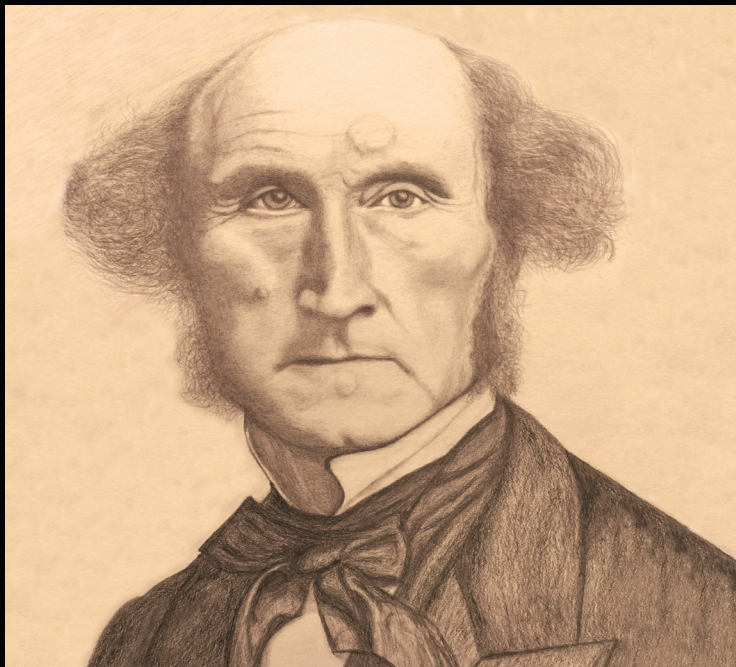


Most... youths who have had knowledge drilled into them, have their mental capacities not strengthened, but overlaid by it. They are crammed with mere facts, and with the opinions or phrases of other people, and these are accepted as a substitute for the power to form opinions of their own. And thus...so often grow up mere parroters of what they have learnt, incapable of using their minds except in the furrows traced for them. Mine, however, was not an education of cram. My father never permitted anything which I learnt to degenerate into a mere exercise of memory. He strove to make the understanding not only go along with every step of the teaching, but if possible, precede it. Anything which could be found out by thinking, I never was told, until I had exhausted my efforts to find it out for myself (p. 45). — JOHN STUART MILL

THE THINKER'S GUIDE for STUDENTS on

HOW TO STUDY & LEARN A DISCIPLINE



By DR. RICHARD PAUL and DR. LINDA ELDER

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Why a Thinker's Guide on How to Study and Learn?

This guide is designed not only for students but also for administrators and faculty, to remind us all of the essence of what it is to study academic subjects with discipline. It does not aim to take the intellectual work out of learning—for this would be an insult to the intelligence of our readers. It contributes, rather, toward making intellectual work and deep learning more manageable, practical, and intuitive. Its goal is to foster lifelong learning and the traditional ideal of a liberally educated mind: a mind that questions, probes, and masters a variety of forms of knowledge, through command of itself, intellectual perseverance, and the tools of learning. It respects equally the traditions of John Henry Newman, Bertrand Russell, and Albert Einstein.

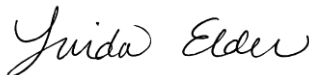
It does not answer all questions, but rather puts all questions into a clear perspective. It emphasizes that all bona fide fields of study share common intellectual structures and standards of reasonability. It emphasizes that foundational intellectual structures and standards of reasonability are worth learning explicitly and in themselves, since they help us more deeply interconnect and understand all that we learn. It also emphasizes foundational intellectual dispositions and values that define the traits of the disciplined thinker in all fields: intellectual autonomy, intellectual humility, intellectual integrity, intellectual perseverance, intellectual empathy, confidence in reason, and fairmindedness. On every page, it honors the idea and power of intellectual work.

It scorns the idea of knowledge as the memorizing of bits and pieces of information, or as the mere accumulation of so many units or institutional credits. It rejects both dogmatic absolutism and intellectual relativism. It warns us of the danger of ignorance and misconception, and by implication, that of self-deception and illusion in human affairs. It emphasizes the importance of contrasting disciplines whose questions are, by and large, answerable in definitive ways, with those whose questions require multiple perspectives, role-playing, and reasoned judgment. It distinguishes, in short, one-system subjects like physics, chemistry, and math (where disagreement between experts plays a minor role) from competing-systems subjects like history, psychology, and art (where expert disagreement plays a major role).

If this thinker's guide is successful, it will serve as a resource to which one can return again and again to garner new depth of meaning and understanding. What is worth learning is worth learning well, and there is nothing better worth learning than the very process of learning itself: the development, through systematic intellectual work of the arts, habits, and strategies, of a DISCIPLINED mind.



Richard Paul
Center for Critical Thinking
2003



Linda Elder
Foundation for Critical Thinking
2003

Forward:

John Stuart Mill as an Exemplar of How to Study and Learn¹

*A pupil from whom nothing is
ever demanded which he cannot do,
never does all he can.*
– John Stuart Mill

The Thinker's Guide on How to Study and Learn is based in the premise that all substantive and useful learning occurs over time, and only through deep long-term commitment to the process. Each of us, teachers and students alike, must work our way to increasingly higher levels of intellectual development. And the level of intellectual development we reach in our lifetimes will be largely determined by our level of commitment to disciplining and directing the native processes of our own minds, using our own free will. Deep and powerful learning results from an abiding passion for learning.

All content is learned, ultimately, through the thinking you do as you work your way to insights and significant understandings. This happens, for instance, when you engage with ideas presented to you in books, articles, websites, and so forth. This engaged reasoning requires willingness on your part, the student, to persevere through the difficulties inherent in developing your complex human mind. It also requires explicit methods and strategies for thinking through content.

For illuminating examples of such methods and strategies, we can turn to John Stuart Mill's *Autobiography*. Mill, a preeminent thinker of the 19th century, enjoyed a rare understanding of the processes involved in disciplining the mind. This was primarily due to his home schooling experience with his father, James Mill, who was himself an important theoretician.

As you work your way through *The Thinker's Guide on How to Study and Learn*, keep in mind the powerful insights offered by Mill (and briefly summarized here). When you can, link the insights you are gaining by using this guide with the insights Mill discovered as a student under the guidance of his father. Note how fundamental, foundational, and in many case simple are these methods. And yet also realize that it is precisely these foundational methods that lead to the highest levels of learning when applied diligently over time.

