

Preface: Discussion of Critical Thinking Concepts

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Critical thinking is the art of taking direct action on your thinking . . . in order to make it better. It means learning to think ABOUT your thinking in a self-correcting manner.

I spontaneously jump to a conclusion: *"You're just like all girls!"*

I put my critical thinking into action: *"Wait, what do I mean by that?" What are "all girls" like? "Do I really mean that, or am I just sounding off?"*

I spontaneously think: *"Why do I have to do all the work?"*

I put my critical thinking into action: *"Wait, that's not true! I don't have to do all the work. Most of the other people in my family do a lot more work than I do. I must be just sounding off because I don't want to do any work."*

Critical thinking means stopping ourselves and asking ourselves whether our thinking is making sense, whether we are accurate in the way we are depicting situations and events, and whether we are logical in the conclusions we are coming to. It's like the traffic light that monitors the traffic, forcing it to stop and check before it goes forward.

When we are thinking critically we routinely probe our thinking. We constantly ask ourselves questions which force our thinking to a higher level, questions which assess our thinking and uncover the flaws within it. As a result, when we are thinking critically we come to realize the importance of applying intellectual standards to thinking. The majority of this software series focuses on teaching young children such standards. Critical thinkers consistently ask questions such as:

- Am I clear about what the directions are? Am I clear about what the teacher is asking me to do? Am I clearly stating what I am thinking? Is there a better way to tell this story so that people will understand me better?
- Am I accurate in what I am saying? Are the facts that I am using accurate? How do I know they are? How can I check to see whether they are? Have I checked to make sure that the facts I am using are relevant? When my teacher asks me a question, do I answer with relevant information, or do I say things that don't relate to the question?
- Do I think through problems to make sure that I come to logical conclusions? Do my answers make sense, or are they somehow illogical?

In this computer software series, *Thinkology™*, the focus is on helping young children begin to understand what it means to take active command of their thinking, to begin to put into action *"intellectual"* tools of success both in and out of school. The series begins with an emphasis on the intellectual standard of clarity. If our thinking is unclear, our ability to communicate, and even to understand what we ourselves are thinking, is impaired. We cannot evaluate thinking we don't understand.

As we know all too well, young children are often unclear about what they are trying to say. Even when they are relatively clear about their meaning, they are often unskilled in how to construct sentences so that they are clear to others. Therefore they need considerable practice in clarifying their thinking and in communicating that thinking to others.

In addition to teaching students to understand the importance of clarity in thinking (which is what we do in the first module of *Thinkology*, Volume I: Clarity), in subsequent volumes we focus on the intellectual standards of accuracy, and logicalness.

Thinkology is designed to help students in understanding these basic critical thinking concepts, and the important role they play in high quality thinking. It is practice oriented. Nevertheless, teachers interested in helping their students develop as critical thinkers must bring critical thinking into the heart of their instruction. They must identify and formulate teaching strategies designed to develop the intellectual capabilities of children. In other words, although this computer software package should be highly effectual in introducing important critical thinking concepts to students, its long-term effectiveness will be determined by the extent to which critical thinking is fostered throughout the curriculum and by the extent to which teachers foster critical thinking each and every day in the classroom.

Indeed the very meaning of the word “education” implies the development of a host of abilities of mind; abilities which enable a person to deal with multiple situations, to face complex problems, and to reason well throughout the affairs of daily life. Thus when we foster critical thinking in the classroom, students are enabled not only to better meet our curriculum objectives but also to function more successfully in their lives.

Although critical thinking, which requires disciplined reasoning, has been largely ignored in the schooling process, the “ideal” of an educated person has been the focus of many a great thinker for hundreds of years. Consider this thought from the eminent 19th Century British educator John Henry Newman (1852),

“When I speak of knowledge, I mean something intellectual, something which grasps what it perceives through the senses; something which takes a view of things... which reasons upon what it sees, and while it sees; which invests it with an idea.”

Newman speaks of the intellect as that part of the mind which:

“...has been disciplined to the perfection of its powers, which knows and thinks while it knows, which has learned to leaven the dense mass of facts and events with the elastic force of reason, such an intellect cannot be partial, cannot be exclusive, cannot be impetuous, cannot be at a loss... because it ever knows where it stands and how its path lies from one point to another.”

And Newman eloquently points out that a person may be well schooled, yet:

“by lingering in the vestibule of knowledge - he may not realize what his mouth utters; he may not see with his mutual eye what confronts him; he may have no grasp of things as they are; ... no power of discriminating between truth and falsehood, of sifting out the grains of truth from the mass. Such... is an acquired faculty of judgment, of clear-sightedness... of sagacity, of wisdom... of intellectual self-possession and repose.. the eye of the mind, of which the object is truth, is the work of discipline and habit.”

Although these comments may appear as “lofty ideas,” in essence what Newman is pointing out is that the disciplined mind is the mind which is habitually clear, which can distinguish between the true and the false, which is logical in its approach to solving problems. It is the mind which is not impulsive, but carefully works its way through issues. It is the mind which relies upon reason as its guide. It is the mind which is able to pull out the relevant from the “mass” of both relevant and irrelevant information. It is the mind which uses sound judgment, and which has keen insight. It is, in other words, the critical thinking mind.

