. Assess Critical Thinking Explicitly

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1. Establish a positive professional relationship with your students.

2. Explain your methods, and reasoning up front.

3. Explicitly teach active learning strategies for completing assignments and performing better on assessments.

4. Give students your reasoning.

5. Establish reasonable rules for discussion and other interaction.

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1. Select Critical Thinking Skills That Pertain to Your Discipline

A. Ask yourself questions about what practitioners in your field do with their thinking.

C. If you prefer to browse for ideas, review the list in Appendix C: Examples of Critical Thinking Skills.

2. Identify or Create a Signature Assignment That Collects Evidence of Critical Thinking Skills

A. Select an existing assignment.

B. Plan a new signature assignment.

C. Create the signature assignment narrative.

3. Select Critical Thinking Scoring Criteria & Create Your Scoring Rubric

Why Use Our Method for Measuring Critical Thinking?

A. Select one row from each of the six categories in the critical thinking framework.

B. Adapt the wording of the descriptors (the words in each scoring cell) to fit your signature assignment. (Optional but Highly Recommended Step)

C. Copy and paste each row into the Critical Thinking Rubric Template.

D. Send your rubric to me for posting online. tom.zane@slcc.edu

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4. Inference

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Section 1:
Introduction to Critical Thinking
Introduction

Why Is Critical Thinking (CT) So Important to Educators?

Brain and educational research suggests that CT is an essential driver for learning and growth. Indeed, critical thinking is to knowing as listening is to hearing (Snyder and Snyder, 2008). Truly and deeply learning the content of any discipline or profession can only occur via conscious and deliberate engagement with the content. Clearly then, CT is not a new curricular or content area for us to teach. We are not teaching critical thinking per se. Instead, our goal is to help our students to think critically about the content.

Why is CT Underutilized in Higher Education Courses Today?

You might think that a concept as ubiquitous as CT would be found in nearly all aspects of higher education. After many discussions across campus, I’ve seen that CT does appear in many of our Course Curriculum Outlines (CCOs), yet only a small percentage of us can point to specific instances of CT in our current teaching methods and assessments.

So why is CT rarely formalized into our teaching and assessment practices? I have encountered five interrelated reasons:

1. **CT is a mushy buzzword** that is so broad and so varied in definition that it becomes nearly unusable.
2. **We teach like we were taught.** Lectures are common – yet learning and brain research suggests that the lecture followed by fact-based exams approach to teaching is a poor method for long-term learning. Instead, this leads to a surface level, read-memorize-regurgitate-forget cycle of learning leaving little room for deeper thinking about, and use of the content of our courses and disciplines.
3. **Many of us “cover” CT in our courses by offering assignments that we believe will require our students to think.** We default to this approach mainly because nobody bothered to tell us how to use CT for learning – that is, how to teach, assign, and assess CT skills.
4. **Textbooks rarely encourage CT.** Passive fact-based extraction and even note taking can short circuit CT.
5. **Many of us are driven by a “cover the material” mindset.** We have replaced good thinking with content volume.
6. **Many of us feel inadequate to the task of teaching and learning CT.** Whether due to lack of training, experience, or because we maintain some misconceptions, we just don’t seem to deal with CT effectively.
Critical Thinking Defined

A Simple Definition

Critical thinking is the conscious and deliberate use of thinking skills and strategies used for guiding what to think, believe, or do.

(See CT theorists such as Paul, Elder, Facione, & Ennis for similar definitions Critical Thinking References List or for a shorter reading list see Appendix G: Critical Thinking References Reading List.

CT From a Teaching and Learning Perspective

CT is a strategic mental process driven by four factors:
1. A prerequisite desire and willingness to use CT.
2. Specific knowledge, information, or other content to engage with.
3. Thinking skills and strategies for learning and applying the content.
4. Criteria (standards) for determining what to think, believe, or do.

CT From a Process Perspective – The Critical Thinking Framework

CT can be organized—albeit loosely—into six inter-related types of thinking. I have found that this framework holds up to many specific applications of CT across the institution.

<table>
<thead>
<tr>
<th>1. Interpretation</th>
<th>The primary definition of interpretation is the act of making sense of various inputs. Interpretation requires that we clarify the purpose, issue, problem/question, meaning, etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Analysis</td>
<td>Analysis means to break down, examine, or otherwise explore the issues, available information, arguments, etc. With analysis, we must manipulate, process, or otherwise make active changes to the inputs to make better sense of them.</td>
</tr>
<tr>
<td>3. Evaluation</td>
<td>To evaluate means to determine the merit, value, efficacy, advantages, worth, authenticity, validity, impact, or significance, of something (e.g., the evidence, claims, assumptions, biases, perspectives, etc.)</td>
</tr>
<tr>
<td>4. Inference</td>
<td>This broad term covers reasoning coupled with the use of evidence and standards that together are necessary for synthesizing, coming to a conclusion, making decisions, identifying alternatives, generalizing, planning, predicting, etc.</td>
</tr>
<tr>
<td>5. Explanation</td>
<td>Communicate the outcomes of thinking such as stating results, justifying procedures, explaining meaning, presenting arguments, etc. This is considered CT because of the mental processes involved in designing a well-written (or spoken) message.</td>
</tr>
<tr>
<td>6. Self-regulation</td>
<td>During all of the above (and sometimes following the thinking as well), reflect, self-examine, pose questions about thinking, self-correct, etc.</td>
</tr>
</tbody>
</table>

Strategies for Using Critical Thinking in Your Classroom

Implementing CT in your classroom can be very simple or could involve very detailed methods. If you are a novice instructor or have little experience with using CT for deeper learning, I recommend that you start small and simple. The following list offers strategies that have been shown to work in classrooms from kindergarten to graduate school.

These strategies are listed roughly by relative ease of use & effectiveness.

1. Assign Students to Use and Apply What They Are Learning

This is a powerful tool for learning and teaching students to use CT because it leads to hands-on and brains-on tasks (e.g., what educational theorists call active engagement).

2. Ask Critical Thinking Questions in Your Assignments, Discussions, and Exams

Move beyond the common “facts” level (“what” level) sorts of content questions to demand things like comparison, analysis, synthesis, planning, prediction, trouble-shooting, etc. For example, make assignments that require research, problem solving, decision making, etc. that go beyond what is in the textbook. (See Appendix C: Examples of Critical Thinking Skills for examples of CT issues and Appendix D: Examples of Critical Thinking Question Stems for help with developing CT questions.)

3. Assess Critical Thinking Explicitly

Students learn and do what is assessed, so try one of the following approaches:

A. Provide criteria and standards for good thinking in your discipline. Rubrics are an easy and extremely powerful way to define and communicate these.

B. Assign students to get directly involved with assessment via peer review. Taking the role of evaluator forces students to think about their (and others’) thinking (metacognition). Hold students accountable for their peer assessments.

C. Where appropriate, use ill-structured\(^1\), real-world, authentic problems that may have several good solutions.

D. Provide feedback to students on their CT ability (using those same rubrics mentioned previously is a good way to handle this approach).

E. Model good reflection and then ask your students for reflection on the content you are teaching, how well they are learning, their assumptions, changes in their thinking, etc. (see examples of reflection questions at the bottom section of Appendix D: Examples of Critical Thinking Question Stems.)

\(^{1}\) An ill-structured problem is messy, real world (authentic), complex, yields answers based on judgment, often has multiple “right” answers, and is almost always not found in the textbook. For example, recommend whether the city should budget for sidewalk repair, street repair, or another police officer. Ill-structured problems are not convergent problems with just one correct solution or personal preference questions that have as many answers as you have students.
4. Provide direct instruction in thinking like a _______: {Historian, Welder, Nurse, etc.}
   
a. Explain what CT is, what it means in your discipline, and give examples.
   b. Model CT by thinking aloud to walk your students through your thinking (e.g.,
      “when I need to decide which approach to take with this problem I consider x.”
   c. Ask the whole class to walk through some CT using your discipline’s content.
Engaging Students

The Challenge
Research suggests that many students in the western world are victims of our educational system. Average students are guided day by day in simple passive learning activities. They read, listen to lectures, and regurgitate what they have “learned” on exams. In many classes, they have to do relatively little work and almost no deep thinking about the content. Unfortunately, this approach leads to shallow, surface, short-term learning. Clearly, this sort of learning is not the intent of higher education. Few among us would argue against learning to be better thinkers. But moving beyond passive learning into active learning places some burden on the student – which inevitably leads to some resistance.

A Few Proven Methods
It is up to us to help our students make the switch from passive recipient of knowledge to engaged, active user of knowledge. Suggestions for helping students make this change abound in the educational, learning, organizational behavior, and other literatures. Nearly all articles and books that I’ve read agree on a few simple approaches to overcoming student resistance to change:

1. **Establish a positive professional relationship with your students.**
   Don’t play a part – be yourself. Trust and respect when properly earned can overcome nearly all resistance.

2. **Explain your methods, and reasoning up front.**
   When higher education students are told the whys and wherefores of active learning methods the majority will go along. For example, many students don’t know how the material of your class will be used later on. Further, most don’t know that learning for long term memory can make their lives easier next semester or on the job. Help your students to understand how active learning practices are in their best interest. For example, describe why you are making the assignment and explain what you expect students to gain from doing the work.

3. **Explicitly teach active learning strategies for completing assignments and performing better on assessments.**
   Remember that most students have not been taught explicitly how to learn and how to think through issues within a given discipline. Research suggests that think aloud modeling is an excellent tool for teaching students to think.

4. **Establish reasonable rules for discussion and other interaction.**
   Your goal is to maximize active thinking and learning yet protect fairness and safety.

