Critical Thinking

Summary of LEAP Definition: Critical thinking is a habit of mind characterized by the analysis of issues, ideas, artifacts, and events from all relevant perspectives, including reflecting on one's own, before accepting or formulating an opinion or conclusion.

Critical thinking is often described as “thinking outside the box.” But what is the box? How do we help students move outside their "box"? And how do we assess their critical thinking?

Critical thinking is important in education: It helps move students beyond comprehension and acceptance of facts to a more comprehensive understanding of a text, argument, issue, problem, or system as they build confidence and come to challenge what may be the norm.

Among the many definitions across the curriculum, 4 main characteristics emerge:


We are thinking critically when we focus on a particular issue, problem, or system, and ask:

- What is going on here? (Curiosity that leads to Analysis)
- What is already known about this? (Analysis – disciplinary knowledge)
- Why is this important to me? Or not? (Reflection: What do I value?)
- To whom this may also be important? (Analysis: Seeking relevant perspectives)
- To whom this may not be important? (Considering biases and assumptions)
- What can or needs to be done? (Problem-solving)
- Who can help me figure this out? (Seeking credible evidence)
- Which leads to asking,
- What seems to be the best action to take? (Reasoned judgment; ethical reasoning)

Critical Thinking requires Open-mindedness, Discipline, Reasoned Judgment, Metacognition

We are thinking critically when we

- Analyze the issue, problem, or situation
- Seek a variety of viewpoints or perspectives beyond our own
- Remain open to alternative interpretations
- Reflect on our priorities in response to new evidence or ideas
- Do not reject unpopular views out of hand.

In sum, critical thinkers engage:

- Critical thinkers question. They are skeptical.
- Critical thinkers are active. They analyze, ask questions, and seek answers – to try to understand, not just remember to get the “right answer” on a test.
- Critical thinkers are open to new ideas and competing perspectives.
- Critical thinkers are reflective. They are willing to challenge their beliefs, to investigate their way of thinking.

In contrast, unquestioning, passive, closed-minded thinkers take a simplistic view of the world:

- They accept what people in authority over them as “truth” without question.
- They see things in black and white, as either-or, right or wrong, yes or no. (Dichotomies)
- They see no connections and complexities.
- They see no perspective, observation or interpretation but their own.
Critical Thinking

Teaching Critical Thinking

When we can articulate what we want students to do and why, we can plan courses and design assignments that help them move towards becoming critical thinkers who analyze (i.e., critique), question (research proposal), seek credible answers (research project/paper), and reflect on their learning.

Verbs from Bloom's Taxonomy relevant to our discipline:

With the ability to articulate what we want students to know and do, we can articulate Student Learning Outcomes and establish a criteria for assessment and thus develop assignments that help students develop disciplined habits of mind as scholars in our fields.

Summative Assessment: Sequencing assignments and courses
Formative Assessment: Sequencing and scaffolding activities

Grid: Moving from Introducing to Practicing to Reinforcing, from 100- to 400-level courses
WTL Activities & Resources

Writing to Learn activities can happen frequently or infrequently in your class; some can extend over the entire semester; some can be extended to include a wide variety of writing tasks in different formats and to different audiences. More WTL activities:

- The reading journal
- Generic and focused summaries

**Generic and Focused Summaries**: Depending on the level of detail that might be useful for each assignment, have students write out a paragraph or a page of summary for each assigned reading. When collected in a reading journal or learning log, these summaries help students understand readings more fully when they are first assigned and remember them clearly for later tests or synthesis assignments.

You might also consider asking students to do more focused summaries. By providing key questions about the reading, you can help students narrow in on the main ideas you want them to emphasize and remember from a reading.

Or if abstracts are significant in your discipline, you might ask students to analyze the abstracts in a major professional journal and write similar abstracts of the readings they are assigned in the course.