¹ All quotes in this article are taken from *Autobiography* by John Stuart Mill, first published in 1873. The version used herein was published by Penguin Books, 1989, London, England.

John Stuart Mill, born in London in 1806, was educated throughout his primary and secondary years by his father, James Mill, a leading exponent of “radicalism.” John Stuart Mill became one of the most widely recognized authorities on utilitarianism. His most famous works include *On Liberty*, *Representative Government*, *Utilitarianism*, and *The Subjection of Women*.

In the mid-1850's, Mill wrote his *Autobiography*, and in it we find, among other things, a remarkable story of a father (James Mill) dedicated to the intellectual development of his son. This is evidenced in the methods he used to instruct, guide, and direct John Stuart Mill to ever deeper levels of understanding, insight and knowledge.

James Mill carefully crafted a one-on-one tutorial approach, with emphasis on the development of critical thinking abilities, traits and dispositions. His fundamental purpose was to develop, in his son, a mind in control of itself, ever reaching for the truth.

The methods used by James Mill had a profound and lasting effect on his son, and most specifically on the cultivation of John Mill's intellect. We cannot replicate the early 19th-century world of John Stuart Mill, and few parents and teachers can dedicate such time and energy to the instruction of one pupil alone. Still, as students, you can learn a great deal from studying the methods and effects of James Mill's instruction.

James Mill approached the acquisition of knowledge and insight as an unending, often confusing, messy, uncomfortable process. He recognized substantive learning as a process that entails grounding one's thinking in significant ideas, and connecting important ideas to other important ideas; he understood it as a process of discovery and rediscovery, of application and correction. He recognized the difficulties in bringing ideas into thought and taking ownership of them. He consistently guided (if not drove) his pupil to deeper and deeper levels of understanding.

What follows are excerpts from Mill's *Autobiography* that exemplify and support these conclusions. We believe that the essence of James Mill's methodology is found in the best instruction in all disciplines, at all levels throughout education – having students intellectually engaged, learning command of their own minds as they read, write, discuss, question, and as they think their way into and through important ideas.²

² From this point forward, the name “Mill” will be reserved for John Stuart Mill. When the father is referenced, the name James Mill will be used. Also note that, throughout this forward, some commentary is offered. At other times, the points made by Mill require no comments.

The Instructional Methods of James Mill

Mill begins his autobiography with comments on the extraordinary approach to education taken by his father and the importance, therefore, of documenting the methodology used. Mill says:

in an age in which education, and its improvement, are the subject of more, if not of profounder study than at any former period of English history, it may be useful that there should be some record of an education which was unusual and remarkable, and which...has proved how much more than is commonly supposed may be taught, and well taught...

the common modes of what is called instruction, are little better than wasted.

There may be interest in noting the successive phases of any mind which was always pressing forward, equally ready to learn and to unlearn either from its own thoughts or from those of others (p. 25).

my father, in all his teaching, demanded of me not only the utmost that I could do, but much that I could by no possibility have done (p. 28).

Much of Mill's daily instruction:

consisted in the books I read by myself, and my father's discourses to me, chiefly during our walks...In these walks I always accompanied him, and with my earliest recollections of green fields and wild flowers, is mingled that of the accounts I gave him daily of what I had read the day before. To the best of my remembrance, this was a voluntary rather than a prescribed exercise. I made notes on slips of paper while reading, and from these, in the morning walks, I told the story to him (p. 29).

In these frequent talks about the books I read, he used, as opportunity offered, to give explanations and ideas respecting civilization, government, morality, mental cultivation, which he required me afterward to restate to him in my own words. He also made me read, and give him a verbal account of, many books which would not have interested me sufficiently to induce me to read them of myself...He was fond of putting into my hands books which exhibited men of energy and resource in unusual circumstances, struggling against difficulties and overcoming them...Of children's books, any more than of playthings, I had scarcely any, except, an occasional gift from a relation or acquaintance...It was no part however of my father's system to exclude books of amusement, though he allowed them very sparingly. Of such books he possessed at that time next to none, but he borrowed several for me (p. 30).

Note the instructional processes and patterns used by James Mill, which became routine in the life of Mill from an early age:

1. The student is required to read from a substantive text and then

- give an oral summary of what s/he read.
2. The teacher comments on important ideas connected with the ideas the student has summarized. The student is then required to state in her or his own words the ideas being illuminated by the teacher.
 3. The student is required to read the works of important thinkers s/he would never choose to read, and which guide the student to important traits of mind.

Mill comments on the value of learning through teaching other students:

In my eighth year I commenced learning Latin, in conjunction with a younger sister, to whom I taught it as I went on, and who afterwards repeated the lessons to my father; and from this time, other sisters and brothers being successively added as pupils [Mill had eight siblings], a considerable part of my day's work consisted of this preparatory teaching. It was a part which I greatly disliked; the more so, as I was held responsible for the lessons of my pupils, in almost as full a sense as for my own; I however derived from this discipline the great advantage, of learning more thoroughly and retaining more lastingly the things which I was set to teach: perhaps, too, the practice it afforded in explaining difficulties to others, may even at that age have been useful (p. 31).

Throughout his autobiography, Mill mentions the names of important writers and theoreticians who influenced his development under his father's tutelage. Hence, internalizing the important ideas and understandings of important theoreticians was a primary theme running throughout Mill's education. Mill, for example, comments on being profoundly influenced by the Socratic method, as detailed in the works of Plato:

There is no author to whom my father thought himself more indebted for his own mental culture than Plato, or whom he more frequently recommended to young students. I can bear similar testimony in regard to myself. The Socratic method of which the Platonic dialogues are the chief example, is unsurpassed as a discipline for correcting errors ... The close, searching *elenchus*³ by which the man of vague generalities is constrained either to express his meaning to himself in definite terms, or to confess that he does not know what he is talking about; the perpetual testing of all general statements by particular instances; the siege in form which is laid to the meaning of large abstract terms, by fixing upon some still larger class-name which includes that and more, and dividing down to the thing sought – marking out its limitations and definition by a series of accurately drawn distinctions between it and each of the cognate objects which are successively parted off from it – all this, as an education for precise thinking, is inestimable, and all this, even at that age, took such hold of me that it became

³ "Literally, a pearl or a pearl pendant worn as an earring, but as a technical philosophical term *elenchus* refers to the Socratic method of extracting truth through cross-examination."

part of my own mind (pp. 38-39).