See [Keeley, Shemberg, Cowell, & Zinnbauer, 2010](#) for additional information on these issues.
Critical Thinking Implementation – A Brief Overview

How Do We Implement CT In Our Courses?
Several authors have written entire books to answer this question. The vast majority of the strategies I’ve seen boil down to this:

Select, use, and assess a small subset of critical thinking skills you believe are essential for learning and applying the content of your discipline.

It is really up to you how simple or complex you make your use of CT skills in your classroom. Ensuring that students are practicing CT can be as simple as asking the right sorts of questions or as complex as initiating a full-blown problem-based learning pedagogy.

If you are new to CT, I recommend starting at the small and simple end of the spectrum. Identify what thinking skills matter to your profession and then find a way to get students to use those skills. Most importantly, assesses your students on their use of the skills since research suggest that our students learn what is graded.

CT Implementation Steps Using a Signature Assignment (The Brief View)
In this document I will assume you want to start small and simple with your CT implementation. An excellent way to do this, and, a way to also take care of your College-wide Student Learning Outcomes (CWSLOs) assessment requirements, would be to use a signature assignment scored with a rubric that measures CT. This simple approach can be easily handled in three brief steps.

1. Select Critical Thinking Skills That Pertain to Your Discipline
You have been utilizing the thinking skills of your discipline for years so this step may be fairly simple. In this step you will identify the critical thinking skills that matter to you and to your discipline.

2. Identify or Create a Signature Assignment That Collects Evidence of Critical Thinking Skills
Next, find an existing assignment or to build a new one that will “show” you the qualities of your students’ thinking. Note that “showing” is not the same as doing. While an assignment may require certain thinking to complete, if evidence doesn’t appear in their submissions you won’t be able to judge the quality of their thinking.

3. Select Critical Thinking Scoring Criteria & Create Your Scoring Rubric
In this step you will establish criteria to help you determine how in depth your students are thinking. For example, if you value predicting financial trends or diagnosing reasons for an event, how will you know just how successful they are at this skill?
Section 2:
Detailed Implementation Instructions
Detailed Instructions for CT Implementation Steps

1. Select Critical Thinking Skills That Pertain to Your Discipline
The selection of specific CT skills is related to the nature of your discipline and your personal values. To identify some of the CT elements in your discipline try this.

A. Ask yourself questions about what practitioners in your field do with their thinking.

1. What do practitioners in my discipline do with their knowledge and thinking day to day?
   - What clarifications do they need to make?
   - What assessments and judgments must they make?
   - What questions do they have to pose?
   - What problems do they have to solve?
   - What decisions do they have to make?

2. How do practitioners in my field go about analyzing information in their jobs?
3. How do they go about communicating all of the above (and to whom)?


C. If you prefer to browse for ideas, review the list in Appendix C: Examples of Critical Thinking Skills.
2. Identify or Create a Signature Assignment That Collects Evidence of Critical Thinking Skills

Did you notice that the title did not mention using an assignment that requires students to simply use CT?

"A good signature assignment goes beyond simply requiring critical thinking to finish it. Instead, a good signature assignment yields gradable evidence of the critical thinking skills that matter to you."

A. Select an existing assignment.

The easiest way to handle this step is to identify an assignment that you already use. I prefer this method because it is more consistent with our belief that CT is simply a part of learning. So it is better to select a naturally occurring assignment from within your curriculum than to build an add-on assignment that captures CT skills.

B. Plan a new signature assignment.

We have created a Signature Assignment Planning Template to help you build your assignment.

*Hint: For an assignment that measures critical thinking, ask the right sorts of questions!*

To browse critical thinking questions that might help you conceptualize your signature assignment, see Appendix D: Examples of Critical Thinking Question Stems.

C. Create the signature assignment narrative.

We have also created a Signature Assignment Student Handout Template that you can give to your students. {Instructions are included with the template.}

We will post examples of signature assignments as we collect them in Appendix E. If you are willing to share yours, please send it to me tom.zane@slcc.edu
3. Select Critical Thinking Scoring Criteria & Create Your Scoring Rubric

In the previous step you selected the critical thinking skills that you value. Now you will create a rubric that will allow you to determine how well your students perform each skill.

Note: If you already have a rubric or other scoring method, you might be able to use that if it goes after the same thinking skills shown in our rubric examples. If you prefer to build your own rubric rows rather than selecting from our examples, we welcome that as well.

Why Use Our Method for Measuring Critical Thinking?

Recall from previous materials that CT is a cyclical and iterative process made up of multiple and overlapping activities. CT can be simply defined as:

*Critical thinking is the conscious and deliberate use of thinking skills and strategies used for guiding what to think, believe, or do.*

Critical thinking (CT) is a holistic, complex, and integrated thinking skill. While thinking happens in phases, everything is connected. But scoring student signature assignments holistically (one score for all of their thinking) is difficult and can be unreliable. On the other hand, if we atomize the elements of thinking down too far in our rubrics, we do just as much damage to the validity of the scores. So we need to strike a balance between these two extremes. We do this by building at least six rows in our scoring rubrics based around the six-part process view of critical thinking.

*The following steps are a quick and easy approach to building rubrics that can score critical thinking elements in student work.*

Before you begin, recall the steps you completed when selecting/building your signature assignment:

- Decide whether you are going to score a product, performance, person, and/or process.
- Decide whether you will score in sections or as a whole.
- Select at least one specific bulleted criterion from each of the parts of the critical thinking framework to use in your critical thinking rubric.

A. Select one row from each of the six categories in the critical thinking framework.

Like a Chinese lunch menu, pick one from Column A, one from Column B… All of these six sets of examples are in Appendix F.

1. Interpretation
2. Analysis
3. Evaluation
4. Inference
5. Explanation (Communication)
6. Self-regulation (Metacognition)

B. Adapt the wording of the descriptors (the words in each scoring cell) to fit your signature assignment. *(Optional but Highly Recommended Step)*

Rubrics are handed out to students along with the signature assignment. Research has shown that giving students the rubric improves learning (and scores). We recommend adapting (also called localizing) the rubric rows when you are using the scoring rubric for just one assignment. Doing so will help your students see what “good” thinking looks like in the context of that assignment.

Note how the critical thinking involved here is *how well* the student thought about the sorts of questions that should be asked to guide their research project.

<table>
<thead>
<tr>
<th>Original Example</th>
<th>Does not ask questions.</th>
<th>Identifies some questions.</th>
<th>Asks good questions.</th>
<th>Analyzes insightful questions.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clarifying Questions</td>
<td>Does not ask questions about the budget problem.</td>
<td>Identifies some basic common or obvious questions about the budget problem.</td>
<td>Asks relevant questions that guide further research into the budget problem.</td>
<td>Analyzes insightful questions showing a deep understanding of how the questions can guide the research.</td>
</tr>
</tbody>
</table>

C. Copy and paste each row into the Critical Thinking Rubric Template.

D. Send your rubric to me for posting online. tom.zane@slcc.edu
Section 3: Appendices and Other Help Documents
Appendix A
The Critical Thinking Framework:
A Six-part Process View of Critical Thinking

This list is not exhaustive so some critical thinking skills that are important to you and your discipline may not appear here. Feel free to substitute your skills within any of the six parts of the framework. For a more detailed view of these skills see Appendix B: Detailed Definitions of the Critical Thinking Process Framework.

1. Interpretation
   - Clarifying Understanding
   - Comprehension
   - Critical Reading
   - Decoding
   - Finding Significance

2. Analysis
   - Categorization
   - Classification
   - Deconstruction
   - Identify and Examine
     - Arguments
     - Assumptions
     - Connections
     - Concepts
     - Ideas
     - Reasons and Claims
     - Voice, Subjectivity, Agenda, Bias
   - Considering Diverse Perspectives

3. Evaluation
   - Assess
     - Credibility
     - Quality
     - Relevance
     - Etc.
   - Judgment
   - Using Inductive or Deductive Reasoning

4. Inference
   - Causal Modeling
   - Conjecturing Alternatives
   - Decision Making
   - Drawing Conclusions
   - Generalization
   - Making Connections
   - Planning
   - Prediction
   - Reasoning (Inductive or Deductive)

5. Explanation
   (Optional because many of these may be covered by previous criteria).
   - Abstraction
   - Argumentation
   - Integration
   - Justify Procedures (based on evidence)
   - Present Arguments
   - State Results
   - Summarization
   - Synthesis

6. Metacognition
   - Self-monitoring
   - Reflection
   - Self-correction
Appendix B: Detailed Definitions of the Critical Thinking Process

Framework

Introductory Caveats to Instructors

A. To understand critical thinking we need to recognize that it is a process made up of many sub-skills. Those sub-skills may take on different titles and meanings across disciplines. For a given title shown below, definitions from some disciplines are very broad while others are quite specific. Some are inclusive while others are nuanced. So the titles and definitions listed below may resonate with some faculty and not with others. I have attempted to find the most common titles and definitions and I’ve tried to point out where major differences may exist across disciplines.

B. Almost any of the “sub-skills listed below can be reframed as a process made up of other sub-skills found within this list. For example, the word evaluation denotes a specific mental process related to passing judgment. However, performing an evaluation project would require most of the other thinking skills listed below. Thus, the language we use for describing thinking is mushy at best. When in doubt, use your own language.

C. The list shown below is not exhaustive. There are hundreds of other terms that are related to each of the sub-skills listed below. I have attempted to list a few of the more common related terms.

Prerequisite Skills: Dispositions or Critical Spirit

Dispositions or a Critical Spirit are a nebulous and often undefined set of beliefs, aspirations, feelings, desires, etc. Simply put, a proper mental mindset is a prerequisite to true critical thinking. The thinker has to want to think critically about something to avoid taking the easier routes forward. Dispositions or what some call a critical spirit encompass our motivations and our nature toward thinking rather than denoting a specific thinking skill.