This “*ideal*” of people capable of living lives of rationality or reasonability, of people having disciplined minds, has been the focus of great thinkers from Socrates 2400 years ago to Bacon, Descartes, Hobbs, Locke, and Dewey, as well as many others. Yet this ideal has yet to make it to the every day classroom in a deep and lasting way.

Key Critical Thinking Concepts

Although there are a number of important critical thinking concepts which students need to learn, there are none more important than those which are the focus of *Thinkology*. They include the universal intellectual standards of clarity, accuracy, as well as the concept of logicalness. In this section we elaborate on the meaning of these three concepts, as well as provide the general strategy used in teaching each concept.

Clarity

Clarity is the gateway intellectual standard, the standard which makes communication possible. To effectively communicate, I must begin with a clear mind, clear ideas, clear purposes and goals, clear questions, clear information, clear-cut implications, clear conclusions, and clear ways to think about things. Once made clear, a thought is distinct, evident, intelligible, obvious, plain, understandable, and vivid.

In contrast, thinking which is unclear is confused, muddy, obscure, ambiguous, vague, dim, murky, indistinct, unspecified, unintelligible mixed up, or entangled with other ideas.

Clarity is the gateway standard because without clarity of thought, no other evaluation can be made. Without clarity, we cannot judge other standards such as relevance, depth, significance, accuracy, logicalness, consistency, coherence, etc.

The key to clarity of thought is practice in the clarification of thought. Therefore the structure of this volume provides for multiple, on-going acts of clarification.

Strategy: To provide for interactive practice in the critical thinking skills of distinguishing the clear from the unclear, and of distinguishing different levels of clarity.

Accuracy

To be accurate means to be free from errors, mistakes, or distortion. When we are concerned with accuracy, we seek to conform with fact or truth. Accuracy is an important goal in critical thinking although it is very often a matter of degree. To be adept at discerning whether something is accurate in any given situation presupposes practice in doing so. We want our students to be able to figure out when the information they are considering is accurate, whether a word is being used accurately, whether a word is spelled accurately, whether what someone says is accurate, whether what they read is accurate, whether numbers are being manipulated and or understood accurately. Furthermore we want students to be able to determine whether their interpretations are accurate, as well as whether another person is interpreting a situation or issue accurately.

Strategy: To provide for interactive practice in the critical thinking skills of distinguishing the accurate from the inaccurate in a broad array of contexts.

Logicalness

The word ‘*logic*’ covers a range of related concerns all bearing upon the attempt on someone’s part to give meaning to something or figure it out. All human thought is to some extent based on logic rather than instinct. Humans try to figure things out using ideas, meanings, and thought. Such intellectual behavior inevitably involves logical considerations: some sense of what is relevant and irrelevant, of what

supports and what counts against a belief, of what we should and should not assume, of what we should and should not claim, of what we do and do not know, of what is and is not implied, of what does and does not contradict and of what we should or should not do or believe.

Where something is “*logical*” it is “*reasonable*,” or follows from sound judgment. When a person is logical, he or she is effectively presenting or reasoning something through.

Strategy: To provide for interactive practice in the critical thinking skill of distinguishing the logical from the illogical, and of distinguishing the most logical from the least logical. To introduce the concept “the logic of,” and give children practice in figuring out the logic of numerical sequencing, the logic of a story, and the logic of a sentence.

How Critical Thinking Helps with Classroom Objectives

We know that you are continually faced with the problem of bringing innovations into the classroom while also focusing on the basic curriculum objectives you are required to teach. One of the important things to know about critical thinking is that, when emphasized through instruction, it will help your students meet the objectives established for their grade levels.

For example, when students learn the significance of clarity in thinking, when they learn the importance of logicalness in thinking, and when they see the power of accuracy in thinking, they are better able to do the high quality thinking we are requiring of them in their daily work.

In this section, by focusing on a few examples, we illustrate how critical thinking fosters the teaching of fundamental classroom goals, as outlined in traditional report card objectives.

Let us first begin with clarity. If we expect students to follow directions, they must be clear about what the directions are. When they understand the importance of clarity in thinking, they know to ask questions of clarification such as “*I don’t understand exactly what you are asking us to do. Could you clarify the directions? Could you give me an example of what you mean?*”

If we expect students to learn to listen attentively we must teach them how to clarify what they are hearing in a similar manner. For example, we teach them to continually ask themselves, “*Am I clear about what I am hearing? Is there any thing about what I am hearing that is confusing?*” In so far as they are unclear, students who are critically thinking are skilled at asking, “*Could you elaborate on what you said? Could you explain it in other words?*”

In addition to focusing on clarity, we must teach students to develop their ability to be clear, accurate, and logical in their thinking. If we are interested in developing our students’ abilities to name letters, or match upper and lower case letters, to count to 100 by 10’s or identify coins, we must be concerned with accuracy. Indeed students must come to understand the importance of accuracy in thinking in a general way. For instance they must come to value the ability to accurately reconstruct events in a situation, so that they recognize when they may be distorting information, or misrepresenting what actually happened. If they value accuracy, they will avoid mistaking the “*facts*” of a situation.

