Session 9

The Leader’s Real New Work
Learning and Communication Through Critical Thinking

4 Reasoning
4 Semantic Structuring (Version 1)
4 Semantic Structuring (Version 2)
4 Scientific Method
4 Learning Taxonomy

The Leader’s Real New Work
Learning and Communication Through Critical Thinking

How Do We Learn?

4 By Experimentation: John Harrison and the Longitudinal Clock
4 By Speculation: Albert Einstein and the Theory of Relativity
4 By What Other Sources of Knowledge Tell Us: Fermi, Vienna Circle, Bloomsbury Group, Bauhaus Group...

Scientific Method

4 State the Problem
4 Develop Hypotheses
4 Develop an Experiment
4 Gather Data
4 Test Hypotheses
4 Draw Conclusions
4 Report on Results

The Leader’s Real New Work
Learning and Communication Through Critical Thinking

Definition

Critical Thinking is purposeful goal directed thinking. It is the art of thinking about what one is thinking about in order to make it more clear, more accurate, and ultimately more defensible
Reasoning

The Eight Elements of Reasoning

4 Purpose or Goal
4 Question
4 Ideas or Concepts
4 Assumptions
4 Data, Information, and Facts
4 Inferences
4 Point of View
4 Consequences and Implications

The Eight Elements of Reasoning

Element # 1: Purpose

Purpose is concerned with what we want to accomplish when we reason. In other words, what is our intent, or that of the presenter? For example, we may wish to show that ERP Systems can dramatically improve business effectiveness and efficiency.

Element #2: Question

What is the consequential question being presented or addressed? Is there one? Why should I or you be interested in the topic? Is the question /problem related to the purpose? Following the ERP example, a related question might be: Can ERP systems be employed in connection with the Internet to improve customer to business marketing or to build a customer knowledge base?
The Eight Elements of Reasoning

Element # 3: Ideas or Concepts

It is imperative that the ideas and concepts be clearly stated, and used correctly. In keeping with the idea of the role that learning plays in innovation, ideas or concepts such as those of Heizenberg, Capra, and Maturana and Varela, should be discussed.

Element # 4: Assumptions

Assumptions are ideas that are taken for granted. Reasoning is based on our existing assumptions. Identifying and testing assumptions is essential to ensuring correctness. Surfacing and testing assumptions enables us to prioritize them, and determine which we need to focus on more. Following the innovation problem, we assume that people learn in one of three ways - by experimentation, by speculation and by what others tell them. We might correctly assume therefore that learning can be greatly enhanced by improved communication.

Element # 5: Data, Information, Facts

It is important to know the source and accuracy of the data, information and facts employed in an argument. Today, much of what we use by way of data comes from the Internet yet using the Internet is often a questionable way to arrive at facts. It is important to restrict one’s claims to those that can be supported.

Element # 6: Inferences

Inferences are what people create from concepts and assumptions. It is essential that a well developed line of reasoning be presented. I may reason that because it is dark and cloudy, that it will probably rain today. Here I am basing my inference on some well established data, and knowledge concerning past experiences. Infer only what evidence implies. Identify the assumptions which lead you to your inference.

Element # 7: Point of View

It is important to understand the point of view of the presenter. Does the point of view exclude other points of view? For example in explaining how people learn, does the Gestalt psychologist in consider the point of view of the Behaviorist?

Element # 8: Consequences and Implications

This is really the point where the individual, regardless of whether he be a presenter or a reviewer, must evaluate the consequences drawn from the reasoning.

The Universal Standards

Standard # 1: Clarity

Statements must be clear because if they are not it is difficult to determine whether they are accurate or relevant. For example, the statement “critical thinking will increase our ability to learn” is not accurate. Ways to ensure clarity include questions such as: Could you elaborate further or could you give me an example?

Standard # 2: Accuracy

A statement might be clear, but not accurate. For example the statement “critical thinking will increase our ability to learn” is not accurate. Ways to ensure accuracy include questions such as: Is it really true, or how could we check on that?
Reasoning
The Universal Standards
Standard # 3: Precision
A statement can be clear and accurate, but not precise. For example, the statement “if we learn to think critically, we will be able to improve our ability to communicate” is not precise. Questions designed to improve precision include: Could you give me more details, or could you be more specific?

Standard # 4: Relevance
Statements can be clear, accurate, and precise but not relevant. For example, the statement “communication will make us better citizens is not relevant to innovation.” Ways to ensure relevance include questions such as: How is that connected to the question, or how does that bear on the issue?

The Leader’s Real New Work
Learning and Communication Through Critical Thinking
Reasoning
The Universal Standards
Standard # 5: Depth
A statement can contain all of the above standards but not have sufficient depth to determine whether the reasoning is dealing with the most significant facts. Beware of structural or surface terms. Ways to ensure depth include questions such as: How does your answer address the complexities in question?

Standard # 6 Breadth
Breadth ensures that various points of view are examined. In the political area, one party might delve deeply into an area but fail to take into account the other party’s point of view. This is dangerous because it avoids important stakeholders and possibly damaging assumptions. Ways to ensure breadth include questions such as: Is there another way to look at this, or do we need another point of view?