Caution: This sub-skill is a prerequisite to true critical thinking rather than a first step in the critical thinking process. Most authors suggest that one must be purposeful and should maintain a level of open-mindedness to allow for critical thinking to occur. It is extremely difficult to measure dispositions. In most cases, we can collect indirect evidence that suggest a thinker’s motivations or beliefs.

Related terms include such things as decentering, flexibility, objectivity, honesty, truth seeking, fairness, maturity, willingness to suspend judgment, etc.

1. Interpretation

The primary definition of interpretation is the act of making sense of various inputs. The inputs may include such things as arguments, evidence, statements, ideas, concepts, graphics, pictures, questions, problems, situations, beliefs, etc. For example, at a very simple level, the ability to read and understand a text would be a form of interpretation. At a more complex level, the ability to interpret the message of a political cartoon would also qualify as interpretation.
Interpretation does have other meanings related to outputs. For some, it is the artist’s ability to place a personal touch to a piece. Still others see interpretation as a production task in writing where the writer’s approach and framing illustrate their thoughts about the subject at hand. To avoid confusion, we will not use either of these definitions here. Both of these production definitions will fall under communication instead.

**Caution:** Interpretation is very similar to analysis in many ways. Both deal with making meaning of various inputs. But interpretation is making sense of what is given while analysis suggests the brain manipulate, process, or otherwise make active changes to the inputs to make better sense of the materials.

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 (Facione, 2011).

Sub-skills and Related Terms
- **Clarifying Understanding**
- **Comprehension**
- **Critical Reading**
- **Decoding**
- **Finding Significance**

**Bolded** terms are consistent with the Delphi study of critical thinking (Facione, 1990).

**Clarifying Understanding**

Although this skill is often a subpart of many other skills in this document, it is called out here to show the wide variety of sub-skills connected to clarification activities. When reviewing materials the thinker makes sense of the input.

*Related terms* include such things as understanding, recognizing issues and nuances, consideration, or finding main and related ideas.

**Comprehension**

The term comprehension is perhaps synonymous with understanding. Comprehension assumes actively engagement by the thinker with the elements found in materials or events. In reading instruction and testing the term comprehension holds a specific meaning in that the thinking is limited to what is found within the written text. Thus, comprehension may be a sub-set of the larger term interpretation. Compare with *critical reading*.

**Critical Reading**

Evaluating, interpreting, and reflecting upon a given text. Critical readers consider how/why the text was written versus what was said. Colloquially, this term is sometimes known as reading between the lines or clarifying meaning. Contrast critical reading with reading comprehension which determines if an individual understood the actual words, concepts presented, and other things found within a reading passage.
Decoding & Finding Significance

The term decoding simply means the act of making meaning from complex inputs such as source documents, videos, events, etc. Decoding is different than the skills listed above in that it demands a conversion from one form to another. For example, translating foreign words into English, seeing the meaning of mathematical equation conventions, or even recognizing nonverbal communications would fit here. Decoding is a precursor to analysis in that one must first fully understand the messages presented. The word decoding has a special meaning to reading teachers. We will not use that definition here.

2. Analysis

The most common definition of analysis is the act of breaking a complex construct, situation, or other entity into component parts to aid understanding. However, analysis is an enormous construct that comes in many forms when it is connected to reading, viewing, or listening (inputs) such as recognizing relationships, listing constraints and assumptions, finding ideas within a work, considering diverse perspectives, identifying implications or consequences, discriminating, etc. Analysis is often paired with other skills such as evaluation and judgment to aid deconstruction.

Related terms may include such things as consideration, investigation, looking deeply at issues, comparing, contrasting, reasoning, and many others.

Caution: Analysis is similar to interpretation and evaluation in terms of some of the thinking patterns involved. However, analysis goes beyond interpretation by working with materials to improve sense making and stops short of evaluation in that the thinker does not yet place value or render judgments about the materials at hand. Although our thinking is actually not this linear, think of analysis for our purposes as sandwiched between understanding material (inputs) and assessing or making value judgments about the material.

Identify relationships among and between statements, questions, concepts, descriptions, or other forms of representation intended to express belief, judgment, experiences, reasons, information, or opinions (Facione, 2011).

Sub-skills and Related Terms
- **Categorization**
- **Classification**
- **Deconstruction**
- **Identify and Examine**
  - Arguments
  - Assumptions
  - Connections
  - Concepts
  - Ideas
  - Reasons and Claims
  - Voice, Subjectivity, Agenda, Bias
- **Considering Diverse Perspectives**

**Bolded** terms are consistent with the Delphi study of critical thinking.

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Categorization

The skill of identifying a set of categories from a complex milieu and the ability to place information, objects, items, etc. into categories based on certain criteria. Sub-skills in categorization include such things as the ability to identify relationships, similarities, differences, find potential categories for grouping data, and then organizing information into those categories to aid communication or inference. Related skills include interpretation, abstraction, combination, simplification, analysis, and summarization.

Classification

This skill is very similar to categorization however for our purposes classification assumes a hierarchy or scale among the component parts. For example, classifying life forms uses a highly specialized and pre-determined set of categories.

Deconstruction

Deconstruction means actively breaking complex issues down into component parts to aid understanding or to make new meaning of materials.

Identifying Connections

Connecting one abstract construct to another, or connecting an abstract construct (e.g., theory) to a real-world event. In addition, some disciplines use this term for the act of integrating knowledge from disparate sources (e.g., learning from humanities can inform learning in another discipline). {See also: Making Connections under Inference.}

Identifying Arguments

This sub-skill is similar in form to most of the others in the list under analysis. However, the fodder for this sub-skill is quite specific. The thinker in this case is working with determining the author’s position, claims, or message and finding the reasons, evidence, etc. that support the argument. In other words, the thinker figures out what the author has to say and begins to see the reasons why.

Related terms include finding claims, determining the author’s purpose or main ideas, etc.

Considering Diverse Perspectives

This skill has to do with openly considering an issue from different perspectives or points of view. It includes the ability to identify bias in self, others, and in materials. The origin for this sort of critical thinking may be an awareness or internal impetus to seek out others’ ideas. Terms for this internal locus include open-mindedness, empathy, dedication to fairness and social justice, maturity, or even the elements of the critical spirit.

While considering perspectives is often done as a part of reviewing source materials, personal reflection, or problem solving, the ability to see and articulate perspectives is considered a separate skill by some disciplines. For human relationships, the term
“decentering” is used to denote the ability to stand outside ourselves to objectively view a situation from another person’s perspective.

*Related terms include* creativity, thinking outside the box, looking through another person’s eyes, open-mindedness, and reframing.

### 3. Evaluation

Evaluation is the skill of determining merit, efficacy, advantages, worth, authenticity, validity, impact, or significance, of something (e.g., evidence, sources, assumptions, etc.).

Some disciplines consider the evaluation of source materials as a wholly different construct and place the skill within information literacy rather than critical thinking. Some disciplines separate elements of reviewing source materials into phases of understanding (interpretation), categorization, clarification of meaning, and other skills.

*Related terms* include assessment, criteria construction, and judgment.

**Caution:** Evaluation normally leads to rating, value statements, and decision making. However, for our purposes, evaluation must be limited to the sub-skills listed below and should not be confounded with outcomes of the evaluation. Making a “good” decision may involve evaluation. But a good decision is not necessarily dependent on evaluation, so can’t be a surrogate for “good” evaluation skills. For example, an expert makes unconscious “good” decisions based on experience rather than any sort of evaluation or other critical thinking.

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 (Facione 2011).

**Sub-skills and Related Terms**

- **Assess**
  - Credibility
  - Quality
  - Relevance
  - Etc.
- **Judgment**
- **Using Inductive or Deductive Reasoning**

**Bolded** terms are consistent with the Delphi study of critical thinking.

**Assessment**

At the heart of evaluation is the ability to assess, claims, arguments, situations, beliefs etc. in terms of their credibility, quality, relevance, and other similar factors. This sort of thinking is the act of placing value to facilitate subsequent thinking. Some authors place assessment of information sources here while others move this specific sub-skill under *Information Literacy*. 

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Unfortunately, thinkers often place value subconsciously rather than actively evaluating and deciding on value explicitly. For example, a bigoted person might discount opinions or ideas from authors of another social group without even reading, much less understanding the messages involved. Thus, assessment in the critical thinking sense demands a strong dispositional component to make fair judgments.

*Related terms* include weighing the evidence, considering the issues, open mindedness, explicit decision making, suspending judgment, etc.

**Judgment**

This sub-skill is a mix of evaluation and decision making. Often, it is limited to the use of evidence in making a decision whereas “decision making” might be a broader construct. Judgment in various professions could be founded on emotion, bias, or codified standards external to the individual. Note that this term has special meaning in mathematics (assertions).

4. **Inference**

Inference is easily and specifically defined as coming to a conclusion, or making decisions, deductions, assumptions, etc., based on the evidence at hand. This sub-skill represents the result of critical thinking. While easily defined, many sub-skills are necessarily involved that go beyond such things as analysis and evaluation.

There are more specific meanings to inference in some disciplines such as statistics, where assumptions about a population are made from a small sample of evidence or in various sciences where hypothesis testing is necessary.

*Related terms* include confirmation, deduction, determining implications, identifying potential consequences, inquiry, supposition, etc.

To identify and secure elements needed to draw reasonable conclusions; to form conjectures and hypotheses.; to consider relevant information and to educe the consequences flowing from data, statements, principles, evidence, judgments, beliefs, opinions, concepts, descriptions, questions, or other forms of representation (Facione 2011).