Note in the following passage the intellectual discipline required of Mill, and the importance of the teacher bringing rigor to the learning process (through the rigor of his or her own thought).

My father... commenced instructing me ... by a series of short lectures, which he delivered to me in our walks. He expounded each day a portion of the subject, and I gave him next day a written account of it, which he made me rewrite over and over again until it was clear, precise, and tolerably complete. In this manner I went through the whole extent of the science, and the written outline of it which resulted from my daily *compte rendu*, served him afterwards as notes from which to write his *Elements of Political Economy*. After this I read Ricardo⁴, giving an account daily of what I read, and discussing, in the best manner I could, the collateral points which offered themselves in our progress. On Money, as the most intricate part of the subject, he made me read in the same manner Ricardo's admirable pamphlets, written during what was called the Bullion controversy. To these succeeded Adam Smith; and in this reading it was one of my father's main objects to make me apply to Smith's more superficial view of political economy, the superior lights of Ricardo, and detect what was fallacious in Smith's arguments, or erroneous in any of his conclusions. Such a mode of instruction was excellently calculated to form a thinker; but it required to be worked by a thinker as close and vigorous as my father (p. 43).

Again, as we see from this passage, Mill recognizes the fact that to foster depth and rigor in thinking, teachers must themselves think with rigor and discipline.

This passage also offers a rich example of an effective study method, in which:

1. The teacher routinely and briefly explains an idea of importance to the student.
2. The next day the student is expected to provide a written account of the mini-lecture.
3. The student is required to write and rewrite the paper, becoming clearer and clearer, and increasingly more precise and complete.
4. This pattern is repeated, focusing on the important works of theoreticians in a discipline.
5. The student is then required to work out an intricate comparison of two important theoreticians, using one to illuminate faults and superficialities in another under the guidance of a disciplined thinker (the teacher).

Mill goes on to explain the complex nature of intellectual development and how, by

⁴ *On the Principles of Political Economy and Taxation* (1817), by David Ricardo (1772-1826), one of the founders of classical economics.

implication, the teacher may often expect too much from students. Mill understood this as a natural part of the learning process.

The path was a thorny one even to him, and I am sure it was so to me, notwithstanding the strong interest I took in the subject. He was often, and much beyond reason, provoked by my failures in cases where success could not have been expected; but in the main his method was right, and it succeeded. I do not believe that any scientific teaching ever was more thorough, or better fitted for training the faculties, than the mode in which logic and political economy were taught to me by my father. Striving, even in an exaggerated degree, to call forth the activity of my faculties, by making me find out everything for myself, he gave his explanations not before, but after, I had felt the full force of the difficulties; and not only gave me an accurate knowledge of these two great subjects, as far as they were then understood, but made me a thinker in both. I thought for myself, almost from the first, and occasionally thought differently from him, though for a long time only on minor points, and making his opinion the ultimate standard (p. 43).

In this passage, Mill exemplifies the intellectual dispositions of *intellectual autonomy* and *intellectual perseverance* characteristically fostered through his father's methods.

We also see here, not for the first time, Mill's deep sense of respect for the intellectual capacities of his father. James Mill understands that the mind of the growing child can only be developed to its fullest capacities through the tutelage of the true intellectual (or at least a person striving to develop intellectually). We learn later in Mill's autobiography that he did come to differ from his father on some significant points. However, it must have been to a large degree because of the discipline and skill Mill learned through his father's tutelage that he was later able to properly *critique* his father's ideas and positions.

On the problem of requiring rote memorization in schooling, Mill says:

Most boys or youths who have had knowledge drilled into them, have their mental capacities not strengthened, but overlaid by it. They are crammed with mere facts, and with the opinions or phrases of other people, and these are accepted as a substitute for the power to form opinions of their own. And thus, the sons of eminent fathers, who have spared no pains in their education, so often grow up mere parroters of what they have learnt, incapable of using their minds except in the furrows traced for them. Mine, however, was not an education of cram. My father never permitted anything which I learnt, to degenerate into a mere exercise of memory. He strove to make the understanding not only go along with every step of the teaching, but if possible, precede it. Anything which could be found out by thinking, I never was told, until I had exhausted my efforts to find it out for myself (p. 45).

In the following passage, Mill points out the importance of fostering discipline in the use of language, of the importance of clearly delineating meanings of terms:

18 Ideas for Becoming a Master Student

- Idea #1:** Make sure you thoroughly understand the requirements of each class, how it will be taught, and what will be expected of you. Ask questions about the grading policies and for advice on how best to prepare for class.
- Idea #2:** Become an active learner. Be prepared to work ideas into your thinking by active reading, writing, speaking, and listening.
- Idea #3:** Think of each subject you study as a form of thinking. (If you are in a history class, your goal should be to think historically; in a chemistry class to think chemically; etc.)
- Idea #4:** Become a questioner. Engage yourself in lectures and discussions by asking questions. If you don't ask questions, you will probably not discover what you do and do not know.
- Idea #5:** Look for interconnections. The content in every class is always a SYSTEM of interconnected ideas, never a random list of things to memorize. Don't memorize like a parrot. Study like a detective, always relating new learning to previous learning.
- Idea #6:** Think of your instructor as your coach. Think of yourself as a team member trying to practice the thinking exemplified by your instructor. For example, in an algebra class, think of yourself as going out for the algebra team and your teacher as demonstrating how to prepare for the games (tests).
- Idea #7:** Think about the textbook as the thinking of the author. Your job is to think the thinking of the author. For example, role play the author frequently. Explain the main points of the text to another student, as if you were the author.
- Idea #8:** Consider class time as a time in which you PRACTICE thinking (within the subject) using the fundamental concepts and principles of the course. Don't sit back passively, waiting for knowledge to fall into your head like rain into a rain barrel. It won't.

