Steps for Better Thinking:
Improving Your Critical Thinking Ability

Definition: Critical Thinking

Exercise:

List words or phrases that describe "critical thinking":

Open-Ended Problems

Throughout your educational program, your work career, and your personal and civic life you will be faced with dilemmas that have no single "correct" answer. Such dilemmas are called ***open-ended problems***. Your task for an open-ended problem is to find the best—not the only—possible solution. These problems involve uncertainties or ambiguities that prevent a single correct answer. This can occur for a variety of reasons, such as the following:

- There is a range of feasible solutions
- The outcomes of various solutions are unknown
- There is only incomplete information about the problem

Exercise:

List examples of open-ended problems (personal, civic, work, school).

PERSONAL:

SCHOOL:

WORK:

CIVIC:

STEPS FOR BETTER THINKING
A Developmental Problem Solving Process

FOUNDATION
Knowledge and Skills

- Repeat or paraphrase information from textbooks, notes, etc.
- Reason to single "correct" solution, perform computations, etc.

STEP 1
Identify the Problem, Relevant Information, and Uncertainties
(low cognitive complexity)

- Identify problem and acknowledge reasons for enduring uncertainty and absence of single "correct" solution
- Identify relevant information and uncertainties embedded in the information

STEP 2
Explore Interpretations and Connections
(moderate cognitive complexity)

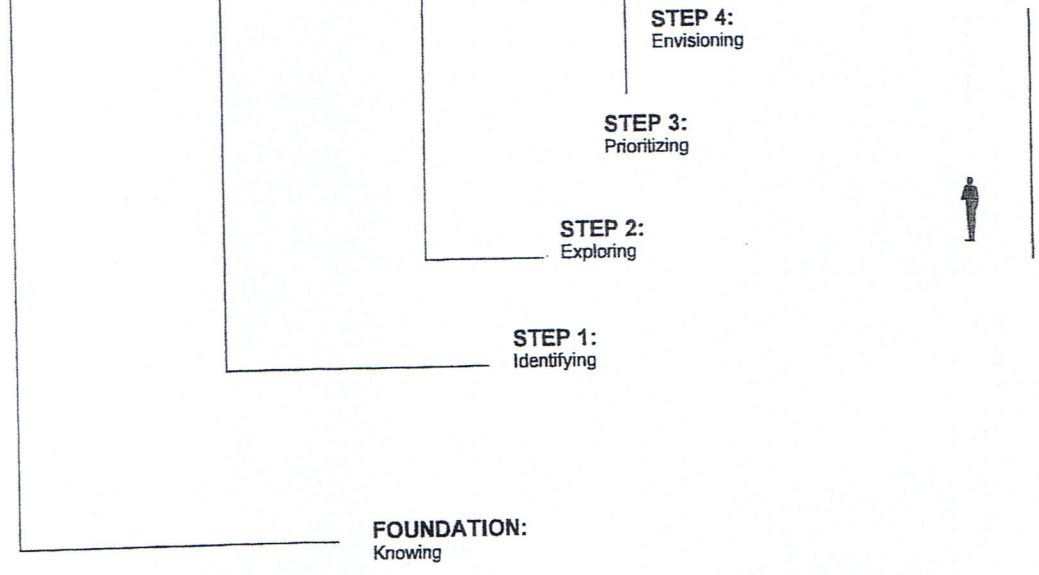
- Interpret information:
  (1) Recognize and control for own biases
  (2) Articulate assumptions and reasoning associated with alternative points of view
  (3) Qualitatively interpret evidence from a variety of points of view
- Organize information in meaningful ways that encompass problem complexities

STEP 3
Prioritize Alternatives and Implement Conclusions
(high cognitive complexity)

- After thorough analysis, develop and use reasonable guidelines for prioritizing factors to consider and choosing among solution options
- Efficiently implement conclusions, involving others as needed

STEP 4
Envision and Direct Strategic Innovation
(highest cognitive complexity)

- Acknowledge, explain, and monitor limitations of endorsed solution
- Integrate skills into on-going process for generating and using information to guide strategic innovation



Coursework Tasks and Steps for Better Thinking

Foundation—Knowing	Tasks for Open-Ended Problems			
	Step 1—Identifying	Step 2—Exploring	Step 3—Prioritizing	Step 4—Envisioning