**Sub-skills and Related Terms**

- Causal Modeling
- **Conjecturing Alternatives**
- Decision Making
- **Drawing Conclusions**
- Generalization
- Making Connections
- Planning
- Prediction
- **Reasoning (Inductive or Deductive)**

**Bolded** terms are consistent with the Delphi study of critical thinking.
Causal Modeling
This skill is the act of thinking-through or otherwise using a causal model. A causal model is a representation of real-world relationships, dynamic, and/or connections among variables. Causal models are used to examine cause and effect, chronological relationships, and processes. These uses often result in making predictions (running the causal model forward), determining root causes (diagnosing or running the causal model backward), or identifying errors. Because causal modeling has various interpretations, it can look identical to planning (see Conjecturing Alternatives above), prediction (see Drawing Conclusions above), decision making, etc.

Conjecturing Alternatives
On first glance this sub-skill seems to fit earlier in the critical thinking process. However, it is placed here underneath inference because coming up with alternatives involves integrated reasoning and decision making. For example, the thinker may need to come up with plan A, B, and C to allow for contingencies.

Decision Making
Although the phrase “decision making” is a large process in its own right, the more specific act of making a decision fits well into inference. Like drawing conclusions, decision making assumes the use of various sub-skills of critical thinking that precede this section.

Drawing Conclusions
This sub-skill is simply defined as the endpoint of using Inference (see the Inference section - above). The thinker uses evidence, ideas, beliefs, etc. to come to closure in one form or another (e.g., opinions, positions, arguments. choices, decisions, etc.).

Generalization
Generalization is the inference of specific rules, conclusions, principles, broad statements, etc. It is perhaps a sub-part of Drawing Conclusions in that it is a specific method for using evidence from a small sample to a larger population. For example, the thinker may use the results of three lab experiments to generalize a rule about the boiling point of water or may use a few past experiences to make broad comments about an issue. In this sense, generalizations can be under or over stated based on the sufficiency of the evidence at hand.

Making Connections
Connecting one abstract construct to another, or connecting an abstract construct (e.g., theory) to a real-world event. In addition, some disciplines use this term for the act of integrating knowledge from disparate sources (e.g., learning from humanities can inform learning in another discipline). {See also: Identifying Connections under Analysis.}

Planning
The organization of ideas, steps, etc. for guiding future events. See also, Causal Modeling.
Related terms include design, projecting, scheduling, logistics, etc.

Prediction
Prediction has to do with using often incomplete data to determine future events. Prediction often utilizes causal modeling, analysis, evaluation, decision making, etc.

Related terms include forecasting.

Reasoning
This term is a very large construct that includes much of what is in this entire document. As such, reasoning could fit under many of the headings. Reasoning can be limited to inductive or deductive thought. Or, it could be expanded to include any sort of deep thinking or “thinking through” something that begins with such things as examining assumptions or identifying perspectives then ends with such things as explanations, justifications, or predictions. The end product of reasoning could be a conclusion or position; but could also look much like making a decision or solving a problem.

Reasoning is placed here underneath Inference because we will use a specific definition based on the use of logic for considering issues. Inductive reasoning (making general conclusions from specific evidence or deveining principles from facts) as well as deductive reasoning (moving from general to specific or principle to instantiation) are both fair game.

5. Explanation
Now it is time in the critical thinking process to communicate all that has come before. Thinkers must organize their thoughts and feelings in ways that illustrates their thinking and communicates their meaning. The thinking behind the resulting narrative, report, picture, or other representation is what matters here.

Related terms may include clarification, description, portrayal, excerpting (or abstracting) information, etc.

Caution: The point to this last sub-skill is the ability to communicate well. All of the previously listed sub-skills are separate and distinct in that there might be strong explanation yet faulty reasoning involved. Thus this sub-skill has more to do with how well a narrative is written than what it is saying. When measuring this sub-skill ensure that graders understand the difference between the traits of good explanation versus what is good about the previous sub-skills discussed earlier in this document. So why is this still considered critical thinking? Let’s take writing traits as an example. Traits include such things as Consideration of Audience, Content Development, Use of Evidence, etc. Clearly, the writer must do a fair bit of critical thinking to succeed with these traits. Therefore we recommend using both pure critical thinking measures for the sub-skills discussed earlier as well as trait measures showing how well the narrative or other submission communicated.
To present in a cogent and coherent way the results of one’s reasoning. This includes stating and justifying the 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 (Facione 2011).

**Sub-skills and Related Terms**
- Abstraction
- Argumentation
- Integration
- Justify Procedures (based on evidence)
- Present Arguments
- State Results
- Summarization
- Synthesis

**Bolded** terms are consistent with the Delphi study of critical thinking.

**Argumentation**

The term argument is most often defined as the ability to construct reasons for a position or to support a conclusion. In writing, the term *argument* may relate to the ability to persuasively explain a point of view, position, decision, etc. Like most of the other terms related to critical thinking, it is similar, a part of, or a superset to terms like logical reasoning, mathematical proofs, analysis, evaluation, prioritization, organization, justification, explanation, prediction, presentation of evidence, use of examples, etc.

**Synthesis**

Organizing, assembling, or otherwise combining variables, issues, etc. into a coherent whole.

**6. Metacognition for Self-regulation**

This skill is not a linear step in the critical thinking path. Rather, it is a special form of critical thinking that is related, but uses different sorts of thinking and has different goals.

To self-consciously monitor and control one’s own 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 (Facione 2011).

**Sub-skills and Related Terms**
- **Self-monitoring**
- Reflection
- **Self-correction**

**Bolded** terms are consistent with the Delphi study of critical thinking.

This is another large construct with various definitions. The construct has been defined as thinking about thinking (*thinking about thinking* and *self-awareness*), thinking about personal knowledge and learning (*knowing about knowing* and *epistemic awareness*) and stepping outside automatic thoughts and actions to monitor and regulate thinking/learning (*executive management* and *control of cognition*).
Related terms include self-directed or intentional learner, reflective professional, reflective judgment, etc.

Caution: Any one of the three definitions listed above denotes a very large and multifaceted construct. For example, reflection is made up of several components and can even be seen as a large process versus a type of thinking. Self-monitoring and self-correction each contain several smaller steps that each have levels of skill involved and assume a goodly portion of discipline-based knowledge to pull off. Therefore, measuring any of these sub-skills can quickly expand beyond practical limits. Unless the ultimate goal of grading is one of these three constructs, (for example, a measure of a student’s reflection) I recommend using a brief and limited operational definition for measuring these sub-skills.

Reflection

In nearly every discipline, reflection involves some sort of retrospection or self-evaluation of actions, biases, assumptions, beliefs, feelings, or, of recently completed events, products, or processes. These are often a part of a portfolio. In almost every use of the term, reflection involves looking back at symptoms or outcomes as opposed to making predictions. Depending on the discipline, reflection can be a broad construct that encompasses many of the terms listed in this document or can describe a prescribed mental process. In many academic disciplines, reflection is limited to a product – often written – in which students describe their reasoning, judgments, feelings, evaluations, etc. In a few disciplines reflection is defined even more narrowly as a search for truth or social justice. However, some believe truth seeking is an outcome or purpose for critical thinking.
Appendix C: Examples of Critical Thinking Skills

This list is taken directly from a useful study of critical thinking.


Predisposing Factors for Critical Thinking

1. Knows that opinions vary in quality, with good opinions supported by reasons
2. Intellectual honesty
3. Skeptical
4. Fair-minded
5. Respects clarity and precision
6. Demands justification
7. Reflective cognitive style
8. Persistence (some people opt not to begin the thinking process)
9. Ability to “break set”
10. Having incremental (as opposed to an entity) view of intelligence
11. Willing to suspend judgment and gather more information
12. Aware of own gaps in knowledge
13. Concern for accuracy
14. Maintains an open attitude
15. Adaptability
16. Objectivity
17. Cognitive flexibility to detach reasoning from prior knowledge
18. Desire for knowledge even if it undermines own cause
19. Open-mindedness—tolerance for other views
20. Analyticity—anticipate consequences
21. Confidence in own reasoning skills
22. Intellectual curiosity—eagerness to learn even when knowledge is not immediately useful
23. Cautious in making judgments

Interpretation Skills

1. Recognize gist in material
2. Break goal into sub-goals
3. Strip verbal argument of irrelevancies and rephrase it in essential terms
4. Extract meaning from context
5. Understand contextual nuances
6. Frame the message
7. Probe question or problem to obtain clarifying information
8. Question deeply
9. Redefine problem and goal
10. Seek clear statement of the question
11. Understand intended definition of certain words
12. Discern when a term is used with different meanings
13. Recognize need for operational definition
14. Identify and challenge assumptions
15. Identify unstated assumption in a discussion
16. Identify missing information from an argument
17. Identify premises and conclusions
18. Identify missing premises
19. Analyze ambiguities in arguments
20. Critique to distinguish reliable from unreliable assumptions
21. Distinguish fact/opinion/assumption elements in an argument
22. Distinguish relevant from irrelevant information
23. Examine evidence to distinguish anecdote from fact
24. Determine whether a statement is overly vague or overly specific
25. Identify own assumptions