- Idea #9:** Relate content whenever possible to issues and problems and practical situations in your life. If you can't connect it to life, you don't know it.
- Idea #10:** Figure out what study and learning skills you are not good at. Practice those skills whenever possible. Recognizing and correcting your weaknesses is a strength.
- Idea #11:** Frequently ask yourself: "Can I explain this to someone not in class?" (If not, then you haven't learned it well enough.)
- Idea #12:** Seek to find the key concept of the course during the first couple of class meetings. For example, in a biology course, try explaining what biology is in your own words. Then relate that definition to each segment of what you learn afterward. Fundamental ideas are the basis for all others.
- Idea #13:** Routinely ask questions to fill in the missing pieces in your learning. Can you elaborate further on this? Can you give an example of that? If you don't have examples, you are not connecting what you are learning to your life.
- Idea #14:** Test yourself before you come to class by trying to summarize, orally or in writing, the main points of the previous class meeting. If you cannot summarize main points, you haven't learned them.
- Idea #15:** Learn to test your thinking using intellectual standards. "Am I being clear? Accurate? Precise? Relevant? Logical? Am I looking for what is most significant?"
- Idea #16:** Use writing as a way to learn by writing summaries in your own words of important points from the textbook or other reading material. Make up test questions. Write out answers to your own questions.
- Idea #17:** Frequently evaluate your listening. Are you actively listening for main points? Can you summarize what your instructor is saying in your own words? Can you elaborate what is meant by key terms?
- Idea #18:** Frequently evaluate your reading. Are you reading the text book actively? Are you asking questions as you read? Can you distinguish what you understand from what you don't?

The Relationship Between Critical Thinking and How to Study and Learn a Discipline

The Problem:

All thinking occurs within, and across, disciplines and domains of knowledge and experience, yet few students learn how to think well within those domains. Despite having taken many classes, few are able to think biologically, chemically, geographically, sociologically, anthropologically, historically, artistically, ethically, or philosophically. Students study literature, but do not think in a literary way as a result. They study poetry, but do not think poetically. They do not know how to think like a reader when reading, nor how to think like a writer while writing, nor how to think like a listener while listening. Consequently they are poor readers, writers, and listeners. They use words and ideas, but do not know how to think ideas through, and internalize foundational meanings. They take classes but cannot make connections between the logic of a discipline and what is important in life. Often even the best students have these deficiencies.

The Concept of Critical Thinking:

Critical thinking is the kind of thinking—about any subject, content, or domain—that improves itself through disciplined analysis and assessment. Analysis requires knowledge of the elements of thought; assessment requires knowledge of and adherence to standards for thought. Critical thinking also takes into account the innate or intrinsic barriers to criticality such as egocentric and sociocentric tendencies, and entails the cultivation of intellectual virtues such as intellectual humility, empathy, integrity, and confidence in reason.

A Critical Person:

A critical person is one who has mastered a range of intellectual skills and abilities and embodies intellectual traits or virtues. When people use critical thinking skills largely to advance their selfish interests, they are critical thinkers only in a weak or qualified sense. If, on the other hand, they commonly use intellectual skills fairly, routinely entering empathically into the points of view of others, they can be said to be critical thinkers in a strong sense. Of course, developing as critical persons is always a matter of degree, since no one could ever be the “ideal thinker.”

Becoming a Skilled Learner:

To study well and learn any subject is to learn how to think with discipline within that subject. It is to learn to think within its logic, to:

- raise vital questions and problems within it, formulating them clearly and precisely;
- gather and assess information, using ideas to interpret that information insightfully;
- come to well-reasoned conclusions and solutions, testing them against relevant criteria and standards;
- adopt the point of view of the discipline, recognizing and assessing, as need be, its assumptions, implications, and practical consequences;
- communicate effectively with others using the language of the discipline and that of educated public discourse; and
- relate what one is learning in the subject to other subjects and to what is significant in human life.

To become a skilled learner is to become a self-directed, self-disciplined, self-monitored, and self-corrective thinker, who has given assent to rigorous standards of thought and mindful command of their use. Skilled learning of a discipline requires that one respect its power as well as its limitations.

Essential Idea: A critical learner is one who masters intellectual skills while seeking to embody intellectual virtues.

How To Learn With Discipline

When learning: look for interrelationships; try to connect everything together. Think of learning as figuring out the parts of an organized and intelligible **system** (with everything fitting together like the parts of a jig-saw puzzle).

Everything you learn is related to every other thing you learn and learning things in relation to each other makes everything you learn more memorable, more intelligible, and more useful. Understanding science is understanding the “system” that scientific thinking represents. Understanding grammar is understanding the “system” that grammatical thinking represents. In other words, there is a logic to science, a logic to grammar, a logic to everything whatsoever! Science is about scientific thinking, grammar is about grammatical thinking, psychology is about psychological thinking, and so on.

In grammar, nouns (having something to talk about) make no sense without verbs (saying something about them). At the same time, to use nouns (and hence talk about something) successfully you need adjectives (to qualify them). To use verbs successfully you need adverbs (to qualify them). Each grammatical structure plays a logical role in a system of meaningful relationships—which one understands best as an interrelated system of ideas.

All “content” is logically interdependent. To understand one part of some content requires that you figure out its relation to other parts of that content. For example, you understand what a scientific experiment is only when you understand what a scientific theory is. You understand what a scientific theory is only when you understand what a scientific hypothesis is. You understand what a scientific hypothesis is only when you understand what a scientific prediction is. You understand what a scientific prediction is only when you understand what it is to scientifically test a view. You understand what it is to scientifically test a view only when you understand what a scientific experiment is, etc. To learn any body of content, therefore, is to figure out (i.e., reason or think through) the connections between the parts of that content. There is no learning of the content without this thinking process.

Essential Idea: When learning any concept, idea, law, theory, or principle, ask yourself: To what other concepts, ideas, laws, theories, or principles is this connected?

How to Identify an Underlying Idea for the Subjects You Study

Virtually all courses have some inherent unity which, when understood, ties all the learning of the course together (like a tapestry). This unity is typically found in foundational ideas that define the subject and its goals. Below are suggestions for beginning to understand the foundational ideas behind some of the major disciplines. Use them to begin to think within the subjects. However, you must make sure you can state, elaborate, exemplify, and illustrate each of these ideas IN YOUR OWN WORDS with your own examples and illustrations. Otherwise, you are merely mouthing words that have no definite meaning in your mind.