Demonstrating Knowledge:
• Define _____.
• Define in your own words _____.
• Calculate _____.
• Properly apply a given procedure (mathematical, statistical, or other).
• List the elements of _____.
• Describe _____.
• List the pieces of information contained in _____ narrative/paragraph/text.
• Search for specific information from the library or Internet.
• Select the correct multiple choice answer.
• Fill in the blank (with the correct word or phrase).
	Identifying Relevant Information:
	• Distinguish between information that is relevant and not relevant for a given problem.
	• Identify relevant laws, standards or rules for _____.
	• Read articles, consult experts, and explore other resources to:
	  • Identify issues/factors related to _____.
	  • Identify various potential solutions to _____.
	  • Describe arguments in favor of _____.
	Identifying Uncertainties:
	• Describe uncertainties concerning _____.
	• Identify reasons why _____ might change or vary.
	• Explain why there is no single, "correct" way to _____.
	• Identify and describe uncertainties about the interpretation or significance of _____.
	• Explain why _____ cannot completely eliminate risk of _____.
	• Explain why even an expert cannot predict for certain what will happen when _____.
		Interpreting Information From Multiple Viewpoints:
		• Analyze the pros and cons or costs and benefits of _____.
		• Compare and contrast _____ [theories/ viewpoints/perspectives].
		• Interpret and discuss the evidence related to _____.
		• Identify assumptions and reasoning associated with _____.
		• Interpret _____ from more than one viewpoint.
		• Objectively evaluate _____ information.
		• Explore the implications of ambiguities when analyzing _____.
		• Consider the impact of alternatives on various stakeholders in _____.
		• Analyze the quality of information and evidence related to _____.
		• Recognize and control own biases when _____.
		Organizing Information:
		• Organize information and analyses to help you think about or to communicate _____.
		• Develop meaningful categories for _____.
			Prioritizing and Concluding:
			• Develop and use reasonable guidelines for drawing conclusions regarding _____.
			• Prepare and defend a solution or explain your opinion about _____.
			• Explain how you would respond to arguments that support other reasonable solutions to _____.
			• Objectively consider _____ when making a decision.
			• Address and prioritize the costs and benefits of _____ in reaching conclusions about _____.
			• Explain which issues you weighed more heavily than other issues in arriving at your conclusion about _____.
			• Develop an effective plan for addressing _____.
			Effectively Involving Others in Implementation:
			• Describe how to implement the best solution to _____.
			• Communicate _____ effectively for a given setting and audience.
			• Explain how you designed your memo/presentation/_____ to effectively communicate to your audience.
				Acknowledging Limitations:
				• Identify potential future developments in _____.
				• Describe limitations to a recommendation about _____.
				• Strategically consider contingencies and future developments related to _____.
				• Describe conditions under which you would reconsider your solution to _____.
				Monitoring and Improving Over Time:
				• Develop strategies for generating new knowledge about _____.
				• Engage in continuous improvement in _____.
				• Acknowledge changing circumstances and reconsider _____ as appropriate.
				• Establish a plan for monitoring the performance of your recommended solution to _____.
				• Manage _____ under changing circumstances or unusual demands.

NOTE: The tasks in the table require you to adequately perform all aspects of Steps for Better Thinking *through* the step in which the assignment is listed. For example, if a task is listed under Step 3, then it requires performance of the Foundation and Steps 1 and 2 in addition to Step 3.

Foundation: Knowledge for Addressing an Open-Ended Problem

Foundational knowledge provides you with the information you need to analyze a problem.

Questions You Can Ask Yourself:

1. How can I gather information about the problem?
2. What "textbook" information would be helpful (e.g., definitions, formulas, theories, etc.)?
3. Have I read and understood applicable materials (e.g., textbooks, articles, etc.)?
4. Have I used dictionaries or other resources to help me understand terminology?
5. Have I practiced using applicable procedures, formulas, calculations, etc.?
6. Have I asked questions of experts (including my professor), as needed?

Exercise:

What did you need to KNOW to address today's homework assignment?