**Reasoning Skills**

1. Understand limits of extrapolation
2. Reason by finding analogous arguments to bolster conclusion
3. Refine generalizations and avoid oversimplification
4. Apply general principles to specific cases
5. Generalize from specific instances to broader classes
6. Determine whether a simple generalization is warranted
7. Draw inductive inference from observations
8. Reason by taking representative samples
9. Distinguish between deductive and inductive reasoning
10. Reason by deductive logic to draw conclusions from premises
11. Reason dialogically to identify and compare perspectives
12. Reason dialectically to evaluate points of view
13. Trace logic in an argument
14. Determine whether a statement follows from premises
15. Distinguish between logically valid and invalid inferences
16. Check consistency of information in the problem
17. Avoid ad hominem reasoning fallacy (consider argument not the person)
18. Avoid false dichotomy reasoning fallacy (artificially reduce the number of choices)
19. Avoid guilt by association reasoning fallacy
20. Avoid emotional appeal reasoning fallacy
21. Identify instances of faulty thinking
22. Mentally simulate plans to see if they achieve goals
23. Mentally generate a structure of possibilities that presently don’t exist
24. Mentally simulate probable consequences of alternative
25. Develop and use mental models
26. Recognize bias in hindsight analysis
27. Reason from starting point with which one disagrees
28. Recognize fallibility of own
Assessment Skills
1. Know value and cost of information, how and when to seek it
2. Know when new information supports/refutes conclusion
3. Consider new evidence as it becomes available
4. Weigh multiple factors when necessary
5. Perform means-ends analysis to check status
6. Support general assertions with details
7. Frame decision in alternative ways
8. Assess an assertion’s truthfulness based on accuracy of relevant facts
9. Assess an assertion’s truthfulness based on its degree of precision
10. Assess an assertion’s truthfulness based on presence of unbiased evidence
11. Assess an assertion’s truthfulness based on having credible sources
12. Assess an assertion’s truthfulness based on its logical consistency
13. Assess an observation’s credibility based on short time between observation and report
14. Assess an observation’s credibility based on first-hand report by observer
15. Assess an observation’s credibility based on minimal interference
16. Assess an observation’s credibility based on reporter’s belief that observation was accurate
17. Assess an observation’s credibility based on corroboration by other sources
18. Assess credibility of information source based on author’s reputation for accuracy
19. Assess credibility of information source based on being in author’s field of expertise
20. Assess credibility of information source based on absence of conflict of interest
21. Assess credibility of information source based on known risk to author’s reputation
22. Assess credibility of information source based on data-gathering and processing methods
23. Assess credibility of information source based on agreement with other sources
24. Assess strength of conclusion based on reasonableness of assumptions
25. Assess strength of conclusion based on consistency with known facts
26. Assess strength of conclusion based on alternatives are inconsistent with known facts
27. Assess strength of conclusion based on its ability to explain the evidence
28. Assess strength of argument based on clarity of meaning
29. Assess strength of argument based on identity of stated and unstated conclusions
30. Assess strength of argument based on identity of premises supporting conclusions
31. Assess strength of argument based on identity of unstated assumptions
32. Assess strength of argument based on reliability and reasonableness of inferences

Meta-Cognitive Skills
1. Look beyond first obvious explanation to consider alternative interpretations
2. Identify the need to think hard
3. Develop perspective to explore the implications of beliefs, arguments, or theories
4. Ask questions and be willing to ponder (e.g., use scientific method)
5. Generate summaries
6. Generate alternative explanations
7. Generate multiple ideas
8. Adopt multiple perspectives
9. Consider multiple sides of an issue
10. Stay relevant to the main point
11. Take total situation into account
12. Monitor events for consistency with expectations
13. Monitor own understanding of problem
14. Compare analogous situations
Appendix D: Examples of Critical Thinking Question Stems

The best questions in education go beyond asking a fact or definition. The following table is organized by major thinking categories in column one. In column two I’ve included question stems for classroom discussions or in your assignments.

<table>
<thead>
<tr>
<th>Critical Thinking Framework Categories</th>
<th>Question Stems</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>{Each stem contains lead-in words and blanks for you to fill in. Some stems contain multiple options separated by a slash (/). In these cases, select the word or words that best fit your needs}</td>
</tr>
</tbody>
</table>

1. Interpretation
   The primary definition of interpretation is the act of making sense of various inputs. Interpretation requires that we clarify the context, purpose, issue, problem/question, meaning, etc.

   **Why Am I Here Today**
   - What is your purpose / goal / objective for ________?
   - What are the problems / conflicts / issues ________?
   - What questions would you ask of ________?
   - What constraints might limit ________?
   - What guiding question / hypothesis will you use to ________?

   **Situation**
   - What assumptions exist that might influence ________?
   - What contextual factors are influencing ________?
   - What points of view / perspectives are influencing ________?
   - What biases are present in ________?

   **Just the Facts Ma’am**
   - Who ________?
   - What is (are) ________?
   - When ________?
   - Where ________?
   - Why ________?
   - How ________?

   **Clarifying Meaning**
   - What confusing or otherwise ambiguous information exists in ________?
   - What additional resources are needed to clarify ________?
   - How would you translate / convert ________ into ________?
   - What research process will you use to ________?

2. Analysis
   Analysis means to break down, examine, or otherwise explore the issues, available information, arguments, etc. With analysis, we must manipulate, process, or otherwise make active changes to the inputs to make better sense of them.

   **Break It Down**
   - What are the parts / features / functions / processes of ________?
   - What is the theme / thesis / central message / argument in ________?
   - What patterns exist in the ________?
   - What inconsistencies are present in ________?

   **Categorization for Clarity**
   - What categories would help us better understand ________?
   - How would you categorize / classify / group / order ________?
   - What patterns can you find in ________?

   **Cause, Effect, and Connections**
   - What are the reasons / results of ________?
   - What are the causes / effects of ________?
3. Evaluation
To evaluate means to determine the merit, value, efficacy, advantages, worth, authenticity, validity, impact, or significance, of something (e.g., the evidence, claims, assumptions, biases, arguments, perspectives, etc.)

Preparing for the Evaluation
What criteria will you use to determine ________?
How will you know if ________?
How will you verify ________?

Evaluation Based on Standards External to the Student
Is / are ________ Accurate?
- Capable?
- Clear?
- Complex?
- Comprehensive?
- Creative?
- Diverse?
- Effective?
- Fair?
- Honest?
- Influential?
- Logical?
- Precise?
- Relevant?
- Significant?
- Sufficient?
- Valuable?

These pertain to any sort of evaluation (e.g., of an argument, claim, data, source material, document, illustration, idea, opinion etc.)

Evaluation Based On Opinion
Do you think ________ is a good or a bad thing?
What is your opinion of ________?
Do you agree or disagree with ________?
How would you feel if ________?
What should or should not happen if ________?
What are the pros or cons of ________?

4. Inference
This broad term covers reasoning coupled with the use of evidence and standards that together are necessary for coming to a conclusion, making decisions, identifying alternatives,

Procedural Knowledge
How could / would you ________?

Prediction
Could this have happened in ________?
If ________ had happened, then what would be different?
What does the ________ theory predict will happen if ________?
What might occur if ________?
What would you do if ________?

Diagnosis

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| generalizing, planning, predicting, etc. | What caused ________?  
What are the reasons for ________?  
Why did ________ happen?  
Why did ________ changes occur?  
Why did ________ choose ________?  
Under what conditions would ________ occur?  
Why is it NOT possible for ________? |
| Planning & Prioritization | How would you plan to ________?  
If you had access to all resources how would you deal with ________?  
What is the most important ________? |
| Conclusions, Decisions | What would you select ________?  
What conclusions can you draw from ________?  
What are the possible solutions/ resolutions to ________?  
Are there alternatives to ________?  
How would you have handled ________?  
What approach would you use to ________?  
What could be done to minimize (maximize) ________?  
What inference can you make ________?  
What generalizations could you make about ________? |
| Recommendations | What would you recommend ________?  
What changes to ________ would you recommend?  
What ________ would you change if ________?  
Is there a better solution to ________? |
| 5. Explanation (Communication) | Communicate the outcomes of thinking such as stating results, justifying procedures, explaining meaning, presenting arguments, etc. This is considered CT because of the mental processes involved in designing a well-written (or spoken) message. |
| Justification and Use of Evidence | What data was used to ________?  
What information would you use to support ________?  
Which facts / information / ideas justify ________?  
Why do you think ________?  
How could you defend the ________?  
Why was ________ better than ________?  
What examples can you find of ________? |
| Application | (Show that the student can do x – this requires an inferential leap on the part of the faculty members who score student projects.)  
Use the information to ________.
Apply the ________ to ________.
Argue ________.  
Construct a ________ that would ________.  
Create new uses for ________.  
Describe / explain / clarify ________.  
Provide examples of ________.  
Summarize ________.  
Synthesize / distill down the information to ________. |
### 6. Self-regulation (Metacognition)
During all of the above (and sometimes following the thinking as well), reflect, self-examine, pose questions about thinking, self-correct, etc.

<table>
<thead>
<tr>
<th><strong>Before (Executive Control)</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>What do you need to accomplish today?</td>
<td></td>
</tr>
<tr>
<td>Why are you doing this?</td>
<td></td>
</tr>
<tr>
<td>How does this information relate to what you already know?</td>
<td></td>
</tr>
<tr>
<td>What assumptions or prejudices, or other thoughts might be influencing you?</td>
<td></td>
</tr>
<tr>
<td>What strategy should you use?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>During (Self-monitoring)</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>How well are you doing?</td>
<td></td>
</tr>
<tr>
<td>What are you sure you know / don’t know?</td>
<td></td>
</tr>
<tr>
<td>What do you still need to do?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>After (Self-correction)</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>How would you rate your efforts?</td>
<td></td>
</tr>
<tr>
<td>What could you do better next time?</td>
<td></td>
</tr>
<tr>
<td>What do you need to learn / change to do better next time?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Look Back (Reflection)</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>What progress have you made?</td>
<td></td>
</tr>
<tr>
<td>How have you changed in your thinking /understanding /competence?</td>
<td></td>
</tr>
<tr>
<td>How does this information relate to other courses you have taken?</td>
<td></td>
</tr>
<tr>
<td>How could you apply what you have learned to upcoming courses or to life in general?</td>
<td></td>
</tr>
</tbody>
</table>

### Reference Notes
Similar tables of question stems can be found throughout the literature and online. A Google search using the terms “Question Stems” will result in over 100K hits. We acknowledge the many efforts that helped us brainstorm our list. A good discussion of the use of these sorts of stems can be found in the following article.