- **Mathematics** as learning to think quantitatively
- **Economics** as the study of “who gets what, when, and how”
- **Algebra** as arithmetic with unknowns
- **Sociology** as the study of human conformity to group norms
- **Anthropology** as the physical and historical study of humans in light of their evolution from non-cultural into cultural animals
- **Physics** as the study of mass and energy and their interaction
- **Chemistry** as the study of elementary substances and the manner in which they react with each other
- **Philosophy** as the study of ultimate questions with a view to living an examined life
- **Biochemistry** as the chemistry of life processes in plants and animals
- **Science** as the attempt to learn through quantifiable observations and controlled experimentation
- **Theology** as the study of theories of spiritual reality
- **Ethics** as the study of principles to be used in contributing to the good of, and avoiding unnecessary harm to, humans and other sentient creatures
- **Art** as the application of skill and judgment to matters of taste and beauty (as in poetry, music, painting, dance, drama, sculpture, or architecture)
- **Professions** as ways of earning a living through the skilled and artful use of knowledge in everyday life

Essential Idea: When beginning to learn a subject, it is helpful to formulate an organizing idea to guide your thinking.

Understanding Content Through The Thinking It Requires: A Key To Deep Learning

All Subjects Represent A Systematic Way of Thinking. The first and most important insight necessary for deep learning of academic subjects is that everything you learn is, in the last analysis, nothing more nor less than a systematic way of thinking about a particular set of things.

Organized Systematically by Ideas. There is no way to learn a body of content without learning the ideas that define and structure it. There is no way to learn a concept without learning how to use it in thinking something through. Hence, to learn the idea of democracy is to learn how to figure out whether some group is functioning democratically or not. To learn the idea of fair play is to learn how to figure out whether someone is being fair in the manner in which they are participating in a game. To learn the idea of a novel is to learn how to distinguish a novel from a play or short story. To learn the idea of a family is to learn how to distinguish a family from a gang or club. To learn any body of content, therefore, it is necessary to learn to think accurately and reasonably within the ideas that define the content.

Leading to a Systematic Way of Questioning. Ideas within a subject are intimately connected with the kind of questions asked in it. All subjects represent ways of asking and answering a body of questions. There is no way to learn mathematical content without learning how to figure out correct answers to mathematical questions and problems. There is no way to learn historical content without learning how to figure out correct or reasonable answers to historical questions and problems. There is no way to learn biological content without learning how to figure out answers to biological questions and problems. We study chemistry to figure out chemicals (to answer questions about chemicals). We study sociology to figure out people (how and why people behave as they do in groups). All subjects can be understood in this way.

Essential Idea: All subjects represent a systematic way of thinking defined by a system of ideas leading to a distinctive and systematic way of questioning.

How to Understand Ideas

Ideas are to us like the air we breathe. We project them everywhere. Yet we rarely notice this. We use ideas to create our way of seeing things. What we experience we experience through ideas, often funneled into the categories of “good” and “evil.” We assume ourselves to be good. We assume our enemies to be evil. We select positive terms to cover up the indefensible things we do. We select negative terms to condemn even the good things our enemies do. We conceptualize things personally by means of experience unique to ourselves (often distorting the world to our advantage). We conceptualize things socially as a result of indoctrination or social conditioning (our allegiances presented, of course, in positive terms).

Ideas, then, are our paths to both reality and self-delusion. We don't typically recognize ourselves as engaged in idea construction of any kind whether illuminating or distorting. In our everyday life we don't experience ourselves shaping what we see and constructing the world to our advantage.

To the uncritical mind, it is as if people in the world came to us with our labels for them inherent in who they are. THEY are “terrorists.” WE are “freedom fighters.” All of us fall victims at times to an inevitable illusion of objectivity. Thus we see others not as like us in a common human nature, but as “friends” and “enemies,” and accordingly “good” or “bad”. Ideology, self-deception, and myth play a large part in our identity and how we think and judge. We apply ideas, however, as if we were simply neutral observers of reality. We often become self-righteous when challenged.

If you want to develop as a learner, you must come to recognize the ideas through which you see and experience the world. You must take explicit command of your thinking. You must become the master of your own ideas. You must learn how to think with alternative ideas, alternative “world views.” As general semanticists often say: “The word is not the thing! The word is not the thing!” If you are trapped in one set of concepts (ideas, words) then your thinking is trapped. Word and thing become one and the same in your minds. You are unable then to act as a truly free person.

Essential Idea: To understand our experience and the world itself, we must be able to think within alternative world views. We must question our ideas. We must not confuse our words or ideas with things.

How to Think Within the Ideas of a Subject

Learning to think within the ideas of a subject is like learning to perform well in basketball, ballet, or on the piano. Thinking within the ideas of a subject at an advanced level without disciplined practice is as unnatural to the human mind as sitting down at a piano and spontaneously playing Chopin's Polonaise.

Unfortunately, many classes do not highlight how to think within the ideas of the subject. Merely receiving lectures on the content of a subject will not teach you how to think within its ideas. You must therefore set out to discover how to think within biology, how to think within chemistry, how to think within economics, etc. You will not discover this thinking by cramming large masses of partially digested contents of a textbook or sets of lectures into your head. Here is what we recommend.

Recognize that you are seeking a new way to look at learning. Recognize that it will take time to become comfortable in this new perspective. Consider your task as a student to be to learn new ways to think. Stretching the mind to accommodate new ideas is crucial.

For example, if you are in a history course, your job is to learn how to think historically. If you are in a writing class, your job is to learn to think like a skilled writer. If you are in a sociology, psychology, geography, biology, philosophy, or chemistry class, you should be striving to think sociologically, psychologically, geographically, biologically, philosophically, or chemically.

If you are in a nursing, engineering, or architecture class, you should be attempting to think like a professional nurse, like an engineer, or like an architect.

Recognize that there are key ideas behind the subject that give a unified meaning to it. Look up a variety of formulations of the essence of the subject (use dictionaries, textbooks, encyclopedias). Remember that you are looking for the ideas that give a unified meaning to the subject and thus enable you to experience the subject as a system. What makes art art? What makes science science? What makes biology biology? Try to find the common denominator of the subjects you study. Ask your instructor for help.

Now relate every new idea (in the textbook or lectures) to the fundamental idea with which you began. The big idea with which you began should be in the background of all new ideas. Seek intuitive connections, connections that make complete sense to you.

