

CRITICAL THINKING AND PROBLEM SOLVING



Scope of Presentation

- **Critical Thinking Vs Problem Solving**
- **Skills in Solving Problems**
- **Socratic Questioning**
- **A Developmental Problem Solving process**



Teaser

Is there any difference
between

Critical Thinking and
Problem Solving?



Critical Thinking

- Critical Thinking is an intentional and reflective way of **analysing and evaluating** issues or circumstances in order to **gain new insights**, and/or arrive at a **reasonable—rather than only—conclusion**



Problem

- Any negative situation, issue, or matter that is unresolved.
- Any question or matter involving doubt, uncertainty, or difficulty. A matter about which it is difficult to decide what to do.



Problem Solving

- Problem Solving focuses on a specific situation.
- “Problem Solving is a mental process that involves discovering, analyzing, and solving problems to overcome obstacles and find a solution that best resolves the issue.”
-
- “Don’t find fault...find a remedy!”



-Henry Ford

Skills Necessary for Effective Problem Solving

- Critical thinking is one of the most vital skills you can possess for problem solving in all areas of life.
- Critical Thinking can help you to define and solve real problems, to ask the right questions, to decide if a position or solution is valid, or to suggest a path forward for an important issue.



- There are a number of strategies and models through which critical thinking skills are applied in problem solving but the ones we are going to explore in the session are the **Socratic Questioning** supported with A Developmental Problem Solving Process **Steps to better Thinking.**

- **Socratic Questioning lies at the heart of Critical thinking**



Socratic Questioning

- Socratic Questioning is a way to ask the right questions in order to distinguish the real problem from the stated or perceived problem.
- Asking the right questions in a presentation, meeting, or conversation to get at the heart of the issue is a skill that sets critical thinkers apart from others.



Socratic Questions help to discover the real problem.

- When you are given a problem or problem statement, rather than discovering it yourself, it is important that you make sure the problem you were given accurately reflects the true situation.
- It helps identify the boundaries of the problem and helps you learn if you are getting to the heart of the problem as you continue questioning.



9 Types of Socratic Questions

- 1) Questions for Clarification:**
- 2) Questions that Probe Purpose:**
- 3) Questions about the Question:**
- 4) Questions about Viewpoints and Perspectives:**
- 5) Questions that Probe Assumptions:**
- 6) Questions that Probe Reasons and Evidence:**
- 7) Questions that Probe Concepts:**
- 8) Questions that Probe Inferences and Interpretations:**
- 9) Questions that Probe Implications and Consequences:::**



- **Questions for clarification:**

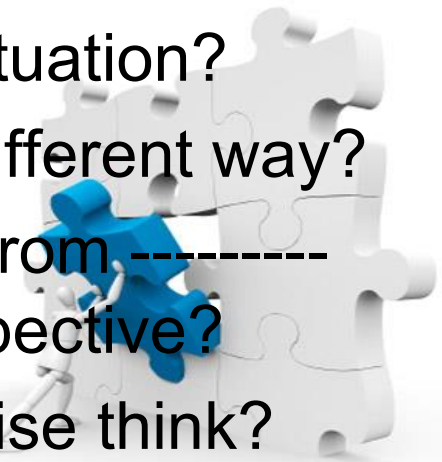
- What is the main point?
- What do you think is the main issue here?
- Let me see if I understand you. Is the main problem ----- or -----

- **Questions about the Question:**

- Do we all agree that this is the question?
- Why is the question important?
- Who raised the question?
- What does this question assume?



- **Questions that probe purpose:**
 - What is the purpose of solving this problem?
 - What is the desired end-state to which we are working?
 - What are the goals of each of the stakeholders? Do stakeholders' goals conflict?
- **Questions about Viewpoints and Perspectives:**
 - Is there an alternative explanation to the situation?
 - Can/Did anyone restate the problem in a different way?
 - You seem to be approaching the problem from ----- perspective, why this rather than that perspective?
 - What might someone with ----- expertise think?



- **Questions that probe assumptions:**
 - What are your assumptions?
 - What could we assume instead?
 - You have based your reasoning on the idea that ---Why base your reasoning on ----- rather than -----?
- **Questions that probe reasons and evidence:**
 - Do you have any evidence for that?
 - What are your reasons for saying that?
 - Are these reasons adequate? What other information do we need?
 - How do you know? What difference does that make?