Appendix E: Signature Assignment Examples

None yet.

Please send exemplars to tom.zane@slcc.edu
Appendix F: Definitions and Examples of Completed Rubric Rows

A Microsoft Word Version of this document is available to make it easier to cut and paste your rubric.

1. Interpretation

The primary definition of interpretation is the act of making sense of various inputs. The inputs may include such things as arguments, evidence, statements, ideas, concepts, graphics, pictures, questions, problems, situations, beliefs, etc. For example, at a very simple level, the ability to read and understand a text would be a form of interpretation. At a more complex level, the ability to interpret the message of a political cartoon would also qualify as interpretation.

Cautions:

- Interpretation is very similar to analysis in many ways. Both deal with making meaning of various inputs. But interpretation is making sense of what is given while analysis suggests the brain manipulate, process, or otherwise make active changes to the inputs to make better sense of the materials.
- Interpretation does have other meanings related to outputs – and these will be handled in the communications section later on. For some, it is the artist’s ability to place a personal touch to a piece. Still others see interpretation as a production task in writing where the writer’s approach and framing illustrate their thoughts about the subject at hand. To avoid confusion, we will not use either of these definitions as a part of interpretation. Instead, both of these production definitions will fall under communication instead.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Well Below Expectations 1</th>
<th>Below Expectations 2</th>
<th>Meets Expectations 3</th>
<th>Exceeds Expectations 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clarifying Questions - Construction</td>
<td>Omits key questions to guide efforts.</td>
<td>Includes key questions to guide efforts.</td>
<td>Defines key questions to guide efforts.</td>
<td>Clarifies key questions to guide efforts.</td>
</tr>
<tr>
<td>Clarifying Understanding</td>
<td>Does not raise key issues.</td>
<td>Mentions key issues.</td>
<td>Describes key issues.</td>
<td>Examines / explains key issues.</td>
</tr>
<tr>
<td>Differentiation</td>
<td>Identifies various elements/issues/ideas/etc.</td>
<td>Describes characteristics of various elements/issues/ideas/etc.</td>
<td>Differentiates between elements/issues/ideas/etc. (usually with large or common characteristics)</td>
<td>Distinguishes between and among elements/issues/ideas/etc. (usually with finer distinctions)</td>
</tr>
<tr>
<td>Comprehension</td>
<td>Misunderstands the situation/material.</td>
<td>Follows the basics/gist of the information in the situation/material.</td>
<td>Comprehends the important elements found in the situation/material.</td>
<td>Deeply understands the nuances found in the situation/material.</td>
</tr>
<tr>
<td>Critical Research</td>
<td>Misses key source materials.</td>
<td>Records /cites the content found in source materials.</td>
<td>Describes /defines the content of source materials.</td>
<td>Critiques the content of source materials.</td>
</tr>
<tr>
<td>Critical Reading</td>
<td>Overlooks</td>
<td>Identifies some</td>
<td>Describes /defines</td>
<td>Explains /counters</td>
</tr>
<tr>
<td>Use of Quotes</td>
<td>Use of Quotes</td>
<td>Use of Quotes</td>
<td>Use of Quotes</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>--------------</td>
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<td></td>
</tr>
<tr>
<td><strong>Restates</strong> the speech/document/etc.</td>
<td><strong>Paraphrases</strong> the speech/document/etc.</td>
<td><strong>Describes</strong> pertinent quotes from the speech/document/etc.</td>
<td><strong>Interprets</strong> the meaning of the speech/document/etc.</td>
<td></td>
</tr>
<tr>
<td><strong>Finding Relationships And Patterns</strong></td>
<td><strong>Finding Relationships And Patterns</strong></td>
<td><strong>Finding Relationships And Patterns</strong></td>
<td><strong>Finding Relationships And Patterns</strong></td>
<td></td>
</tr>
<tr>
<td>Does not identify any patterns in the data or information.</td>
<td>Mentions a potential main pattern running through the data or information.</td>
<td>Summarizes the main pattern running through the data or information.</td>
<td>Explores patterns running through the data by explaining the patterns and/or sub-patterns.</td>
<td></td>
</tr>
<tr>
<td><strong>Finding Significance</strong></td>
<td><strong>Finding Significance</strong></td>
<td><strong>Finding Significance</strong></td>
<td><strong>Finding Significance</strong></td>
<td></td>
</tr>
<tr>
<td>Ignores or misrepresents the meaning of the information.</td>
<td>Identifies potential meanings of the information.</td>
<td>Describes the meaning of the information.</td>
<td>Scrutinizes the meaning of the information.</td>
<td></td>
</tr>
</tbody>
</table>
2. Analysis

The most common definition of analysis is the act of breaking a complex construct, situation, or other entity into component parts to aid understanding. However, analysis is an enormous construct that comes in many forms when it is connected to reading, viewing, or listening (inputs) such as recognizing relationships, listing constraints and assumptions, finding ideas within a work, considering diverse perspectives, identifying implications or consequences, discriminating, etc. Analysis is often paired with other skills such as evaluation and judgment to aid deconstruction.

Related terms may include such things as consideration, investigation, looking deeply at issues, comparing, contrasting, reasoning, and many others.

Note: Analysis is similar to interpretation and evaluation in terms of some of the thinking patterns involved. However, analysis goes beyond interpretation by working with materials to improve sense making and stops short of evaluation in that the thinker does not yet place value or render judgments about the materials at hand. Although our thinking is actually not this linear, think of analysis for our purposes as sandwiched between understanding material (inputs) and assessing or making value judgments about the material.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Well Below Expectations 1</th>
<th>Below Expectations 2</th>
<th>Meets Expectations 3</th>
<th>Exceeds Expectations 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Categorization</td>
<td>Does not organize information.</td>
<td>Lists information.</td>
<td>Categorizes information into meaningful groups.</td>
<td>Explores ways to categorize information to improve meaning.</td>
</tr>
<tr>
<td>Consider Assumptions (Personal And Others’)</td>
<td>Does not identify assumptions.</td>
<td>Identifies assumptions.</td>
<td>Questions the validity of assumptions</td>
<td>Validates /debunks assumptions.</td>
</tr>
<tr>
<td>Consideration</td>
<td>Accepts the ____</td>
<td>Questions the ____</td>
<td>Considers the ____</td>
<td>Examines the ____</td>
</tr>
<tr>
<td>Consider Diverse Perspectives</td>
<td>Does not identify various perspectives.</td>
<td>Identifies various perspectives</td>
<td>Describes various perspectives.</td>
<td>Scrutinizes various perspectives.</td>
</tr>
<tr>
<td>Consider Conflicting Opinions and Points of View.</td>
<td>Does not identify conflicting opinions about the issue.</td>
<td>Identifies conflicting opinions about the issue.</td>
<td>Explains both sides of the issue.</td>
<td>Impartially explores the issue.</td>
</tr>
<tr>
<td>Points of View</td>
<td>Expresses personal bias in presentation of viewpoints.</td>
<td>Presents one viewpoint in support of own position.</td>
<td>Uses a neutral approach to identify pro and con viewpoints.</td>
<td>Objectively examines each stakeholder’s viewpoint focusing especially on own biases.</td>
</tr>
<tr>
<td>Analysis</td>
<td>Itemizes the ____</td>
<td>Breaks Down the ____</td>
<td>Analyzes the ____</td>
<td>Examines the ____</td>
</tr>
<tr>
<td>Comparison and Contrast</td>
<td>Identifies some points for comparison.</td>
<td>Compares OR contrasts common or basic points /issues / etc.</td>
<td>Compares AND Contrasts meaningful points /issues / etc.</td>
<td>Interprets the meaning of critical points / issues / etc. for comparison and contrast.</td>
</tr>
<tr>
<td>--------------------------</td>
<td>----------------------------------------</td>
<td>-----------------------------------------------------------</td>
<td>--------------------------------------------------------</td>
<td>-----------------------------------------------------------------</td>
</tr>
<tr>
<td>Information Selection</td>
<td>Briefly mentions some facts or data.</td>
<td>Recounts /cites data /facts.</td>
<td>Filters the data /facts to find useful information.</td>
<td>Selects and organizes data /facts to support the thesis /argument /etc.</td>
</tr>
<tr>
<td>Examination /Experimentation</td>
<td>Looks at the _____.</td>
<td>Probes the _____.</td>
<td>Examines the _____.</td>
<td>Experiments with the _____.</td>
</tr>
</tbody>
</table>

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3. Evaluation

Evaluation is the skill of determining merit, efficacy, advantages, worth, authenticity, validity, impact, or significance, of something (e.g., evidence, sources, assumptions, etc.).

Related terms include assessment, criteria construction, and judgment.