Essential Idea: There are basic ideas that act as guide-posts to all thinking within a subject. Look for these basic ideas and stretch your mind to learn them. Weave everything else into them.

How to Control (and Not Be Controlled By) Ideas

The ideas we have formed in personal experience are often egocentric in nature. The ideas we inherit from social indoctrination are typically ethnocentric in nature. Both can significantly limit our insight. This is where mastery of academic subjects and of our native language comes into play. This is where education is supposed to empower us.

The ideas we learn from academic subjects and from the study of distinctions inherent in language-use represent sources of ideas that can take us beyond our personal egocentrism and the social ideology in which we are otherwise typically entrapped. When we learn to think historically, sociologically, anthropologically, scientifically, and philosophically, we can come to see ignorance, prejudice, stereotypes, illusions, and biases in our personal thinking and in the thinking common in our society. Many, without such command, confuse very different things: for example, needing and wanting, having judgment and being judgmental, having information and gaining knowledge, being humble and being servile, being stubborn and having the courage of one's convictions.

Command of distinctions such as these and those inherent in multiple disciplines can have a significant influence upon the way we shape our experience. If, for example, we confuse ethics with arbitrary social conventions or religion or national law, we have no basis for understanding the true basis of universality in ethics: awareness of what does harm or good to humans and other sentient creatures.

When we develop our thinking, we go beneath the surface of ideas. Our personal experience is no longer "sacred." We recognize our fallibility. We strive for ideas to roaden and empower us as free individuals.

Essential Idea: There are at least four different sources for ideas: our personal experience, socialization, the academic subjects we study, and our native language (English, Spanish, etc.) To become truly educated, we must learn to monitor and evaluate our use of ideas from these domains. Only then can we learn how to control (and not be controlled by) ideas.

How Good a Student Are You?

Test Yourself:

- #1: Do you understand the requirements of every class in which you are registered, how they will be taught, and what will be expected of you? Have you sought out and received advice about how you can best prepare for class?
- #2: Do you know your strengths and weaknesses as a student and thinker? Have you tried to find out? Are you in the habit of evaluating aspects of your thinking—your purpose, the question you are trying to answer, the information you are using to answer it, etc.? Good thinkers regularly question their thinking. Be especially careful to distinguish what you know for sure from what you merely believe (but may not be true).
- #3: Have you identified the KIND of thinking that is most important in a given class? Think of subjects as forms of thinking (history = historical thinking; sociology = sociological thinking; biology = biological thinking).
- #4: Do you ask questions in and out of class? Do you engage yourself in lectures and discussions by asking questions? Good instructors value questions from students.
- #5: Are you looking for interconnections? Do you understand the content in every class as a SYSTEM of interconnected understandings or as a random list of things to memorize? Don't memorize individual points like a parrot. Study to understand, to figure things out.
- #6: Are you practicing the thinking of the subject? Could you explain this thinking with examples and illustrations (to someone who was not in the class)?
- #7: Are you reading your textbooks to figure out the THINKING of the author(s)? Do you translate the author's thinking into your thinking (by putting basic points into your own words)? Do you role-play the author (to someone else) explaining the main points of the various sections of the text?
- #8: Do you relate content whenever possible to issues and problems and practical situations in life? If you can't connect what you are learning to issues in life, your understanding of it is at best incomplete.
- #9: Can you explain the main idea behind the class in your own words? Are you seeking to find the key concept of the course from the first couple of class meetings? For example, in a biology course, try explaining what biologists are

(mainly) trying to figure out. Don't use technical terms in your explanation. Then relate that explanation to each segment of what you are learning in the course. How does each segment fit in?

- #10: Do you test yourself before you come to class by trying to summarize, orally or in writing, the main points of the previous class meeting? If you cannot summarize main points, you haven't learned them.
- #11: Do you check your thinking using intellectual standards? "Am I being clear? Accurate? Precise? Relevant? Logical? Am I looking for what is most significant? Am I recognizing complexities?"
- #12: Do you use writing as a way to learn by writing summaries in your own words of important points from the textbook or other reading material? Do you make up test questions? Do you write out answers to your own questions?
- #13: During lecture time, do you actively listen for main points? If we arbitrarily stopped the lecture at various points, could you accurately summarize what the instructor had just said in your own words?
- #14: Do you frequently assess your reading? Do you read the textbook actively? Are you asking questions as you read? Do you recognize the points you do and do not understand?

**Well, what do you think?
How good a student are you?**

How to Think Through the Defining Traits of the Disciplined Mind

As a student, you need to cultivate not only intellectual abilities, but intellectual dispositions as well. These attributes are essential to excellence of thought. They determine with what insight and integrity you think. Here we briefly describe the intellectual virtues and provide related questions that foster their development. *Only to the extent that you are routinely asking these questions of yourself are you developing these virtues.*

Intellectual humility is knowledge of ignorance, sensitivity to what you know and what you do not know. It means being aware of your biases, prejudices, self-deceptive tendencies, and the limitations of your viewpoint. Questions that foster intellectual humility include:

- What do I really know (about myself, about the situation, about another person, about my nation, about what is going on in the world)?
- To what extent do my prejudices or biases influence my thinking?
- To what extent have I been indoctrinated into beliefs that may be false?
- How do the beliefs I have uncritically accepted keep me from seeing things as they are?

Intellectual courage is the disposition to question beliefs you feel strongly about. It includes questioning the beliefs of your culture and the groups to which you belong, and a willingness to express your views even when they are unpopular. Questions that foster intellectual courage include:

- To what extent have I analyzed the beliefs I hold?
- To what extent have I questioned my beliefs, many of which I learned in childhood?
- To what extent have I demonstrated a willingness to give up my beliefs when sufficient evidence is presented against them?
- To what extent am I willing to stand up against the majority (even though people might ridicule me)?

Intellectual empathy is awareness of the need to actively entertain views that differ from our own, especially those we strongly disagree with. It is to accurately reconstruct the viewpoints and reasoning of our opponents and to reason from premises, assumptions, and ideas other than our own. Questions that foster intellectual empathy include:

- To what extent do I accurately represent viewpoints I disagree with?
- Can I summarize the views of my opponents to their satisfaction? Can I see insights in the views of others and prejudices in my own?
- Do I sympathize with the feelings of others in light of their thinking differently than me?

