

Critical Thinking: Identifying the Targets

Abstract

The goal of this chapter is to set out clearly what critical thinking is in general and how it plays itself out in a variety of domains: in reading, in writing, in studying academic subjects, and on the job. Richard Paul and Jane Willson provide down-to-earth examples that enable the reader to appreciate both the most general characteristics of critical thinking and their specific manifestations on the concrete level. It is essential, of course, that the reader becomes clear about the concept, including its translation into cases, for otherwise she is apt to mis-translate the concept or fail to see its relevance in a wide variety of circumstances.

The danger of misunderstanding and mis-application is touched upon in this chapter at the end, but is developed at great length in another chapter, “Pseudo Critical Thinking in the Educational Establishment” (p. 47).

- Is this a good idea or a bad idea?
- Is this belief defensible or indefensible?
- Is my position on this issue reasonable and rational or not?
- Am I willing to deal with complexity or do I retreat into simple stereotypes to avoid it?
- If I can't tell if my idea or belief is reasonable or defensible, how can I have confidence in my thinking, or in myself?
- Is it appropriate and wise to assume that my ideas and beliefs are accurate, clear, and reasonable, when I haven't really tested them?
- Do I think deeply or only on the surface of things?
- Do I ever enter sympathetically into points of view that are very different from my own, or do I just assume that I am right?
- Do I know how to question my own ideas and to test them?
- Do I know what I am aiming for? Should I?

Effectively evaluating our own thinking and the thinking of others is a habit few of us practice. We evaluate which washing machine to buy after reading Consumer Reports, we evaluate which movie to go see after studying the reviews, we evaluate new job opportunities after talking with friends and colleagues, but rarely do we explicitly evaluate the quality of our thinking (or the thinking of our students).

But, you may ask, how can we know if our thinking is sound? Are we relegated to “trial and error” to discover the consequences of our thinking? Do the consequences always accurately tell the tale? Isn't thinking all a matter of opinion anyway? Isn't my opinion as good as anyone else's? If what I believe is true for me, isn't that all that matters? In our education and upbringing, have we developed the ability to evaluate, objectively and fairly, the quality of our beliefs? What did we learn about thinking during our schooling?

How did we come to believe what we do believe, and why one belief and not another? How many of our beliefs have we come to through rigorous, independent thinking, and how many have been down-loaded from the media, parents, our culture, our spouses or friends? As we focus on it, do we value the continuing improvement of our thinking abilities? Do we value the continuing improvement of our students' thinking abilities? Important research findings indicate that we need to look closely at this issue. Mary Kennedy reports the findings on the opposite page in the Phi Delta Kappan, May, 1991, in an article entitled, "Policy Issues in Teaching Education."

How can we improve our thinking without effective evaluation practices? Can we learn how to evaluate our thinking and reasoning objectively? Let's look at one concrete example for clues into the elements of effective evaluation in a familiar field. In platform diving, there are criteria to be met to receive a score of "10" and standards that judges and competitors alike use to evaluate the dive. These standards guide the divers in each practice session, in each effort off the board. Without these criteria and standards, how would the diver and the judges know what was excellent and what was marginal? Awareness of the criteria and standards are alive in the divers' and coaches' minds. Do we have parallel criteria and standards as we strive to improve our abilities, our performances in thinking?

There is nothing more common than evaluation in the everyday world but for sound evaluation to take place, one must establish relevant standards, gather appropriate evidence, and judge the evidence in keeping with the standards.

There are appropriate standards for the assessment of thinking and there are specific ways to cultivate the learning of them. The research into critical thinking establishes tools that can help us evaluate our own thinking and the thinking of others, if we see their potential benefit and are willing to discipline our minds in ways that may seem awkward at first. This chapter briefly lays out those tools in general terms and acts as a map, so to speak, of their dimensions. We present examples of student thinking that demonstrate critical and uncritical thinking as we define those terms. In other chapters, we identify approaches to teaching critical thinking that are flawed, and explain why they undermine the success of those who attempt to use them.

Important Research Findings

First Finding: National assessments in virtually every subject indicate that, although our students can perform basic skills pretty well, they are not doing well on thinking and reasoning. American students can compute, but they cannot reason . . . They can write complete and correct sentences, but they cannot prepare arguments . . . Moreover, in international comparisons, American students are falling behind . . . particularly in those areas that require higher-order thinking . . . Our students are not doing well at thinking, reasoning, analyzing, predicting, estimating, or problem solving.