Cautions:

- Some disciplines consider the evaluation of source materials as a wholly different construct and place the skill within information literacy rather than critical thinking. We will allow it to be placed here.
- Evaluation normally leads to rating, value statements, and decision making. But those outcomes of evaluation will be handled later under the Inference section.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Well Below Expectations 1</th>
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<th>Meets Expectations 3</th>
<th>Exceeds Expectations 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assess or Judge Based on Standards</td>
<td>Misinterprets ____</td>
<td>Accepts ____ at face value.</td>
<td>Makes some judgments about ____</td>
<td>States and uses standards to examine ____</td>
</tr>
<tr>
<td>Rigor</td>
<td>Lists some of the facts/issues/ideas/etc.</td>
<td>Defines the facts/issues/ideas/etc.</td>
<td>Checks /Verifies /Corroborates the facts/issues/ideas/etc.</td>
<td>Validates / Defends /Argues /Debunks the facts/issues/ideas/etc.</td>
</tr>
<tr>
<td>Degree of Consideration</td>
<td>Defines the items/options/ideas/etc.</td>
<td>Suggests the value of items/options/ideas/etc.</td>
<td>Ranks / Rates the items/options/ideas/etc.</td>
<td>Critiques the items/options/ideas/etc.</td>
</tr>
<tr>
<td>Evaluation</td>
<td>States the credibility/quality/relevance/etc. of ____</td>
<td>Describes the credibility/quality/relevance/etc. of ____</td>
<td>Explains the credibility/quality/relevance/etc. of ____</td>
<td>Explains the credibility/quality/relevance/etc. of ____</td>
</tr>
<tr>
<td>Assess Data or Source Materials</td>
<td>Ignores the validity of data or source materials.</td>
<td>Recognizes the validity of data or source materials.</td>
<td>Determines /assesses the validity of data or source materials.</td>
<td>Explains the potential effects of the validity of data or other source material.</td>
</tr>
<tr>
<td>Use of Standards and Criteria</td>
<td>Does not use criteria or use invalid criteria for making judgments.</td>
<td>Identifies criteria used for making judgments.</td>
<td>Defines the criteria and reasoning used to make judgments.</td>
<td>Applies relevant criteria to the problem or issue.</td>
</tr>
<tr>
<td>Judgment</td>
<td>Guesses or restates others’ judgments about the value/merit/efficacy of ____</td>
<td>States a judgment about the value/merit/efficacy of ____</td>
<td>Determines the value/merit/efficacy of ____</td>
<td>Explains the reasons for a given value judgment about ____</td>
</tr>
<tr>
<td>Suspend or Delay Judgment</td>
<td>Rushes to make a judgment/decision/conclusion.</td>
<td>Applies some facts/information/data to making a judgment.</td>
<td>Uses sufficient facts/information/data for making a judgment.</td>
<td>Suspends judgment until all available facts/information/data are available.</td>
</tr>
<tr>
<td>Depth of Reasoning</td>
<td>Makes a quick decision based on opinion or other means.</td>
<td>Decides between options based on some information.</td>
<td>Discriminates between/among options before making a decision.</td>
<td>Appraises the options at length to make a more informed decision.</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------------------------------------------</td>
<td>--------------------------------------------------</td>
<td>-------------------------------------------------------------</td>
<td>------------------------------------------------------------------</td>
</tr>
<tr>
<td>Testing</td>
<td>Estimates the _____.</td>
<td>Calculates the _____.</td>
<td>Tests the _____.</td>
<td>Evaluates the _____.</td>
</tr>
<tr>
<td>Adjusting/Calibrating</td>
<td>Reads the _____.</td>
<td>Tests the _____.</td>
<td>Adjusts the _____.</td>
<td>Calibrates the _____.</td>
</tr>
<tr>
<td>Determine Priorities or Probabilities</td>
<td>Offer outcomes without determining their probability.</td>
<td>Identify probable outcomes.</td>
<td>Distinguish between probable and improbable outcomes.</td>
<td>Explain why some outcomes are more probable than others.</td>
</tr>
</tbody>
</table>
4. Inference

**Hint:** You may want/need to select two rows from this, the largest of the six part of the critical thinking framework.

Inference is easily and specifically defined as coming to a conclusion, or making decisions, deductions, assumptions, etc., based on the evidence at hand. This sub-skill represents the result of critical thinking. While easily defined, many sub-skills are necessarily involved that go beyond such things as analysis and evaluation.

There are more specific meanings to inference in some disciplines such as statistics, where assumptions about a population are made from a small sample of evidence or in various sciences where hypothesis testing is necessary.

*Related terms* include confirmation, deduction, determining implications, identifying potential consequences, inquiry, supposition, etc.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Well Below Expectations 1</th>
<th>Below Expectations 2</th>
<th>Meets Expectations 3</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Framing Assumptions</strong></td>
<td>Jumps directly to an answer for the problem.</td>
<td>Identifies the assumptions at work in a given problem.</td>
<td>Addresses the framing assumptions around a problem when dealing with an issue.</td>
<td>Reframes the problem to yield new perspectives on the issue.</td>
</tr>
<tr>
<td><strong>Inquiry</strong></td>
<td>Attempts to generate a hypothesis.</td>
<td>States a valid hypothesis.</td>
<td>Adequately tests a hypothesis.</td>
<td>Interprets the meaning and implications of test results for a hypothesis.</td>
</tr>
<tr>
<td><strong>Conjecturing Alternatives</strong></td>
<td>Does not list any valid alternatives.</td>
<td>Lists some alternatives but some may not be valid.</td>
<td>Considers valid alternatives.</td>
<td>Discovers unique alternatives</td>
</tr>
<tr>
<td><strong>Decision Making</strong></td>
<td>Does not make a decision.</td>
<td>Mentions decisions.</td>
<td>Makes some supporting comments for decisions.</td>
<td>Justifies decisions.</td>
</tr>
<tr>
<td><strong>Decision Making Based On Evidence</strong></td>
<td>Does not mention evidence for making decisions.</td>
<td>Mentions evidence for making decisions.</td>
<td>Explains evidence for making decisions.</td>
<td>Examines evidence for making decisions.</td>
</tr>
<tr>
<td><strong>Decision Making Based On Support</strong></td>
<td>Does not make a decision.</td>
<td>Makes a decision but does not provide backing.</td>
<td>Makes and supports a good decision.</td>
<td>Justifies why a given decision is the best.</td>
</tr>
<tr>
<td><strong>Making Connections</strong></td>
<td>Suggests connections between ____.</td>
<td>Makes some connections between ____.</td>
<td>Reasons / hypothesizes appropriate connections between _____.</td>
<td>Authenticates / theorizes connections between _____.</td>
</tr>
<tr>
<td><strong>Cause and Effect Relationships</strong></td>
<td>Does not state (or misstates) the cause and effect relationship.</td>
<td>Defines the cause and effect relationship.</td>
<td>Summarizes the elements of the cause and effect relationship.</td>
<td>Explains the nuances of and/or reasoning for the cause and effect</td>
</tr>
<tr>
<td><strong>Handling Contradictions</strong></td>
<td><strong>Induction</strong></td>
<td><strong>Use Inductive Analysis</strong></td>
<td><strong>Reasoning</strong></td>
<td><strong>Reasoning for or against a position.</strong></td>
</tr>
<tr>
<td>----------------------------</td>
<td>---------------</td>
<td>----------------------------</td>
<td>---------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td><strong>Misses the contradictions in ____</strong></td>
<td><strong>Does not make a logical generalization.</strong></td>
<td><strong>Does not state potential reasons for the event OR makes overgeneralizations about the reasons for the event.</strong></td>
<td><strong>Makes illogical attempts at reasoning.</strong></td>
<td><strong>States a position.</strong></td>
</tr>
<tr>
<td><strong>Identifies the contradictions in ____</strong></td>
<td><strong>Overgeneralizes due to missing evidence or unfounded assumptions.</strong></td>
<td><strong>Suggests potential reasons for the event.</strong></td>
<td><strong>Identifies reasons for position / argument / decision.</strong></td>
<td><strong>Advocates /argues one side of a position.</strong></td>
</tr>
<tr>
<td><strong>Explains the contradictions in ____</strong></td>
<td><strong>Constructs a valid generalization based on evidence.</strong></td>
<td><strong>Summarizes the most likely reasons for the event.</strong></td>
<td><strong>Explains reasons for position / argument / decision.</strong></td>
<td><strong>Defends /challenges a position with reasoning.</strong></td>
</tr>
<tr>
<td><strong>Resolves the contradictions in ____</strong></td>
<td><strong>Clearly articulates the logic of a generalization based on evidence.</strong></td>
<td><strong>Explores and/or prioritizes the reasons for the event.</strong></td>
<td><strong>Justifies reasons for position / argument / decision.</strong></td>
<td><strong>Substantiates / refutes a position with overwhelming reasoning. (Normally using both sides of the position).</strong></td>
</tr>
<tr>
<td>Compromise</td>
<td>Makes a unilateral decision.</td>
<td></td>
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<tr>
<td>--------------------</td>
<td>-------------------------------</td>
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</tr>
<tr>
<td></td>
<td>Attempts to weigh the options before attempting to solve the problem.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Negotiates a decision to solve the problem.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mediates a decision to find an optimal solution to the problem.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Music Development</td>
<td>Assembles a series of notes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Constructs a melody.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Develops a coherent musical piece.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Composes a publishable musical score.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creativity: Imaginative</td>
<td>Copied a solution from the course textbook.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Paraphrased a common or textbook solution.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Developed an uncommon solution that was not in the textbook.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Generated a unique solution that I have not heard before.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creativity: Inventive</td>
<td>Replicated the approach discussed in class.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Used a proven/common approach.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Experimented with an approach that was not previously discussed in class.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Created an unconventional approach that went well beyond the assignment.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creativity: Production</td>
<td>Copies an idea already presented in class or from the textbook.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Generates something similar to previously encountered models.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Creates something unusual.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Invents something completely unique.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Translation</td>
<td>Determines the word equivalents in the target language.</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>Uses some phrases in the target language.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Translates materials/speech/document into the target language.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adapts materials/speech/document into the target language.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5. Explanation Optional Category

Now it is time in the critical thinking process to communicate all that has come before. Thinkers must organize their thoughts and feelings in ways that illustrates their thinking and conveys their meaning. The thinking behind the resulting narrative, report, picture, or other representation is what matters here.

