
CRITICAL THINKING AND READING

It is one thing to read a text or listen to a lecture, it is quite another thing to understand, relate to, and apply the information. Critical thinking deals with overcoming assumptions. All actions, decisions, and judgments spring from assumptions—if they are unchecked or inappropriate we will make poor decisions and wrong judgments. When we see a commercial, read a text book, or listen to a political debate, it is our job as critical thinkers to weed out the assumptions that are presented to us (or that we ourselves assume) and to make valuable decisions about and improvements upon the subject matter. We must ask ourselves questions like: do these assumptions make sense, do these assumptions fit reality as we understand and live it, under what conditions do these assumptions seem to hold true, and under what conditions do they seem false? Critical thinking is an art that must be developed, fostered, and practiced for it to benefit you.

Remember: the quality of life you live and the way you view the world depends on your quality of thought.

What the ABSENCE of Critical Thinking Looks Like

- We reproduce the damaging reactions we have learned.
- We accept at face value all justifications given by organizations and political leaders.
- We believe TV commercials.
- We accept and say that if the textbook says it, then it must be so.
- We accept and say that if the organization does it, then it must be right.

What the PRESENCE of Critical Thinking Looks Like

- We are contextually sensitive: being sensitive to stereotypes about people from a particular group and trying to accept others at face value unconditionally.
- We practice perspective thinking: trying to get into the other person's head or walking in the other person's shoes in order to see the world as they see it.
- We have a tolerance for ambiguity: ability to accept multiple interpretations of the same situation.

- We are alert to premature ultimatums: invoking a powerful idea or concept which inspires such reverence that any further debate is prevented (example: a politician invokes "democracy").

Characteristics of Critical Thinkers

Truth Seeking: A courageous desire for the best knowledge, even if such knowledge fails to support or undermines one's preconceptions, beliefs, or self interests.

Open-Minded: Tolerance to divergent views, self-monitoring for possible bias.

Analytical: Demanding the application of reason and evidence, alert to problematic situations, inclined to anticipate consequences.

Systematical: Valuing organization, focus, and diligence to approach problems of all levels of complexity.

Self-Confident: Trusting of one's own reasoning skills and seeing oneself as a good thinker.

Inquisitive: Curious and eager to acquire knowledge and learn explanations even when the applications of the knowledge are not immediately apparent.

Cognitively Mature: Prudence in making, suspending, or revising judgment, an awareness that multiple solutions can be acceptable, and an appreciation of the need to reach closure even in the absence of complete knowledge.

Analyzing a Text

No matter what your major is, if an instructor gives you a text to read, be it a handout or a book, it is for a reason. As a chemistry major, you may feel nervous approaching a long philosophical article or book just as an English major would when encountering a calculus exam. In order to get the most out of a text, you must apply your critical thinking skills and decipher *why* you are being asked to read the text and *how* it fits into your course.

<h3><i>Reading to Understand Tips</i></h3>
--

- **Build cohesion among texts.** If you have multiple texts to read, find the common denominator. Ask yourself: what themes or ideas do these texts have in common, how does this particular text fit in to the course, what do the combination of these texts say about the course?
- **Synthesize the texts.** Adjust the way in which you read a text depending on its genre. You wouldn't approach a medical article the same way you would a short story.
- **Go outside the text.** To develop a fuller understanding and augment your knowledge, read what others have said. To start, check the dictionary or wikipedia to give yourself a basis, then explore further.
- **Read selectively.** Use your critical thinking skills to filter the text. Some of the information may be irrelevant depending on the theme or goal of your course. Analyze what is important and how it fits into the course, then sift through the text for what is applicable.

Writing in Your Textbook

One way to analyze a text is to write in it—pull out the key points and definitions so you can read them later without rereading the entire text. You then become an active reader instead of a passive one. I should mention up front that some students refuse to write in their textbooks because it lowers the buyback value. Others find writing in their texts an invaluable learning process. Keep in mind, it would cost you hundreds of dollars to retake the course versus the twenty dollars you “saved” by refraining from writing in your book. You do the math!

The easiest way to write in your books is to follow this format:

1. **In the margins, write down a question(s) based on each heading or chapter title.**
2. **Circle or highlight the answers within the text.**

That’s it! Then when you study, you can cover up the text, read the questions, and find out whether you actually know the material or not.