Step 1: Identifying the Problem, Relevant Information, and Uncertainties

There are three major purposes in identifying the problem, relevant information, and uncertainties: (1) to help you focus only on information that is relevant to the problem, (2) to determine whether the problem is open-ended, and (3) assuming the problem *is* open-ended, to gain an understanding of why there is no single correct solution. Step 1 of Steps for Better Thinking sets the stage for further analysis (i.e., Step 2).

Questions You Can Ask Yourself:

1. Is there disagreement about this problem?
   a) If not, look for more information. If I don't find any information about disagreement, the problem might NOT be open-ended (i.e., there might be a single correct solution).
   b) If so:
      i) What are the different opinions/solutions?
      ii) What are the underlying uncertainties that leave room for disagreement? (This is VERY important)
2. Why aren't any of the solutions totally "correct"?

Exercise:

Step 2: Exploring Interpretations and Connections

There are three major purposes in exploring interpretations and connections related to the problem: (1) to understand and analyze important information related to the problem (including evidence and alternative points of view), (2) to recognize and control your own biases in addressing the problem, and (3) to ensure an organized and thorough analysis. Adequate performance in Step 2 of Steps for Better Thinking will allow you to adequately reach a conclusion to the problem (Step 3).

Questions You Can Ask Yourself:

1. Do I have any initial preferences for one solution? If so:
   a) Can I identify where my bias comes from?
   b) How can I set my preferences aside while I study the problem?
2. For the various pieces of evidence related to the problem (arguments, theories, research, data, quotes, etc.):
   a) What are the strengths and weaknesses of different pieces of evidence?
   b) How can the evidence be used to support different points of view?
3. For the various points of view:
   a) What are the arguments for and against each point of view?
   b) What are the assumptions and biases related to each point of view?
4. How might I organize the above information to help me reach a conclusion?

HINT: When you begin to analyze/explore connections for a problem, it is often helpful to think about how this problem is similar to other problems you have addressed.

Exercise:

Step 2: Exploring Interpretations and Connections (continued)

Exercise:

Step 3: Prioritizing Alternatives and Implementing Conclusions

Your conclusions should be persuasive, but also objective. In addition, you need to consider others as you implement conclusions (including communications such as your homework assignment). You can achieve these goals by: (1) supporting your conclusion with a thorough analysis of the problem (i.e., adequate performance of Step 2), (2) being sure that you are reasonable and objective in considering the various points of view, (3) explaining adequately how you weighed various options in reaching a conclusion, and (4) appropriately adapting your communication for your audience.

Questions You Can Ask Yourself:

1. Have I been objective in considering the various pieces of information and various points of view for this problem?
2. How did I decide which solution or opinion is most reasonable?
3. Which values and priorities are most important in reaching a solution/opinion? Why?
4. How can I explain my opinion/solution to other people?
5. How would I respond to arguments that support other solutions/opinions?
6. What is the most efficient way to implement my solution?
7. What is the best way to communicate with my audience?

Exercise:

Step 4: Envisioning and Directing Strategic Innovation

Because open-ended problems have no single "correct" solution, they often need to be re-examined over time. This can occur because new information becomes available, because the importance of various factors changes over time, and so on. It is important to embrace change as a natural step in the process for open-ended problems. The best critical thinkers respond quickly to change and new threats and also visualize and take advantage of new opportunities.

Questions You Can Ask Yourself:

1. What are the limitations of my solution/opinion? What are the implications of those limitations?
2. Is it possible to obtain additional information that would alter my solution/opinion?
3. What types of information might become available in the future that could affect my solution/opinion?
4. What other conditions might cause me to reconsider my solution/opinion?
5. What strategies could be implemented to monitor the results of my solution/opinion?
6. How can I anticipate and take advantage of future changes?

Exercise:

Steps for Better Thinking:
A Tool for Building Critical Thinking Skills

Individuals with better critical thinking skills are able to make better decisions and be more persuasive. In professional settings, they are valued more highly than individuals with poor decision making skills. Individuals who recognize and control their own biases, who more thoroughly address uncertainties, and who objectively consider a variety of viewpoints, make better decisions. Although it may appear easy, these skills are difficult to develop. Great effort and much practice are required.

Exercise:

Write down ideas about how Steps for Better Thinking might change your future approach to open-ended problems.