Second Finding: Textbooks in this country typically pay scant attention to big ideas, offer no analysis, and pose no challenging questions. Instead, they provide a tremendous array of

information or ‘factlets,’ while they ask questions requiring only that students be able to recite back the same empty list.

Third Finding: Teachers teach most content only for exposure, not for understanding.

Fourth Finding: Teachers tend to avoid thought-provoking work and activities and stick to predictable routines. Conclusion: “If we were to describe our current K–12 education system on the basis of these four findings, we would have to say that it provides very little intellectually stimulating work for students, and that it tends to produce students who are not capable of intellectual work.

Fifth Finding: Our fifth finding from research compounds all the others and makes it harder to change practice: teachers are highly likely to teach in the way they themselves were taught. If your elementary teacher presented mathematics to you as a set of procedural rules with no substantive rationale, then you are likely to think that this is what mathematics is and that this is how mathematics should be studied. And you are likely to teach it in this way. If you studied writing as a set of grammatical rules rather than as a way to organize your thoughts and to communicate ideas to others, then this is what you will think writing is, and you will probably teach it so . . . By the time we complete our undergraduate education, we have observed teachers for up to 3,060 days.

Implication: “We are caught in a vicious circle of mediocre practice modeled after mediocre practice, of trivialized knowledge begetting more trivialized knowledge. Unless we find a way out of this circle, we will continue re-creating generations of teachers who re-create generations of students who are not prepared for the technological society we are becoming.”

(Figure 1 condensed from “Policy Issues in Teaching Education” by Mary Kennedy in the Phi Delta Kappan, May, 91, pp 661–66.)

Critical Thinking: A Picture of the Genuine Article

Critical Thinking is a systematic way to form and shape one’s thinking. It functions purposefully and exactly. It is thought that is disciplined, comprehensive, based on intellectual standards, and, as a result, well-reasoned.

Critical Thinking is distinguishable from other thinking because the thinker is thinking with the awareness of the systematic nature of high quality thought, and is continuously checking up on himself or herself, striving to improve the quality of thinking. As with any system, critical thinking is not just a random series of characteristics or components. All of its components — its elements, principles, standards and values — form an integrated, working network that can be applied effectively not only to academic learning, but to learning in every dimension of living.

Critical thinking's most fundamental concern is excellence of thought. Critical thinking is based on two assumptions: first, that the quality of our thinking affects the quality of our lives, and second, that everyone can learn how to continually improve the quality of his or her thinking.

Critical thinking implies a fundamental, overriding goal for education in school and in the workplace: always to teach so as to help students improve their own thinking. As students learn to take command of their thinking and continually to improve its quality, they learn to take command of their lives, continually improving the quality of their lives.

Comprehensive Critical Thinking Has the Following Characteristics

- It is thinking which is responsive to and guided by Intellectual Standards, such as relevance, accuracy, precision, clarity, depth, and breadth. Without intellectual standards to guide it, thinking cannot achieve excellence. [Note: most so-called “thinking skill” educational programs and approaches have no intellectual standards.]
- It is thinking that deliberately supports the development of Intellectual Traits in the thinker, such as intellectual humility, intellectual integrity, intellectual perseverance, intellectual empathy, and intellectual self-discipline, among others. [Note: most “thinking skill” programs ignore fundamental intellectual traits.]
- It is thinking in which the thinker can identify the Elements of Thought that are present in all thinking about any problem, such that the thinker makes the logical connection between the elements and the problem at hand. For example, the critical thinker will routinely ask himself or herself questions such as these about the subject of the thinking task at hand:
 - What is the purpose of my thinking?
 - What precise question am I trying to answer?
 - Within what point of view am I thinking?
 - What information am I using?
 - How am I interpreting that information?
 - What concepts or ideas are central to my thinking?
 - What conclusions am I coming to?
 - What am I taking for granted, what assumptions am I making?
 - If I accept the conclusions, what are the implications?
 - What would the consequences be, if I put my thought into action?

For each element, the thinker must be able to reflect on the standards that will shed light on the effectiveness of her thinking. [Note: Most “thinking skill” programs ignore most or all of the basic elements of thought and the need to apply standards to their evaluation.]

- It is thinking that is **ROUTINELY SELF-ASSESSING, SELF-EXAMINING, and SELF-IMPROVING**. The thinker takes steps to assess the various dimensions of her thinking, using appropriate intellectual standards. [Note: Most “thinking skill” programs do not emphasize student self-assessment.] But what is essential to recognize is that if students are not assessing their own thinking, they are not thinking critically.