Intellectual integrity consists in holding yourself to the same intellectual standards you expect others to honor (no double standards). Questions that foster intellectual integrity include:

- Do I behave in accordance with what I say I believe, or do I tend to say one thing and do another?
- To what extent do I expect the same of myself as I expect of others?
- To what extent are there contradictions or inconsistencies in my life?
- To what extent do I strive to recognize and eliminate self-deception in my life?

Intellectual perseverance is the disposition to work your way through intellectual complexities despite the frustration inherent in the task. Questions that foster intellectual perseverance include:

- Am I willing to work my way through complexities in an issue or do I tend to give up when I experience difficulty?
- Can I think of a difficult intellectual problem in which I have demonstrated patience and determination in working through the difficulties?
- Do I have strategies for dealing with complex problems?
- Do I expect learning to be easy or do I recognize the importance of engaging in challenging intellectual work?

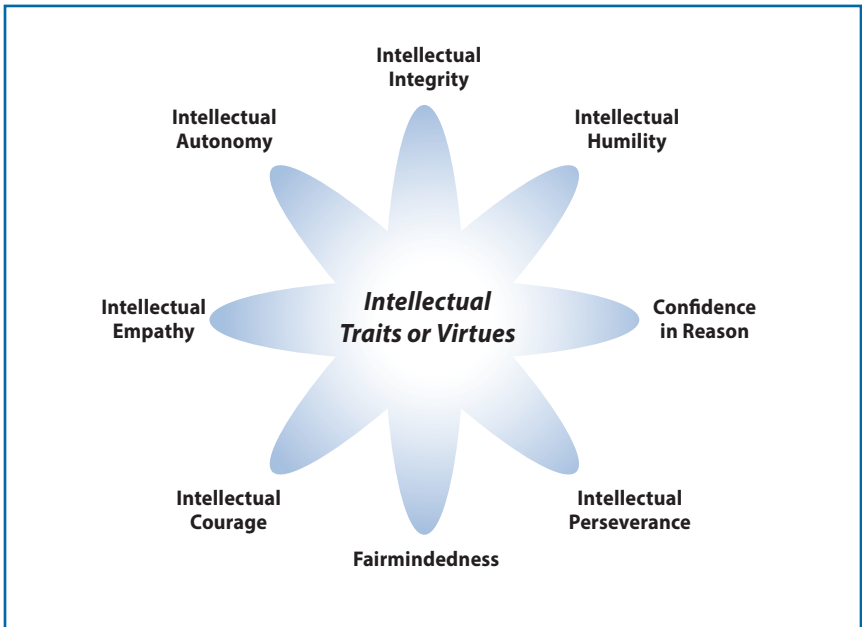
Confidence in reason is based on the belief that one's own higher interests and those of humankind at large are best served by giving the freest play to reason. It means using standards of reasonability as the fundamental criteria by which to judge whether to accept or reject any belief or position. Questions that foster confidence in reason include:

- Am I willing to change my position when the evidence leads to a more reasonable position?

- Do I adhere to principles of sound reasoning when persuading others of my position or do I distort matters to support my position?
- Do I deem it more important to “win” an argument, or see the issue from the most reasonable perspective?
- Do I encourage others to come to their own conclusions or do I try to force my views on them?

Intellectual autonomy is thinking for oneself while adhering to standards of rationality. It means thinking through issues using one's own thinking rather than uncritically accepting the viewpoints of others. Questions that foster intellectual autonomy:

- To what extent am I a conformist?
- To what extent do I uncritically accept what I am told by my government, the media, my peers?
- Do I think through issues on my own or do I merely accept the views of others?
- Having thought through an issue from a rational perspective, am I willing to stand alone despite the irrational criticisms of others?



To Evaluate Thinking We Must Understand and Apply Intellectual Standards

Reasonable people judge reasoning by intellectual standards. When you internalize these standards and explicitly use them in your thinking, your thinking becomes more clear, more accurate, more precise, more relevant, deeper, broader and more fair. You should note that we focus here on a selection of standards. Among others are credibility, sufficiency, reliability, and practicality. The questions that employ these standards are listed on the following page.

Clarity:

understandable, the meaning can be grasped

Accuracy:

free from errors or distortions, true

Precision:

exact to the necessary level of detail

Relevance:

relating to the matter at hand

Depth:

containing complexities and multiple interrelationships

Breadth:

encompassing multiple viewpoints

Logic:

the parts make sense together, no contradictions

Significance:

focusing on the important, not trivial

Fairness:

justifiable, not self-serving or one-sided

Clarity

Could you elaborate further?
Could you give me an example?
Could you illustrate what you mean?

Accuracy

How could we check on that?
How could we find out if that is true?
How could we verify or test that?

Precision

Could you be more specific?
Could you give me more details?
Could you be more exact?

Relevance

How does that relate to the problem?
How does that bear on the question?
How does that help us with the issue?

Depth

What factors make this a difficult problem?
What are some of the complexities of this question?
What are some of the difficulties we need to deal with?

Breadth

Do we need to look at this from another perspective?
Do we need to consider another point of view?
Do we need to look at this in other ways?

Logic

Does all this make sense together?
Does your first paragraph fit in with your last?
Does what you say follow from the evidence?

Significance

Is this the most important problem to consider?
Is this the central idea to focus on?
Which of these facts are most important?

Fairness

Do I have any vested interest in this issue?
Am I sympathetically representing the viewpoints of others?

How to Evaluate an Author's Reasoning

1. Focusing on the author's **Purpose**: Is the purpose of the author well-stated or clearly implied? Is it justifiable?
2. Focusing on the key **Question** which the written piece answers: Is the question at issue well-stated (or clearly implied)? Is it clear and unbiased? Does the expression of the question do justice to the complexity of the matter at issue? Are the question and purpose directly relevant to each other?
3. Focusing on the most important **Information** presented by the author: Does the writer cite relevant evidence, experiences, and/or information essential to the issue? Is the information accurate and directly relevant to the question at issue? Does the writer address the complexities of the issue?
4. Focusing on the most fundamental **Concepts** which are at the heart of the author's reasoning: Does the writer clarify key ideas when necessary? Are the ideas used justifiably?
5. Focusing on the author's **Assumptions**: Does the writer show a sensitivity to what he or she is taking for granted or assuming? (Insofar as those assumptions might reasonably be questioned) Or does the writer use questionable assumptions without addressing problems inherent in those assumptions?
6. Focusing on the most important **Inferences** or conclusions in the written piece: Do the inferences and conclusions made by the author clearly follow from the information relevant to the issue, or does the author jump to unjustifiable conclusions? Does the author consider alternative conclusions where the issue is complex? In other words, does the author use a sound line of reasoning to come to logical conclusions, or can you identify flaws in the reasoning somewhere?
7. Focusing on the author's **Point of View**: Does the author show a sensitivity to alternative relevant points of view or lines of reasoning? Does s/he consider and respond to objections framed from other relevant points of view?
8. Focusing on **Implications**: Does the writer display a sensitivity to the implications and consequences of the position s/he is taking?