- **Questions that Probe Concepts:**

- What are the key concepts that pertain to this problem?
- Are the stakeholders working from common conceptual framework?
- Is our mental model of this problem constraining us?

- **Questions that Probe Inferences and Interpretations:**

- How does my solution to the problem differ from legacy solution? Why is it different?
- Have I given enough thought to a broader range of solutions?
- What other narrative or back story could be responsible?



- **Questions that Probe Implications and Consequences:**

- What are the direct implications of this decision?
- What are the secondary implications of this decision?
- How could undesirable implication be avoided?
- How do we think neighbours/competitors/enemies/regulators et,c will respond?
- What other problems related or unrelated might our conclusions address?
- What are the risks if we are wrong?



Steps for Better Thinking

- Presents sequential steps of the process— identify, explore, prioritize, and envision— which form a building block that helps individuals move toward better solutions to open-ended problems.
- The steps help people organize their work and deal with problems as thoroughly as time and other resources permit.
- More thorough efforts in the lower less complex steps support stronger performance in the higher more complex steps.



- **Wolcott, 2006**

Steps for Better Thinking

Steps	Thinking Competency	Performance Pattern
Foundation	Knowledge and Skills	Confused Fact-Finder
Step 1	Identify the problem, Relevant information and Uncertainties	Biased Jumper
Step 2	Explore Interpretations and Connections	Perpetual Analyzer
Step 3	Prioritize Alternative and Implement Conclusions	Pragmatic Performer
Step 4	Envision and Direct	Strategic

Foundation - Knowledge and Skills:

Confused Fact-Finder

- The Confused Fact-Finder has a strong tendency to deny ambiguity especially in cases where his prior perception is that the subject matter is highly structured with clearly distinguishable right and wrong answers.
- He fails to realistically perceive the complexities and ambiguities of open-ended problems, and he does not understand the legitimacy of different points of view.



- He does not acknowledge the need to make a well-founded judgment; all problems have answers that are dichotomous (e.g., right/wrong, good/bad, or smart/stupid).
- In cases where he believes that authorities do not yet know all the right answers, he tends to reach and justify his opinion based on prior beliefs or his “feelings.” He sometimes asserts that his opinion is “logical,” but he does not consistently use logical arguments to reach or to justify a conclusion.

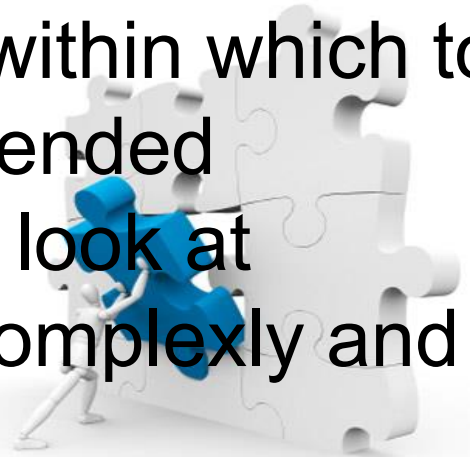


Step 1 - Identify the Problem, Relevant Information, and Uncertainties: The Biased Jumper

- This step involves two components:
 1. Identify problem and acknowledge reasons for enduring uncertainty and absence of single "correct" solution
 2. Identify relevant information and uncertainties embedded in the information



- Biased Jumper can distinguish between well-structured and open-ended problems but proceeds as if her goal is to stack up evidence and information to support conclusion.
- Unfortunately, the Biased Jumper has not yet developed an adequate framework within which to understand information about open-ended problems. Accordingly, she tends to look at problems superficially, rather than complexly and broadly.



- She tends to “jump to conclusions.” She often ignores or discounts information that contradicts her own point of view.
- She sometimes seems overly confident in her conclusions because of her limited understanding of alternative viewpoints. She may insist that all opinions that can be supported with evidence are equally valid.
- Because of this and also because her own solution is not well supported, she may become defensive if challenged or when confronted with new evidence.