- It is thinking in which THERE IS AN INTEGRITY TO THE WHOLE SYSTEM. The thinker is able, not only to critically examine her thought as a whole, but also to take it apart, to consider its various parts, as well. Furthermore, the thinker is committed to thinking within a system of interrelated traits of mind; for example, to be intellectually humble, to be intellectually perseverant, to be intellectually courageous, to be intellectually fair and just. Ideally, the critical thinker is aware of the full variety of ways in which thinking can become distorted, misleading, prejudiced, superficial, unfair, or otherwise defective. The thinker strives for wholeness and integrity as fundamental values. [Note: Most “thinking skills” programs are not well integrated and lack a broad vision of the range of thinking abilities, standards, and traits that the successful critical thinking student will develop. Many tend to instruct students with a technique such as mapping of ideas in diagrams or comparing two ideas, yet these ask little of the student and can readily mislead student and teacher to believe that such techniques will be sufficient.]
- It is thinking that YIELDS A PREDICTABLE, WELL-REASONED ANSWER because of the comprehensive and demanding process that the thinker pursues. If we know quite explicitly how to check our thinking as we go, and we are committed to doing so, and we get extensive practice, then we can depend on the results of our thinking being productive. Good thinking produces good results. [Note: Because most “thinking skills” programs lack intellectual standards and do not require a comprehensive process of thinking, the quality of student response is unpredictable, both for the students and for the teacher.]
- It is thinking that is responsive to the social and moral imperative to not only enthusiastically argue from alternate and opposing points of view, but also to SEEK AND IDENTIFY WEAKNESSES AND LIMITATIONS IN ONE’S OWN POSITION. When one becomes aware that there are many legitimate points of view, each of which — when deeply thought through — yields some level of insight, then one becomes keenly aware that one’s own thinking — however rich and insightful it may be, however carefully constructed — will not capture everything worth knowing and seeing. [Because most “thinking skills” programs lack intellectual standards, the students are unable to identify weaknesses in their own reasoning nor are they taught to see this as a value to be pursued.]

What Does Comprehensive Critical Thinking Look Like?

The following section highlights examples of legitimate, substantial, comprehensive critical thinking in a variety of contexts. These examples will provide the reader with concrete samples of the criteria, the standards and characteristics integral to genuine critical thinking.

Identifying the Target: Critical Thinking at School

Critical thinking has an appropriate role in virtually every dimension of school learning, very little that we learn that is of value can be learned by automatic, unreflective processes. Textbooks, subject matter, classroom discussion, even relationships with classmates are things to

be “figured out” and “assessed.” Let’s look at two students who are each “reading” a passage from a story and see if we can identify the consequences of critical and uncritical reading habits and abilities.

Are We Hitting the Target, Assessing Student Thinking in Reading?

Consider the following example of two students engaging in reading the same story. This example is taken from an important article by Stephen Norris and Linda Phillips, “Explanations of Reading Comprehension: Schema Theory and Critical Thinking Theory,” in *Teachers College Record*, Volume 89, Number 2, Winter 1987. We are privy to conversations between each of the two students, Colleen and Stephen and an experimenter. We are thus invited to reconstruct, from the students’ responses, our own appraisal of the quality of their thinking. The utility of intellectual standards such as clarity, relevance, accuracy, consistency, and depth of thinking come into sharp focus once one begins to assess specific thinking for “quality.”

In what follows we will present episode-by-episode Stephen and Colleen’s thinking aloud as they work through the passage. The experimenter’s questions are given in brackets. We have chosen to make our example detailed, because we see this as the best route for providing specificity to otherwise vague generalizations about the relationship between reading and thinking. To simulate the task for you we present the passage without a title and one episode at a time as was done with the children.

Episode 1

The stillness of the morning air was broken. The men headed down the bay.

Stephen

The men were heading down the bay, I’m not sure why yet. It was a very peaceful morning. [Any questions?] No, not really. [Where do you think they’re going?] I think they might be going sailing, water skiing, or something like that.

Colleen

The men are going shopping. [Why do you think that?] They’re going to buy clothes at The Bay. [What is The Bay?] It’s a shopping center. [Any questions?] No. [Where do you think they’re going?] They’re going shopping because it seems like they broke something.

Commentary

Stephen recognizes that there is insufficient information for explaining what the men are doing. On questioning, he tentatively suggests a couple of alternatives consistent with the information given, but indicates there are other possibilities. Colleen presents one explanation of the story, and seems fairly definitive that the men are going to buy clothes at The Bay, a chain of department stores in Canada. On being queried she maintains her idea that the men are going

shopping but offers an explanation inconsistent with her first one that they are going to buy clothes. To do this she assumes that something concrete was broken, which could be replaced at The Bay.