The Leader’s Real New Work
Learning and Communication Through Critical Thinking
Reasoning
The Universal Standards
Standard # 7: Logic
This is really the test to determine whether something makes sense. Checking statements to ensure a logical framework is important to ensure and protect integrity. Here we look for contradictions in what has been concluded. Ways to ensure logic include questions such as: Does statement B follow from what has been said, or does the first paragraph fit with the last?

Standard # 8: Significance
This really is designed to address the purpose and questions raised initially. Ways to ensure significance include questions such as: Is this the most important problem to consider, is this the central idea to focus on, or which of these facts are most important?

The Leader’s Real New Work
Learning and Communication Through Critical Thinking
Reasoning
Critical Intellectual Traits
4 Humility: Having a consciousness of the limits of one’s knowledge. We should not claim to know more than we know. It implies the lack of pretentiousness or conceit.
4 Courage: This requires that individuals challenge what they learn rather than accept it at face value. This implies the need to look more deeply into various viewpoints that run counter to those that we hold. Willing to learn, to change, to unlearn, but to have the courage of right founded convictions.
4 Empathy: Recognizing the need to put oneself in the place of others. It requires a consciousness of our egocentric tendencies to identify truth with our perception of previous experience and beliefs.
4 Integrity: One must apply the same standards when looking at opposing points of view as when looking at their own arguments. Honestly admitting errors in one’s thought and actions.
4 Perseverance: Recognizing the need to employ intellectual standards in spite of the difficulties and obstacles this may present. The recognition that it may take time to make sense of confusing situations and to develop a necessary deeper understanding or insight.
Critical Thinking

Category 1: Summary/Definition

At this level, the critical thinker must attempt to determine relevant knowledge. Here the term knowledge means basic facts. It does not imply comprehension. The critical thinker attempts to determine the glossary of terms that apply to the problem. Questions that can be employed include: Who, when, what is? Other questions include: Can you give me an example? In the event that someone is talking or writing about the computer language JAVA, an appropriate set of questions might include: What is JAVA, who uses it, and when? Here the critical thinker attempts to determine the various entities appropriate to a problem or question, and the key terms that apply to these entities.

Category 2: Analysis

Here the critical thinker attempts to focus on the parts and their functionality as they relate to the whole. Processes are important here. Continuing with the JAVA example, the critical thinker would want to know the steps involved in using JAVA to develop a warehouse object. Examples of analysis questions include: How, what is the reason for, what other examples are there? What is the relationship between x and y? During analysis, the critical thinker is looking for evidence or proof of support... cause and effect.

Category 3: Hypothesis

Here the critical thinker tends to focus on hypothetical consequences. Questions that are employed include: What would happen if x occurs? If y had happened what would be different? These questions help us understand possible consequences that might not be apparent at first. A question such as what do linked list do to your JAVA program is such an example.

Category 4: Evaluation

Here we are looking for a judgement. Questions such as: Is x good or bad, effective or ineffective are examples of evaluation type questions. Questions such as: What are the advantages or disadvantages are designed to determine whether the material presented is of any value and can be employed. A specific question might be: How helpful is JAVA requires an assessment of the tool. Here we look for evidence to support the conclusion.
The Leader’s Real New Work
Learning and Communication Through Critical Thinking

A Critical Thinking Exercise
...The objective of this Essay is to assert one very simple principle, as entitled to govern absolutely the dealings of society with the individual in the way of compulsion and control, whether the means be physical force in the form of legal penalties or the moral coercion of public opinion. The principle is, that the sole end for which mankind are warranted, individually or collectively, in interfering with the liberty of action of any of their number is, self-protection. The only purpose for which power can be rightly exercised over any member of a civilized community, against his will, is to prevent harm to others. His own good, either physical or moral is not a sufficient warrant. He cannot rightfully be compelled to do so or forbear because it will be better for him to do so, because it will make him happier, because, in the opinions of others, to do so would be wise, or even right. There are good reasons for remonstrating with him, or persuading him, or entreating him, but not for compelling him, or visiting him with any evil, in case he do otherwise. To justify that, from which it is desired to deter him must be calculated to produce evil to some one else. The only part of the conduct of any one for which he is amenable to society, is that which concerns others. In the part which merely concerns himself, his independence, of right absolute. Over himself, over his own body and mind, the individual is sovereign.

*From J.S. Mill's On Liberty*

---

**Semantic Structuring (Version 2)**

*Types of Questions*

<table>
<thead>
<tr>
<th>Entities and Processes</th>
<th>Specific Process Tasks</th>
<th>Subtasks</th>
<th>Confirmation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concept Completion &amp; Definition</td>
<td>Instrumental</td>
<td>Causal Antecedent &amp; Consequence</td>
<td>Verification &amp; Disjunctive</td>
</tr>
</tbody>
</table>

**Summary/Definition:** What is J.S. Mill basically saying here? What is meant by “harm to others”? What does remonstrating mean?

**Analysis:** Why does Mill say what he says? What evidence does Mill use to support his ideas? How do Mill's views relate to those of his contemporaries?

**Hypothesis:** How might Mill's ideas be different if he were writing today? What if we applied this to a discussion of smoking?

**Evaluation:** Do I agree with J.S. Mill? Is Mill persuasive in his discussion of On Liberty? Why? What would be the advantages of adopting Mill's views?