But just to be thorough, here are lots of tips for you to try…

In-Text Note Taking Tips

- Use your highlighter sparingly! Try using it only for specific purposes like highlighting one word whose definition will follow (not the whole definition). If your entire paragraph is highlighted, it defeats the purpose of being able to obtain valuable information quickly.
- Read the whole page first. Then you can properly determine what is worthy of being noted.
- Use a pen or pencil. Underline what you find important (again use it sparingly) and then write in the margins what it means in your own words.
- Use the margins. These are good for writing the key ideas of the page, questions you may have, summaries, etc.
- Locate all ideas, details, etc. Enumerating them will help you to remember.
- Use various marks—brackets, circles, etc.—but use them consistently (for instance, you may choose to circle all new terms and bracket all examples).

- Write a brief summary. At the end of each section or chapter, write down the main points and ideas in your own words.
- Use the inside front or back covers to keep a running glossary of formulas, terminology, etc. and the page numbers on which they are defined.
- Use post-it notes. For those of you who still refuse to write in your books, write key points on post-it notes and put them in their proper places within your book.

***See following pages for examples.**

Suggestions for Writing in your Text

finger pressing stone = 2 objects; spacecraft in vacuum = 1 object, yet both propelled by 3rd law. WHY?

Newton's Third Law of Motion

Although we commonly talk of single forces, Newton recognized that it was impossible to have just an individual force. Rather, there is a mutual interaction between two objects, and forces always occur in equal and opposite pairs. An example given by Newton was that if you press on a stone with your finger, the finger is also pressed upon by the stone. That is, if one object exerts a force on a second object, the second object exerts a force on the first. This is like saying that you can't touch without being touched.

Newton termed these forces action and reaction, and his third law is commonly expressed:

For every action there is an equal and opposite reaction. Or, alternately, for every force there is an equal and opposite force.

This third law may seem contradictory to the second law, but it is not. The second law is concerned with a force acting on a given body of mass m and it resulting acceleration. The force pair of the third law acts on different bodies. Consider the third law in the familiar context of firing a rifle. When the charge explodes, the bullet is accelerated down the barrel. It is acted upon by a force (an action), as evidenced by its acceleration. The reaction force acts on the rifle and it is accelerated in the opposite direction, which gives rise to the backward recoil or "kick" of the rifle. According to Newton's third law

$$F_{\text{action}} = -F_{\text{reaction}}$$

where the minus sign indicates the opposite direction to the action.

Newton's third law is incorporated in many applications... Exhaust gases from burned fuel are accelerated out the back of rocket and jet aircraft engines, and the rockets and aircraft are accelerated forward by the reactive forces.

*3rd law: $F = -F$
reaction forces propel rockets forward
[kick not equal in all rifles]*

*3rd law
2 objects exert
force on each
other*

*action
force in one
direction
reaction
opposite
direction
equal force*

2nd law

ex.

ex.

1. Questions to bring up in class.
2. Selective underlining.
3. Transition boxed.
4. Main ideas in margin.
5. Specialized vocabulary circled and defined.
6. Examples identified.
7. Summary at end of section.
8. Observation in [].

All significant ideas are noted.

Economical marking enables quick review.

Rome's cultural legacy

(5)

1. *preserve G.K. cult.*

2. *professions*

3. *Latin*

4. *thought (shaped by language)*

5. *ex of Roman Peace*

The Romans have left us a great deal. It is broadly true that in the arts, in literature, in philosophy they were imitators of the Greeks rather than originators. They did preserve much of what the Greeks had done. In law, in engineering, both civil and military, and in architecture what they did was never wholly lost to their European successors. Their language remained for over a thousand years after the fall of the empire the medium for all formal

a culture in the European west; above all it remained
b the lingua franca for the Roman Catholic Church.
c Until only yesterday Latin was an inescapable part of all higher education in the European west. It is
d today embedded in all western tongues, even in German, and most certainly in English, as the carrier of most of our cultural ideas. We think as we do, in part at least, because of the way Caesar, Cicero, and thousands of forgotten Romans thought. And, heirs as we are of four hundred years of nationalistic and religious wars, we can never quite get the example of Roman Peace out of our minds.

Different marks for different purposes.

Really need to learn Latin?!

Margins used for summaries, outlines and comments.