- Annotations
- Response papers
- Synthesis papers
- The discussion starter
- Focusing a discussion
- The learning log
- Analyzing the process
- Problem statement
- Solving real problems
- Pre-test warm-ups
- Using Cases
- Letters
- What counts as a fact?
- Believing and doubting game
- Analysis of events
- Project notebooks
- The writing journal

For more ideas, also see

- **What is Writing in the Disciplines?** [http://wac.colostate.edu/intro/pop2e.cfm](http://wac.colostate.edu/intro/pop2e.cfm)
- **How can I avoid getting lousy student writing?** [http://wac.colostate.edu/intro/pop2h.cfm](http://wac.colostate.edu/intro/pop2h.cfm)
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From The WAC Clearinghouse [http://wac.colostate.edu/intro/pop2d.cfm](http://wac.colostate.edu/intro/pop2d.cfm)
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• Ask students to share WTL activities with one or two classmates.

• Ask students to send the WTL writing that contains questions about course material to you over e-mail.

• Ask students to post provocative questions or summary/analysis of readings on an electronic bulletin board or Web forum for class comment.

  Logistical Tip: Have students use loose-leaf paper, not a spiral bound notebook. Teachers can much more easily pick up single pages to review.

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Teacher Commentary on WTL Activities

• Some advantages of WTL
  Kate Kiefer, Rhetoric and Composition: One major advantage of WTL activities is that they are informal, allowing learner and teacher to concentrate on the content rather than on style. Most teachers assigning WTL activities feel comfortable scanning the results without a red pen in hand.

• Reading journals in chemical engineering
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  Ken Reardon, Chemical Engineering: The other thing I do, other than the poster sessions, is a reading notebook. I pick out relevant journal articles and they critique them. And then they have to say, if I gave them a grant for a lot of money, what would they do next? They have to summarize what the person did, what they did or didn’t like about the conclusions, and what they would do next. This helps them to be critical of everything of the whole paper. At first, they don’t know what to criticize. In what to do next, they shouldn’t just go back and fix what the person didn’t do right the first time.

• The value of abstracting
• Roles of synthesizing
• Using problem-solving examples in classes
• The value of role-playing
• Evidence required in engineering
• Advantages of project notebooks
  Carmen Menoni, Electrical Engineering: Sometimes it’s very difficult to tell students to actually record their observations. It’s something you learn to do it and it’s part of the methodology of working. If you don’t do it, I tell you your memory’s path is very short and you forget. And so you have to get into the habit of writing. But there are some students who don’t want to do it.

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having written documentation dated in a notebook comes in becomes a very big part of the [picture].

Patrick Fitzhorn, Mechanical Engineering: There's one other writing component I forgot to mention. Those are Design Notebooks. Those are real-time compilations related to specific projects. Many companies require engineers to keep Design Notebooks for potential litigation needs or patent concepts to decide who did what when to determine patent things... These are very loose and very fluid. My guess is that if you actually ask engineers who keep these documents on a regular basis, they couldn't live without them. Whenever I start on a project, I start a new notebook. That's my historical record of what I'm doing and where my loose ends are so if I come up with solutions, I can go back and re-read the context that gave me those loose ends, so now I'm back up to speed almost immediately rather than having to rethink the entire project.

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Do I have to be an expert in grammar to assign writing? NO!

Not at all! If you assign WTL tasks, you won't want to mark any grammatical flaws because the writing is designed to be impromptu and informal. If you assign more polished pieces, especially those that adhere to disciplinary conventions, then we suggest putting the burden of proofreading squarely where it belongs—on the writer. Editing should not be your major concern as you introduce students to the discourse of your academic community. Perhaps most important, we encourage teachers to focus their commenting energies and to design a grading sheet to match the criteria outlined on your assignment sheet.

- Don't edit writing to learn
- Make students responsible for polishing their drafts
- Think of yourself first as a reader
- Use peer editing
- Try a time-saving short-cut

A time-saving short-cut

If you feel compelled to mark grammatical and stylistic flaws, work out a shorthand for yourself and give students a handout explaining your marks. Most teachers can get by with one symbol for a sentence that gets derailed or confused, another for faulty punctuation of all sorts, and a third for inaccurate words (spelling or meaning). Save your time and energy for commenting on substance rather than form.

- Sample policies on grading mechanics v. content
- Related Web Sites

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Two favorite quotes:
- How can I know what I think till I see what I say? — E. M. Forster
- If you cannot write well, you cannot think well; if you cannot think well, others will do your thinking for you. — Oscar Wilde.

From The WAC Clearinghouse http://wac.colostate.edu/intro/pop2d.cfm
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Eberly Center for Teaching Excellence, Carnegie Mellon University