Episode 2

The net was hard to pull. The heavy sea and strong tide made it even difficult for the girdie. The meshed catch encouraged us to try harder.

Stephen

It was not a very good day as there were waves which made it difficult for the girdie. That must be some kind of machine for doing something. The net could be for pulling something out of the water like an old wreck. No, wait! It said “meshed catch.” I don’t know why but that makes me think of fish and, sure, if you caught fish you’d really want to get them. [Any questions?] No questions, just that I think maybe the girdie is a machine for helping the men pull in the fish or whatever it was. Maybe a type of pulley.

Colleen

I guess The Bay must have a big water fountain. [Why was the net hard to pull?] There's a lot of force on the water. [Why was it important for them to pull the net?] It was something they had to do. [What do you mean?] They had to pull the net and it was hard to do. [Any questions?] No. [Where do you think they're going?] Shopping.

Commentary

For both children the interpretations of Episode 2 built on those of Episode 1. Stephen continues to question what the men were doing. He raises a number of alternative interpretation dealing with the context of the sea. He refines his interpretations through testing hypothetical interpretations against specific details, and hypotheses of specific word meanings against his emerging interpretation of the story. At the outset he makes an inference that a girdie is a machine, but leaves details about its nature and function unspecified. He tentatively offers one specific use for the net, but immediately questions this use when he realizes that it will not account for the meshed catch, and substitutes an alternative function. He then confirms this interpretation with the fact from the story that the men were encouraged to try harder and his belief that if you catch fish you would really want to bring them aboard. Finally, he sees that he is in a position to offer a more definitive but tentative interpretation of the word girdie.

Colleen maintains her interpretation of going shopping at The Bay. When questioned about her interpretation, Colleen responds in vague or tautological terms. She seems not to integrate information relating to the terms net, catch, and sea, and it seemed satisfied to remain uninformed about the nature of the girdie and the reason for pulling the net. In the end, she concludes definitively that the men are going shopping.

Episode 3

With four quintels aboard, we were now ready to leave. The skipper saw mares' tails in the north.

Stephen

I wonder what quintels are? I think maybe it's a sea term, a word that means perhaps the weight aboard. Yes, maybe it's how much fish they had aboard. [So you think it was fish?] I think fish or maybe something they had found in the water but I think fish more because of the word "catch." [Why were they worried about the mares' tails?] I'm not sure. Mares' tails, let me see, mares are horses but horses are not going to be in the water. The mares' tails are in the north. Here farmers watch the north for bad weather, so maybe the fishermen do the same thing. Yeah, I think that's it, it's a cloud formation which could mean strong winds and hail or something which I think could be dangerous if you were in a boat and had a lot of weight aboard. [Any questions?] No.

Colleen

They were finished with their shopping and were ready to go home. [What did they have aboard?] Quintels. [What are quintels?] I don't know. [Why were they worried about the mares' tails?] There were a group of horses on the street and they were afraid they would attack the car. [Any questions?] No.

Commentary

Stephen is successful in his efforts to incorporate the new information into an evolving interpretation. From the outset Stephen acknowledges that he does not know the meaning of quintel and seeks a resolution of this unknown. He derives a meaning consistent with his evolving interpretations and with the textual evidence. In his attempt to understand the expression mares' tails he first acknowledges that he does not know the meaning of the expression. Thence, he establishes what he does know from the background knowledge (mares are horses, horses are not going to be in the water, there is nothing around except sky and water, farmers watch the north for bad weather) and textual information (the men are on the bay, they have things aboard, the mares' tails are in the north) and inferences he has previously made (the men are in a boat, they are fishing). He integrates this knowledge into a comparison between the concerns of Alberta farmers with which he is familiar, and what he takes to be analogous concerns of fishermen. On seeing the pertinence of this analogy, he draws the conclusion that the mares' tails must be a cloud formation foreboding inclement weather. He claims support for his conclusion in the fact that it would explain the skipper's concern for the mares' tails, indicating that he did not lose sight of the overall task of understanding the story.

Colleen maintains her original interpretation but does not incorporate all the new textual information into it. She works with the information on the men's leaving and the mares' tails, but appears to ignore or remain vague about other information. For example, she says the cargo was comprised of quintels but indicates no effort to determine what these things are. She cites the fact that the men were ready to leave and suggests that they have finished their shopping, but does not attempt to explain the use of such words as skipper, cargo, and aboard in the context for

shopping for clothes. She interprets mares' tails as a group of horses the possibly would attack the men, but gives no account of what the horses might be doing on the street. Basically, she appears to grow tolerant of ambiguity and incompleteness in her interpretation.