Hint: Many issues found in students’ submissions may have been covered in the previous four categories. Consider whether the thinking needed to communicate well has already been covered. If everything about good communications has already been covered, you don’t need to include anything from this category since it won’t add any information about your students’ thinking.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Audience Consideration</td>
<td>Did not address the audience.</td>
<td>Identified but didn’t communicate with the audience.</td>
<td>Considered the audience.</td>
<td>Influenced the audience OR spoke convincingly to the audience.</td>
</tr>
<tr>
<td>Argument – Description or Elaboration</td>
<td>Makes a nonsensical or vague claim/argument.</td>
<td>Mentions a claim/argument but leaves the reader/listener with questions.</td>
<td>Describes a claim/argument clearly enough to allow the reader/listener to understand the position.</td>
<td>Elaborates a claim/argument clearly enough to allow the reader/listener to appreciate the position.</td>
</tr>
<tr>
<td>Argument – Use of Reasoning or Evidence</td>
<td>States the issues.</td>
<td>Describes the issues.</td>
<td>Argues the issues using sufficient reasoning / evidence / logic / etc.</td>
<td>Expands /expounds on the issues using exemplary reasoning / evidence / logic / etc.</td>
</tr>
<tr>
<td>Illustration</td>
<td>Does not provide information to illustrate the content.</td>
<td>Provides commonly known information to illustrate the content.</td>
<td>Describes information that illustrates the content.</td>
<td>Details important information that fully illustrates the content with material the reader could not personally bring to the text.</td>
</tr>
<tr>
<td>Synthesis</td>
<td>Copied secondary sources to list the combatants’ perspectives.</td>
<td>Paraphrased mainly secondary sources to understand the combatants’ perspectives.</td>
<td>Analyzed primary source materials to understand the combatants’ viewpoints.</td>
<td>Synthesized primary source materials to fully understand the combatants’ viewpoints.</td>
</tr>
<tr>
<td>Organization / Synthesis</td>
<td>Does not identify the disparate parts.</td>
<td>Tells the reader about the main parts.</td>
<td>Organizes the disparate parts to aid the reader.</td>
<td>Synthesizes the disparate parts into a meaningful whole.</td>
</tr>
<tr>
<td>Synthesis</td>
<td>Does not use external information.</td>
<td>Cites or lists information without synthesis.</td>
<td>Summarizes information from various sources.</td>
<td>Synthesizes information to support the story / thesis / work.</td>
</tr>
<tr>
<td>Organization</td>
<td>Ideas are presented</td>
<td>Ideas are present and</td>
<td>Ideas are arranged</td>
<td>Ideas flow smoothly</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th><strong>Critical Thinking With Signature Assignments</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Summarization / Abstraction</strong></td>
</tr>
<tr>
<td>Restates the experiment.</td>
</tr>
<tr>
<td>Organizes information from the experiment.</td>
</tr>
<tr>
<td>Summarizes the experiment.</td>
</tr>
<tr>
<td>Abstracts the main points of the experiment.</td>
</tr>
</tbody>
</table>

**randomly** and/or are not logically linked to each other thus making it almost impossible to follow. **in a generally acceptable order**, but are not connected to each other in a logical way thus making it difficult to follow. **logically and support each other making it possible to follow.** from one to another and are clearly linked to each other making it very easy to follow.
6. Metacognition

This skill is not a linear step in the critical thinking path. Rather, it is a special form of critical thinking that is related, but uses different sorts of thinking and has different goals. Evidence of these skills often appear in student reflections.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Self-Monitoring</td>
<td>Does not mention own shortcomings or errors.</td>
<td>Mentions own shortcomings or errors.</td>
<td>Describes own shortcomings or errors.</td>
<td>Explores own shortcomings or errors.</td>
</tr>
<tr>
<td>Reflection</td>
<td>Overlooks or does not state own thinking.</td>
<td>Mentions thoughts or beliefs.</td>
<td>Describes own thinking.</td>
<td>Examines the quality of own thinking.</td>
</tr>
<tr>
<td>Self-Correction</td>
<td>Does not identify errors.</td>
<td>Identifies errors.</td>
<td>Self-corrects errors.</td>
<td>Scrutinizes errors to determine ways to avoid errors in the future.</td>
</tr>
</tbody>
</table>
Appendix G: Critical Thinking References Reading List

From a literature review of the top 200 articles related to critical thinking, the following five documents were especially helpful and easy to read.

<table>
<thead>
<tr>
<th>Title and Location</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>King, A. (1995). Designing the instructional process to enhance critical thinking across the curriculum. Inquiring minds really do want to know: Using questioning to teach critical thinking. <em>Teaching of Psychology</em>, 22(1), 13-16. Retrieved February 15, 2013 from <a href="http://bama.ua.edu/~sprentic/695%20King%201995.pdf">http://bama.ua.edu/~sprentic/695%20King%201995.pdf</a></td>
<td>This article contains one of the better descriptions of pedagogical practices for encouraging CT in courses. It is simple, straightforward, and most of all, brief.</td>
</tr>
</tbody>
</table>

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### Other Useful Articles

<table>
<thead>
<tr>
<th>Title and Location</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author(s)</td>
<td>Title and Details</td>
</tr>
<tr>
<td>-----------</td>
<td>------------------</td>
</tr>
<tr>
<td>Flateby, T. (2010)</td>
<td>A system for fostering and assessing writing and critical thinking skills. <em>Assessment Update</em>, 22(3), 12-15. This article is an excellent description of why we elected to use analytic rubrics at SLCC.</td>
</tr>
</tbody>
</table>
Section 4: Forms & Templates
### Forms and Templates #1: Critical Thinking Skills Worksheet

Click here for the macro-enabled template. [Web LINK](#)

<table>
<thead>
<tr>
<th>CT Process Framework</th>
<th>Enter at least one skill on each row.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Interpretation</td>
<td></td>
</tr>
<tr>
<td>2. Analysis</td>
<td></td>
</tr>
<tr>
<td>3. Evaluation</td>
<td></td>
</tr>
<tr>
<td>4. Inference</td>
<td></td>
</tr>
<tr>
<td>5. Explanation (Communication)</td>
<td>(Category 5 is only used if skills you value in students’ work are not covered on other rows.)</td>
</tr>
<tr>
<td>6. Self-regulation (Metacognition)</td>
<td>(Category 6 is most commonly related to student reflections.)</td>
</tr>
</tbody>
</table>
Forms and Templates #2: Signature Assignment Planning Template

Click here for the macro-enabled template. [Web LINK]

1. Title: [Provide a unique title for this assignment to help you communicate. Click here to type.]

2. Brief Description: [Briefly describe what you want your students to do and/or to submit. Include the real-world (authentic) situation, type of task to be accomplished, and the sorts of higher-order thinking (analysis, reasoning, critical thinking, etc.) that students will use to complete the task. You don’t need to create step-by-step student instructions yet. Click here to type.]

3. What course learning outcomes will be tested? [Place applicable course learning outcomes here. Click here to type.]

4. Which college-wide outcomes will you score? (Check all that apply.)
   - 1. Substantive Content
   - 2. Communication Literacy
   - 3. Quantitative Literacy
   - 4. Critical Thinking
   - 5. Civic Engagement
   - Others {List below.}

5. What will be graded? [Check all that apply. Be sure to consider the CWSLOs you checked in #4]
   - Process {Quality of the methods used.}
   - Product {Qualities of the artifact (paper, project, etc.) the students submit.}
   - Performance {Quality of delivery – e.g., singing, dance routine, etc.}
   - Personal Trait {Professionalism, Critical Thinker, Good Listener, etc. Caution: These can be relatively difficult to define and measure.}
   - Content {Quality of the discipline-based information presented (e.g., appropriateness, accuracy, etc.)}

6. What are the criteria for success? [List criteria titles for one or more types of criteria listed below.]

<table>
<thead>
<tr>
<th>Type of Criteria</th>
<th>Enter ideas into one or more boxes below.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality: {Compelling ideas, good solution, strong evidence, precise steps, etc.}</td>
<td></td>
</tr>
<tr>
<td>Depth/Breadth: {Complexity of analysis, insightfulness, completeness, etc.}</td>
<td></td>
</tr>
<tr>
<td>Relevance/Adequacy: {Proper execution, correct formula, good teamwork, effective approach, etc.}</td>
<td></td>
</tr>
</tbody>
</table>
Impact: {Outcome of the task – e.g. solved the dilemma, the patient lived, reduced manufacturing costs, etc.}

Accuracy: {Use this type of criteria sparingly.}

7. What resources, research, and/or other materials will the student need to use? [Briefly list here. Click here to type.]

8. How will the assignment be represented in the student’s ePortfolio? [What will the course page look like? What form will the assignment take on the course page? If you have created mock page designs to share with students, paste those URLs here. Click here to type.]

9. What reflection prompts will accompany the signature assignment? [Include at least one reflection prompt. Giving students a choice of reflection prompts is good practice. Click here to type.]
## Forms and Templates #3: Signature Assignment Student Handout Template

Click here for the macro-enabled template. [Web LINK]

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assignment Title:</td>
<td></td>
</tr>
<tr>
<td>2. Unit, Objectives, Competencies, or Outcomes:</td>
<td></td>
</tr>
<tr>
<td>3. Scenario:</td>
<td></td>
</tr>
<tr>
<td>4. Task Description:</td>
<td></td>
</tr>
<tr>
<td>5. Submission Description:</td>
<td></td>
</tr>
<tr>
<td>6. Due Date(s):</td>
<td></td>
</tr>
<tr>
<td>7. Scoring (Grading):</td>
<td></td>
</tr>
<tr>
<td>8. References, Materials, Equipment:</td>
<td></td>
</tr>
</tbody>
</table>
Forms and Templates #4: Signature Assignment Rubric Template

Click Here for the Rubric Template file [Web LINK]

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Well Below Expectations</th>
<th>Below Expectations</th>
<th>Meets Expectations</th>
<th>Exceeds Expectations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interpretation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inference</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explanation (Optional Row)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metacognition</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Critical Thinking References List

For recommended readings see Appendix I: Critical Thinking References Reading List.


Snyder, M. J. (n.d.). Critical thinking: Teaching methods & strategies. This is an outline of ideas, see previous source for full text.