Essential Idea: You can evaluate thinking by applying intellectual standards to its component parts.

How to Raise Important Questions Within a Subject

Every discipline is best known by the questions it generates and the way it goes about settling those questions. To think well within a discipline, you must be able to raise and answer important questions within it. **At the beginning of a semester of study, try generating a list of at least 25 questions that each discipline you are studying seeks to answer.** To do this you might read an introductory chapter from the textbook or an article on the discipline from an encyclopedia. Then explain the significance of the questions to another person.

Then **add new questions to the list (as your courses proceed) underlining those questions when you are confident you can explain how to go about answering them. Regularly translate chapter and section titles from your textbooks into questions.** For example, a section on photosynthesis answers the question, What is photosynthesis?

In addition, **look for key questions in every lecture you hear. Relate basic questions to the basic theory the discipline uses to solve problems.** Master fundamental questions well. Do not move on until you understand them.

Notice the interrelationship between key ideas and key questions. Without the ideas the questions are meaningless. Without the questions, the ideas are inert. There is nothing you can do with them. A skilled thinker is able to take questions apart, generate alternative meanings, distinguish leading from subordinate questions, and grasp the demands that questions put upon us.

Essential Idea: If you become a good questioner within a discipline, you will learn the essential content of the discipline.

How to Distinguish One-System from Competing-Systems Disciplines

In some disciplines, the experts rarely disagree; in others, disagreement is common. The reason for this is found in the kinds of questions they ask and the nature of what they study. Mathematics and the physical and biological sciences fall into the first category. They study phenomena that behave consistently under predictable conditions and they pose questions that can be expressed clearly and precisely, with virtually complete expert agreement. The disciplines dealing with humans, in contrast—all the social disciplines, the Arts, and the Humanities—fall into the second category. What they study is often unpredictably variable. For example, humans are born into a culture at some point in time in some place, raised by parents with particular beliefs, and form a variety of associations with other humans who are equally variously influenced. What is dominant in our behavior varies from person to person. Hence, many of the questions asked in the disciplines dealing with human nature are subject to disagreement among experts (who approach the questions from different points of view). Consider the varieties of ways that human minds are influenced:

- **sociologically** (our minds are influenced by the social groups to which we belong);
- **philosophically** (our minds are influenced by our personal philosophy);
- **ethically** (our minds are influenced by our ethical character);
- **intellectually** (our minds are influenced by the ideas we hold, by the manner in which we reason and deal with abstractions);
- **anthropologically** (our minds are influenced by cultural practices, mores, and taboos);
- **ideologically and politically** (our minds are influenced by the structure of power and its use by interest groups around us);

- **economically** (our minds are influenced by the economic conditions under which we live);
- **historically** (our minds are influenced by our history and by the way we tell our history);
- **biologically** (our minds are influenced by our biology and neurology);
- **theologically** (our minds are influenced by our religious beliefs); and,
- **psychologically** (our minds are influenced by our personality and egocentric tendencies).

What is more, humans are capable of discovering how they are being influenced in these ways, may reflect on them, and then act to change their behavior in any number of ways. For example, consider how much more difficult it would be to study the behavior of mice if each mouse varied in its behavior from every other mouse depending on experience, personal philosophy, and culture. Or, consider what the study of the behavior of mice would be like if they could discover we were studying them and begin to react to our study in the light of that knowledge. And how could we even proceed to study them if they decided at the same time to study us studying them. In other words, the goal of studying human behavior faces enormous difficulties.

In studying a “one system” subject, in contrast, the task is to learn how to think within one overriding point of view. Learning to think algebraically, for example, does not require that you consider schools of thought within algebra. Algebraic thinking is based on a precisely defined system. Virtually all the ideas of algebra are shared by all mathematicians. Each idea is strictly and precisely defined. It is possible to PROVE this or that. Given a number system, one can derive arithmetic. Given arithmetic, one can derive algebra. Given algebra, one can derive calculus. All inferences can be tested, one by one.

Essential Idea: For any subject one studies, it is important to know the extent of expert disagreement and the “variability” of what one is studying.

How to Ask Questions About Fields of Study

Answer as many of these questions as you can by examining texts in the subject. You may need help from your instructor on some of them.

1. To what extent are there competing schools of thought within this field?
2. To what extent do experts in this field disagree about the answers they give to important questions?
3. What other fields deal with this same subject (from a different standpoint, perhaps)? To what extent are there conflicting views about this subject in light of these different standpoints?
4. To what extent, if at all, is this field properly called a science?
5. To what extent can questions asked in the field be answered definitively? To what extent are questions in this field matters of (arguable) judgment?
6. To what extent is there public pressure on professionals in the field to compromise their professional practice in light of public prejudice or vested interest?
7. What does the history of the discipline tell you about the status of knowledge in the field? How old is the field? How common is controversy over fundamental terms, theories, and orientation?

Essential Idea: Many disciplines are not definitive in their pursuit of knowledge. As you learn a subject, it is important to understand both its strengths and limitations.

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Dr. Richard Paul was a leading proponent of critical thinking until his death in August of 2015, and in his work and legacy, Paul remains an international authority on critical thinking. He founded the Center for Critical Thinking at Sonoma State University in 1980, followed by the Foundation for Critical Thinking. In his lifetime, he developed concepts, principles, and theory essential to a robust and fairminded conception of critical thinking; he worked tenaciously to advance ethical, or strong-sense, critical thinking throughout education and society. In his lifetime, Paul authored more than 200 articles and seven books on critical thinking. He presented workshops to hundreds of thousands of educators over his 35-year history as a primary leader in the critical thinking movement.

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