Interestingly, each student believes that he or she has read the passage. The question becomes, what does it mean "to read" something? Comprehensive, legitimate critical thinking enables us to explore the meaning of the concept "to read" and to come to understand that there is a spectrum of quality of readings, some superficial and mechanical, some deep and thorough. Specifically, Colleen has scrambled to piece together meanings that have little relationship to the writer's ideas. Colleen has "read" the passage but we can quickly see that the quality of her thinking lacks characteristics that we equate with sound reasoning, with critical thinking. She has been ineffective in thinking within the system of meanings inherent in what was said in the passage she tried to read. That her responses were inconsistent did not seem to disturb her, almost as if she had no sense of how to figure out what she was reading. The consequences for Colleen in this episode of thinking are minimal.

However, consider how vulnerable she will be outside school, when much more than grades or teacher approval is riding on her ability to think effectively in other systems, such as health care, parenting, upgrading job skills or becoming a proficient consumer.

On the other hand, Stephen has "read" the passage by means of critical reasoning, effectively decoding not only the words but the writer's thoughts. He has taken the initiative to reconstruct in his mind as much as he can of the logic of the images and concepts that the writer conveyed through the system of language. Stephen also explored the implications of his ideas and was clear about what he understood and failed to understand. He demonstrated intellectual perseverance in striving to make sense when struggling with difficult passages. He expected to make sense of the passage, to grasp the author's ideas, and finally he did. These habits, traits and abilities are among those we find in individuals for whom critical thinking is a comprehensive, substantial system of thought embedded, ideally, in every aspect of their lives. Although Colleen and Stephen have each "read" the passage, a useful distinction can be drawn between "critical reading" and "uncritical reading."

Most reading is performed at the lower end of the spectrum in school today. Very little instruction is given in the thinking skills that critical readers use. Colleen will only be able to improve with professional assistance, that is, with instruction that helps her assess her thinking using intellectual standards and a sense of the elements of thought. She needs help in learning how to think through the elements of a problem. Of course, instruction alone is insufficient. She will also need to apply her will and acquire self-discipline. She will need extensive practice and expectations placed on her effort.

As we stretch ourselves to develop our bodies we naturally feel some physical stress. So, too, do we feel intellectual stress as we stretch our minds to develop our thinking. Students must learn intellectual perseverance, intellectual responsibility, intellectual integrity to develop true intellectual "fitness." This is a lifetime process that merely begins in school. Most students are not well informed about the consequences of their uncritical thinking habits. It is likely that no one has presented these ideas to them so that they realistically grasp the possibility of intellectual

development. Let's now look at two student written responses and examine the quality of the thinking displayed, keeping in mind the implications for the students' future effectiveness.

Are We Hitting the Target, Assessing Student Thinking in Writing?

The Assignment: The students in Ms. Tamari's 8th grade class were asked to write a paragraph in which they were to explain what the most important characteristics of a "friend" are and why they are most important. Here are the written responses of two students, Susan and Carl.

Susan

A friend is someone who cares a lot about you, who likes to be with you, and who helps you out when you get in trouble. The most important characteristics of a friend are loyalty, helpfulness, and honesty. First, it's important for a friend to be loyal because you want to depend on your friend. If someone is not loyal that person may turn against you, especially if she meets someone he or she likes better than you. Second, it's important for a friend to be helpful, because often a person needs help and if you have no friends it can be real hard to feel so alone. And finally, it's important for a friend to be honest because very few people will tell you something about yourself that you don't want to hear. An honest friend will try to help you improve, even though she knows it may hurt your feelings. It's okay to hear some things from a friend because you know that she isn't trying to hurt you.

Observations

Susan is basically doing a good job critically analyzing which characteristics are desirable in a friend. First of all, it is clear that she understands the issue. First she clarifies the concept of a friend. Then she asserts three characteristics of a good friend. Then she takes each one in order and gives good reasons in support of each of them. Her writing is clear, relevant to the issue, systematic, well-reasoned, and reflects deep thinking for her age.

Now let's look at the writing of Carl.