Step 2 - Explore Interpretations and Connection: The Perpetual Analyzer

- The Components of this step include:
 1. Interpret information through:
 - Recognizing and controlling for own biases
 - Articulating assumptions and reasoning associated with alternative points of view
 - Qualitatively interpreting evidence from a variety of points of view
 2. Organize information in meaningful ways that encompass problem complexities



- The Perpetual Analyzer is capable of understanding problems in a very complex way and can talk about how different facets of a problem lead to its complexity but proceeds as if goal is to establish a detached, balanced view of evidence and information from different points of view.
- He is aware of his own limitations and biases in understanding a problem, and he understands others' viewpoints, too.
- He believes that different viewpoints result from interpretations of information within individual perspectives, and he can qualitatively interpret evidence from different perspectives



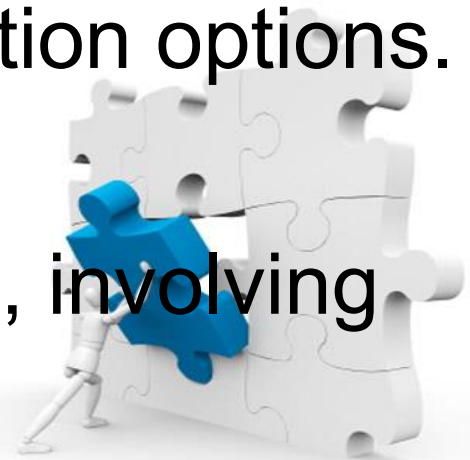
- Although the Perpetual Analyzer's reasoning skills allow him to draw logical conclusions within a given perspective, his greatest difficulty is in prioritizing factors that apply across solution options or perspectives.
- This often causes him to be reluctant to select and defend a single overall solution as most viable. He may select a solution but be unable to articulate adequate support for its superiority over other solutions.
- Thus, he has a tendency to get stuck in the process of analyzing and exploring the problem.



Step 3 - Prioritize Alternatives and Implement

Conclusion: The Pragmatic Performer

- The Components include:
 1. After thorough analysis, develop and use reasonable guidelines for prioritizing factors to consider and choosing among solution options.
 2. Efficiently implement conclusions, involving others as needed.



- The Pragmatic Performer explores a problem from different perspectives as thoroughly as time and other resources permit (Step 2) but proceeds as if goal is to come to a well-founded conclusion based on objective comparisons of viable alternatives.
- She then articulates and weighs a variety of factors as she looks across available options and endorses one as most viable.



- In implementing her conclusions, she carefully prioritizes information for particular audiences, addressing their different concerns in a reasonable manner.
- Her primary weakness is in not coordinating her skills into an efficient, ongoing problem solving process that constructs new knowledge and optimizes decisions over time.



Step 4: Envision and Direct Strategic Innovation: The Strategic Re-Visioner

- The Components include:
 1. Acknowledge, explain, and monitor limitations of endorsed solution
 2. Integrate skills into ongoing process for generating and using information to guide strategic innovation

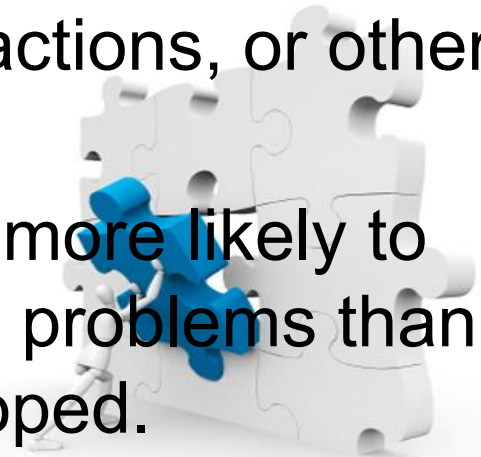


- The Strategic Re-visioner acknowledges the limitations of his proposed problem solutions in a realistic way, easily applies a wide array of knowledge to complex problems, excels at strategic planning and continuous improvement processes, and can take the “long view.”
- He is likely to be on the leading edge of his profession because he can design practical research projects to generate useful new knowledge, and he can recognize or create opportunities that others don't.