If we desire that our students learn to sequence picture cards to tell a story, to recognize numbers out of sequence, to tell a story about an event, to continue a pattern, we must teach them the importance of logicalness in thinking. They must learn that things must make sense, that they must fit together, logically.

These are a few examples which illustrate the primary role critical thinking plays in any good educational program. When students have fundamental critical thinking skills, they are better able to think through any

classroom assignment. They know when they are unclear, and how to clarify their thinking. They strive to be accurate in their work. They value the importance of accuracy in what they say, and in their written work. They are logical in the way they approach assignments.

While these are but a few of the critical thinking skills teachers should foster in students' thinking as we have previously discussed, they are among the most fundamental. When students are able to consistently use the intellectual standards of clarity, accuracy, and logicalness in their reasoning, they possess some of the most important critical thinking abilities.

Students Need High Quality Reasoning Skills

When we teach children to think critically, they improve their ability to meet our curriculum objectives. They can learn anything more effectively. Yet there is, perhaps, an even more important reason to place critical thinking at the foundation of our instruction. The truth is that the world is changing at such a high rate of acceleration, that the world is becoming increasingly more complex, and that the people of the world are becoming ever more interdependent. These global realities are rapidly working their way into the deepest structures of our lives: economic, social, and environmental realities. They have profound implications for teaching and learning.

Remember the time when high school graduates could easily find long-term stable employment, when the high school diploma was the ticket to job and financial security, when people kept the same job all of their working lives? Now the average person changes their career—not just their job—3 to 7 times in a lifetime. The acceleration continues. Our children will need minds for which change is a way of life, in which the complex and unpredictable are normal and ordinary.

Of course, we cannot learn for our children. They must do the work of it. And, of course, they are naturally egocentric and therefore think within a narrow self-serving point of view. Furthermore they are cognitively limited by age. What we can do with young children is to BEGIN the process of developing their minds.

We can help them take those first steps toward becoming disciplined thinkers. We can teach them that good thinkers are thinkers who are open to reason, who understand that complexities are often inherent in problems and that those complexities must be carefully thought through, who understand that disciplined thinking involves high quality assessment of thinking. We can do this by focusing on basic, yet powerful, critical thinking concepts such as those which are the focus of *Thinkology*. For example, we can teach them the value in thinking which is clear, and not muddled, in thinking which seeks the truth rather than deceives itself into misrepresenting the truth, in thinking which makes sense, which is logical rather than incoherent.

Students Lack the Critical Thinking Skills They Need

It is clear, then, that the world is becoming more and more complicated, so that the issues our children will face in their futures are sure to be even more complex than those we are experiencing now. Yet the majority of students, when they leave high school, are grossly under-prepared for the complex realities that lie ahead for them. As John Sculley, former CEO and Chairman of Apple Computer, put it:

"In the new economy, strategic resources no longer just come out of the ground. The strategic resources are ideas and information that come out of our minds. The result: 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 them 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 children for jobs that no longer exist."

Important Research Findings

It is clear that students are not learning the reasoning skills they must have to succeed in their future careers. A summary of research by Mary Kennedy (1991) regarding student learning and instruction at the K-12 level documents the serious reasoning deficiencies of students:

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 that our 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 rationales, 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 creating generations of teachers who re-create generations of students who are not prepared for the technological society we are becoming."*

(Condensed from "Policy Issues in Teaching Education" by Mary Kennedy in the Phi Delta Kappan, May, 1991, pg. 661, Resources and Programs in Critical Thinking.)

The Foundation for Critical Thinking

Despite the fact that little is being done on a broad scale to develop the critical thinking skills of students, many resources are available to assist teachers in this endeavor. **The Foundation for Critical Thinking**, which played a primary role in the development of this software, offers a variety of resources and services for the teacher committed to teaching for deep and insightful learning. The Foundation, in conjunction with the Center for Critical Thinking at Sonoma State University in California, seeks to promote essential change in education and society through the cultivation of fair minded critical thinking.

The Foundation's philosophy is as follows:

"Critical thinking is essential if we are to get to the root of our problems and develop reasonable solutions. After all, the quality of everything we do is determined by the quality of our thinking. Whereas society commonly promotes values laden with superficial, immediate "benefits," critical thinking cultivates substance and true intellectual discipline. Nothing of real value comes easily; a rich intellectual environment - alive with curious and determined students - is possible only with critical thinking at the foundation of the educational process."

The Foundation is committed to providing the support that teachers need to effectively bring critical thinking into the classroom. Among the products available are a set of handbooks for K-12 educators. These are individual teacher's guides to restructuring lesson plans for K-3, 4-6, 7-9, and high school. The Foundation also offers professional development workshops in critical thinking. To receive a brochure which details the services and products provided through the Foundation for Critical Thinking, **call toll free (800) 833-3645**, or visit the Critical Thinking Community on the worldwide web at **www.sonoma.edu/cthink/**. We look forward to hearing from you as you integrate critical thinking into your curriculum using *Thinkology*.