Carl

The most important thing is to have a lot of friends who like to do the things you like to do. Then you can go places and have fun. I mostly like other boys for my friends because they like sports like me. Girls sometimes play sports too but not as good as boys. I like to play baseball, football, and basketball. Sometimes I like to play Hockey. There are no good places to play in my neighborhood and sometimes my mother makes me come in too early. She sometimes makes me very mad because she screws up my life. All she ever wants me to do is work around the house. I don't think she knows anything about having friends. Maybe if she had played sports when she was little she'd let me play more and not just think about work, work, and more work.

Observations

Almost all of Carl's writing is irrelevant to the issue of what are the most desirable characteristics of a friend. He seems simply to be writing thoughts down as they occur to him in a stream of consciousness, in an associational way. Carl begins by confusing the question "What are the most important characteristics in a friend?" with "Is it important to know a lot of people who share pleasures with you?" He then moves to the question "Who do I like?" Then he moves to the question "What do I like to do?" and then on to "What's wrong with my neighborhood?" The final question, "Why doesn't my mother let me do what I want to do?" indicates that he has ended up far off course, yet it is unlikely that he realizes it. Until Carl learns to discipline his mind to stick to the question at hand, he will have trouble doing any quality thinking.

Learning to write out our thinking is one of the best ways to improve it. It goes without saying that excellence in writing requires excellence in thinking.

Writing requires that one systematize one's thinking, arranging thought in a progression that makes the system of one's thought accessible to others. When the writer's thinking lacks a clear purpose, lacks focus, lacks documentation and logic, and standards by which to judge the merit of the ideas, these flaws are revealed in the written work.

Writing, then, which is excellent is excellently thought through and is produced by someone with definite standards for both thinking and writing. (See the chapters: "Why Students and Teachers Don't Reason Well" and "Pseudo Critical Thinking in the Educational Establishment.") It is obvious as we read the responses of Carl and Susan that each has a very different understanding of what is well-thought-out thinking and writing, critical and uncritical thinking and writing. The consequences for Carl's uncritical thinking are minimal in 8th grade, but how will he be affected when he demonstrates the same confusions on the job?

School instruction is focused on "subject matter." We usually, but wrongfully, think of school subjects as little more than masses of facts and definitions to be memorized. We don't often recognize that what is really important about school subjects is that they—when properly learned provide us raw materials upon which to practice thinking in a more proficient and insightful manner. They introduce us to new "systems" in which to think. As you read the next section, see if you can think of school subjects in this more illuminating and penetrating way.

Are We Hitting the Target? Assessing Student Thinking in Academic Subjects.

Subject Matter, Especially in High School and College Courses

Though we often do not think of it this way, all subject matter — history, literature, geography, biology, chemistry, physics, mathematics — is part of a system of logically ordered parts. A historian studies a period and creates a "story" that puts events into meaningful patterns. In literature we study periods with their distinctive visions, their distinctive values, their distinctive modes of expression. One period is "romantic," one is "classic," one is "realist," and so forth. Or we study the outlook of an author, the way he or she sees the world: Dickens, Austen, Hemingway, Faulkner. In geography we develop systems for dividing up the surface of the earth into continents, countries, climates. We develop organized, logical ways to look at the surface,

especially the physical surface, of the earth. In geology, we use a system to arrange time into geological time periods, and correlate principal physical and biological features with those periods. In biology, we develop systems for making sense of multiple forms of living and pre-living things. In math, we develop systems — arithmetic, geometry, algebra, calculus — for dealing with the quantitative dimensions of the world.

Everywhere there are systems inherent in subject matter, networks of logically ordered parts functioning in relation to each other for a definite human purpose. Critical thinking, with its system-unlocking orientation, is the perfect set of tools to take command of the systems inherent in subject matter. It is perfect, that is, only if we understand what it is and how to use it. Most students, unfortunately, have never been introduced to critical thinking, so cannot systematically use it to guide and empower their learning. Most students try to learn what is in fact systematized, by randomly memorizing fragments of the system as if they had no relation to each other. Compare the two following students talking about studying history.

Anna: “I don’t really like history too much. There is too much to try to remember. And it’s all about olden times, with a lot of dates and different wars and people doing things we don’t do anymore. You learn about presidents and kings and what they did and about when things happened. History is all about the past. It’s boring and I never use it. How could you? Things are really different now. “

Carra: “We do it differently in Mrs Brown’s class. Do you know that we’re all part of history? For example, in my mind I remember all of my past as a kind of story I tell myself. That’s how I remember things and that’s also how I figure things out. Think about it. Whenever you talk about yourself, you’re like a historian trying to help people figure things out about you. Everyone is really interested in their own history and in the history of the people they know. That’s what gossip is all about. Also, the news. It’s like the history of yesterday. In her class we talk about how the history writer puts together the story he writes.