Note:

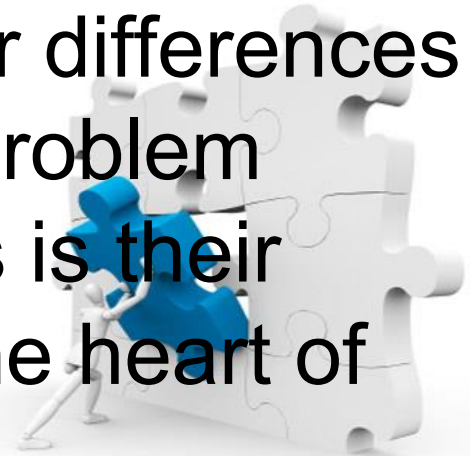
- A person who can exhibit Performance Pattern 4 does not always operate at this level.
- Sometimes we consciously choose to truncate the problem solving process for pragmatic reasons.
- Sometimes we are unable to access our most complex skills due to fatigue, environmental distractions, or other barriers to optimal performance.
- If we have these skills, however, we are more likely to be successful in addressing open-ended problems than those whose skills are not so well developed.



	STEP 0: CONFUSED FACT FINDER	STEP 1: BIASED JUMPER	STEP 2: PERPETUAL ANALYZER	STEP 2: PRAGMATIC PERFORMER	STEP 4: STRATEGIC REVISIONER
PURPOSE	Find the answer	Win the argument.	Objectively analyze the data.	Construct and defend a reasonable conclusion after objective consideration of the full decision space	Long term learning for strategic impacts, with near-term goal of solving the problem at hand.
QUESTION	"What is the right answer?"	"How can I support my conclusion?"	"What does the data say?"	"What shall we do?"	"What can we learn?"
POINT OF VIEW	Likely will not recognize that valid alternative points of view exist.	Acknowledges other points of view, but views them as competition, vice alternatives. May either unfairly favour or discount expert opinion.	Recognize and mitigate bias. Considers alternative points of view	Tailored communication of problem and solutions to affected stakeholders. Empathy for alternative views.	Purposeful perspective taking
ASSUMPTION	Does not recognize the influence of assumptions, or admit that they have made assumptions.	Identifies some significant assumptions but does not evaluate their validity.	Acknowledges and mitigates bias. Identifies assumptions and analyzes their validity	Exploration and defence of operative assumptions.	Purposeful relaxation and contraction of assumptions to spur new ideas.
INFORMATION	Frustrated by ambiguity or uncertainty in the information.	Accepts ambiguity and uncertainty. Opinion or assertion may be accepted as fact. May ignore or dismiss contrary information.	Explores the strengths and weaknesses of various sources of information	Conscientious prioritization of information. Purposeful pursuit of contradictory or refuting data.	Exploration and development of new information sources, and methods. Attentive to the influence of emerging information.
CONCEPT/MM	Unaware of their use of concepts.	May not thoroughly break down a problem into components.	Selects appropriate mental models. Breaks the problem into constituent parts.	Recognizes the potential of alternative mental models/concepts. Prioritizes criteria for evaluation of the options.	Borrowing mental models from other disciplines to spur creative insights.
REFERENCES/CONCLUSION	Little logical flow. Conclusions are unsupported or contradicted by evidence.	Recognizes the question has more than one valid answer. Builds a logical flow to arguments in support of the conclusion.	Hesitates to settle on a conclusion.	Efficient movement to a conclusion based upon prioritization of decision criteria.	Purposeful reconsideration of conclusion in dynamic contexts.
IMPLICATIONS	No consideration of non-immediate implications	Awareness of some immediate personal implications.	Implications are acknowledged, but contribute to indecisiveness. Unappreciative of indecision's negative impact	Aware of immediate implications for range of stakeholders	Strategic consideration of implications beyond immediate decisions.

Conclusion

- Problem issues and situations are usually open-ended with uncertainties and complexities which give room for ambiguity.
- Studies reveal that one of the major differences between experienced, successful problem solvers and novice problem solvers is their ability to ask questions that go to the heart of the problem



- Such questions would lay foundation for critical thinking actions which would generate the most reasonable solution while recognizing that problems need to be addressed repeatedly over time as conditions change and better information becomes available.



Thank you

**Questions
and
Suggestions**