We also look at how the story might be told differently, I mean ‘cause what we read is only a tiny part of what the writer knows, and what the writer knows is only a tiny part of what actually happened. You have to look at it from different points of view or else you don’t have a chance of figuring out what most likely really happened. We are learning how to tell the difference between “facts” and how different people filter and interpret the facts depending on their own interests. We also try to notice what is left out of the history stories we read. Mrs. Brown says we are learning to think like history writers do and face the problems that they face. I think it’s fun to try to figure out history . . . how to tell a story in the most honest way, and how to see when people twist a story to make themselves look good.”

Observations

Anna and Carra, in their reactions to history, model the distinction between the way subjects have traditionally been taught (as a lot of stuff to remember for a test) and the way they should be taught (as a way to figure things out). The traditional student never gets the real point of the subject and hence does not transfer what she learns to the “real” world. By teaching history in a

critical manner, students can readily transfer what they learn to “life-centered” situations. They can improve their own everyday historical thinking.

Critical thinking is valuable, of course, not only in school but in the world beyond school as well. If we are teaching properly, our students not only learn how to apply critical thinking effectively to their reading, writing, and subject-matter learning, they also begin to apply it to their everyday lives. The wonderful result is they not only reason historically about what is in their history textbook, for example, they also begin to reason much better about the “historical” issues in their daily life, as Carra is doing above. They not only reason scientifically about what is in their science textbook, they also begin to reason scientifically about the “scientific” questions in their daily life. They not only hear about ethical principles when talking about characters in stories in their literature class, they also begin to use ethical reasoning when dealing with the ethical issues embedded in their lives.

Indeed, if we do our job correctly, students begin to discover that all the kinds of reasoning that they learn to do at school have application in the “real” world. They not only start to talk about and value reasoning in school, they also begin to discover how actually to do it, how to realistically and effectively to apply intellectual standards to their own thought in virtually every context of their lives. The result is that students, for the first time in their lives, begin to evaluate their own thinking and do so in a way that is increasingly disciplined and objective. Let’s look at three examples of college students beginning to discover the value of applying intellectual standards to their own work and thinking.

Mandy: “I am often inconsistent. The most difficult aspect of my weakness is my attempt at achieving consistency between that of word and deed. That is, I use a double standard. I often say one thing and do another.”

Kristin: “This semester I have learned how to organize my thinking through critical thinking. In organizing my thinking logically, I have learned to break down my thought processes down into specific parts. By breaking my thought process down into specific parts I can see some of my strengths and weaknesses. When I do not organize my thought logically, my writing often becomes trivial, irrelevant and vague.”

Laurie: “It is important to recognize key concepts when one thinks. If I need to figure out a problem and do not understand the key concepts, I will not be able to come to a logical conclusion. I am more and more aware of the need to pay attention to key concepts. One particular example occurred this winter when I went snowboarding for the first time.

The relevant concepts of snowboarding are: one needs to torque the body, the back leg is your anchor, and the edges of the board are used to slow down and in turn control the speed of the board. My friend explained to me that it usually takes a whole day to learn to snowboard, but because I paid close attention to the concepts and kept them carefully in mind, I was able to learn quickly. Most students do not realize that concepts are important in learning. In fact, I think that most students don’t know what concepts are. I certainly didn’t.”

These examples demonstrate that some students are prepared to take advantage of critical thinking instruction, though others are less ready. The teacher's challenge, however, is to meet the student's needs and respond effectively with appropriate instruction.

Identifying the Target: Critical Thinking in the Workplace

With accelerating change and the increasing complexity of problems facing us at the dawn of the 21st Century, we are striving to compete within the new global economic realities. John Sculley, CEO of Apple Computer, Inc. reported to President-elect Clinton in December of 1992:

Most Americans see our largest corporations going through massive restructurings, layoffs, and downsizing. People know something has changed and they are scared because they don't fully understand it and they see people they know losing their jobs.

They also see their neighbors buying high-quality, lower-priced products from abroad, and they ask why can't we build these same products or better ones here at home?

The answer is, we can. But only if we have a public education system that will turn out a world-class product. We need an education system that will educate all our students, not just the top 15–20 percent.

A highly-skilled work force must begin with a world class public education system. Eventually, the New Economy will touch every industry in our nation. There will be no place to hide!

In the New Economy, low-skilled manual work will be paid less. The United States cannot afford to have the high-skilled work being done somewhere else in the world and end up with the low-wage work.

This is not an issue about protectionism. It is an issue about an educational system aligned with the New Economy and a broad educational opportunity for everyone. Maximum flexibility.

In the old economy, America had a real advantage because we were rich with natural resources and our large domestic market formed the basis for economies of scale.

In the New Economy, strategic resources no longer just come out of the ground (such as oil, coal, iron, and wheat). The strategic resources are ideas and information that come out of our minds.

The result is, as a nation, we have gone from being resource-rich in the Old Economy to resource-poor in the New Economy almost overnight! Our public education system has not successfully made the shift from teaching the memorization of facts to achieving the

learning of critical thinking skills. We are still trapped in a K–12 public education system which is preparing our youth for jobs that no longer exist.

Critical thinking is valuable not only in school but in the world beyond school as well. Increasingly, our ever-changing economy demands abilities and traits characteristic of comprehensive critical thinking. They enable us not only to survive but to thrive. They are essential to the new management structures to which successful businesses will routinely and increasingly turn. Consider the news item opposite, from a small town in Wisconsin. It illustrates well a trend which is going to grow enormously, and that is toward high productivity work-place organizations that “depend on workers who can do more than read, write, and do simple arithmetic, and who bring more to their jobs than reliability and a good attitude. In such organizations, workers are asked to use judgment and make decisions rather than to merely follow directions. Management layers disappear as workers take over many of the tasks that others used to do . . .” [Laura D’Andrea Tyson, Chairwoman of the President’s Council of Economic Advisors]. Ladysmith, Wisconsin gives us an opportunity to see this trend displayed.

Mill Interviews 83 for Jobs

Between June 10 and 17, City Forest Corporation completed assessments of 83 candidates for jobs at the soon-to-be-opened paper mill in Ladysmith. The mill, formerly operated by Pope & Talbot, has been idle since last Aug 14.

Candidates for positions at the mill went through a half day “assessment center” to determine their potential for the new work concept to be implemented at the mill. The assessment center included several group problem-solving sessions as well as an oral presentation, written presentation and traditional interview

When the mill reopens, it will operate under a “self-directed team” method. With that approach there are no first line supervisors. Instead, workers are organized into teams that are responsible for much of the decision making and problem solving previously handled by the supervisor.

Each of the four production shifts will have a team leader. The production teams will be supported by a maintenance team . . . and a staff team made up of management and other staff support. The beauty of this new system is that it places more of the control of the day-to-day operation in the hands of the individuals who are doing the hands-on work.

— Ladysmith News, Ladysmith, Wisconsin Thursday, June 24, 1993.

How important, then, is our role as teachers? Can we rely on parents to understand and to provide these essential abilities and traits for their children? Will the children master them on the streets or with their friends? It seems unlikely. How important, then, is it that we, ourselves, devote our professional energies to examining and assessing our own thinking? Can we do a proficient job of helping our students if we are not equally committed to improving our own abilities, traits and habits as well?

Our professional responsibility extends to recognizing that we may very well find that we need to assert our will, our initiative, our discipline and curiosity to secure the best materials and resources available to meet this obligation. How much care, then, should we use in selecting materials that will take us where we want to go, to a deep and comprehensive understanding and working knowledge of legitimate critical thinking?

**Off the Target:
Pseudo-Critical Thinking Approaches and Materials**

Critical thinking cannot be seen, touched, tasted or heard directly, and thus it is readily subject to counterfeit, readily confused with thinking that sounds like, but is not critical thinking, with thinking that will not lead students to success in school and beyond. Critical thinking is readily falsified in the commercial world by those who seek to capitalize on its growing legitimacy. We increasingly need a regular Consumer Report that enables the reader to effectively recognize the counterfeits of good thinking, which are multiplying daily, to help us recognize the latest gimmick du jour. The characteristics of comprehensive critical thinking outlined in this chapter make available just a beginning set of criteria by which professionals and parents can evaluate educational resources in this field.

Educators, business and governmental leaders must begin to distinguish the genuine from the counterfeit, the legitimate from the specious, the incomplete from the comprehensive. Smooth, slick, and shallow thinking are everywhere around us, filled with promises of simple, quick, instant solutions, or misdirecting us into schemes that mispend our own or public monies. Other chapters of this book will provide many examples, principally from the field of education. The reader will doubtless be able to add other examples from his or her own experience.

That we need sound critical thinking to protect ourselves and the public good is intuitively obvious, once we are clear about what critical thinking is and what it can do. Identifying the target precisely, however, is the first step in facing the challenges ahead.