

Critical Thinking across the Curriculum

Essential Skills Booklet (Version. 3.0)

Prepared by Annique Boelryk – Instructional Designer
With significant contributions from:
William MacKenzie, Trudy Bergère, and Beccy Rodgers.

Note: The complete booklet as well as Word files of the Scaffolding resources can be accessed on the Centre for Teaching and Learning Website under Teaching → Teaching Essential Skills → Critical Thinking
http://staff.georgianc.on.ca/ctl/teaching/essentialskills_critical.htm

© 2004. Centre for Teaching and Learning. Georgian College.

Last updated: May 2007



Table of Contents

	Page #
Why Does Critical Thinking Matter Across the Curriculum?	1
Defining Critical Thinking	3
Visual Overview of Critical Thinking Outcomes	5
Critical Thinking Skill Outcomes	6
Thinking Processes in Higher Education	7
General Principles for Teaching Critical Thinking Skills	8
Instructional Strategies for Developing Critical Thinking Skills	9
Problem-Solving Rubric	11
Holistic Critical Thinking Rubric	12
Scaffolding Resources for Critical Thinking	13
Scaffold #1: Formulating Meaningful Questions	14
Scaffold #2: Comparing and Contrasting	16
Scaffold #3: Extracting Themes and Patterns	18
Scaffold #4: Analyzing Perspectives	20
Scaffold #5: Designing Assignment Questions	22
Scaffold #6: Annotating Text	23
Scaffold #7: Identifying Logical Fallacies	25
Scaffold #8: Framework for Problem-Solving	27
Scaffold #9: Evaluating Information Sources	29
Scaffold #10: Expressing Agreement and Disagreement for Constructive Dialogue	31
Scaffold #11: Developing and Supporting an Argument	34
References and Additional Resources	38

Why Does Developing Critical Thinking Skills Across Disciplines Matter?

1. Develops Reasoning

Everyone thinks; it is our nature to do so. But much of our thinking, left to itself, is biased, distorted, partial, uninformed or down-right prejudiced. Yet the quality of our life and that of what we produce, make, or build depends precisely on the quality of our thought. Shoddy thinking is costly, both in money and in quality of life. Excellence in thought, however, must be systematically cultivated. (Critical Thinking.org)

“Traditional college teaching all too often presents students with a welter of information and concepts and leaves them to **struggle on their own to analyze, prioritize, and give structure** to their newfound knowledge” (Meyers, 1986, p. 7).

"**Deep-seated problems** of environmental damage, human relations, overpopulation, rising expectations, diminishing resources, global competition, personal goals, and ideological conflict" will need to be addressed by **individuals capable of reflective and critical thought** (Paul, 1992, p. 4).

2. Promotes Inquiry

Critical thinking is the mental work involved in formulating and pursuing complex questions. **Questions are powerful motivators of inquiry**; what frontiers of knowledge have ever been pushed back without them? Yet questions are disturbingly absent from college classrooms. Less than 4% of class time is spent in questioning, and fewer than one-third of professors' questions invite complex thinking. Students' questions are rarely heard in classrooms (Barnes, 1983).

The **absence of questions** is the direct consequence of our **faith in the content coverage myth**. When our goal is to "cover" the content, efficiency and accuracy in delivery of information become measures of "effectiveness." If we ask questions, we may have to "waste" time correcting inaccuracies in students' responses. If we permit students to ask questions, we may fail to reach our content goals. Yet **students' "inaccurate" answers to our questions, and their "irrelevant" questions to us, are where the true learning is revealed and where teaching should begin.**

3. Develops “Expert” Frameworks for Thinking

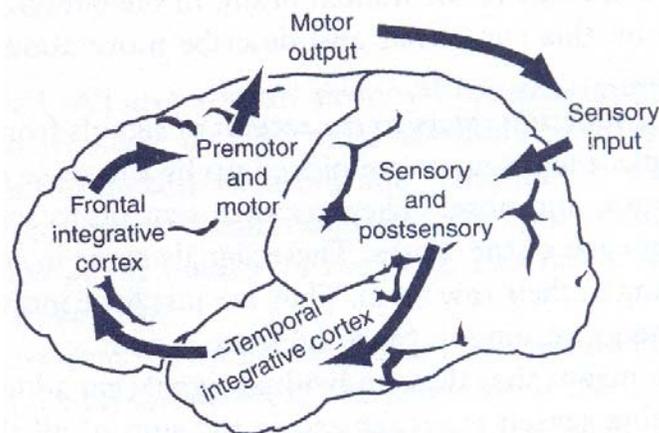
In traditional teaching, there is often an implicit **assumption that learning to think critically develops naturally** as students learn increasingly complex levels of discipline content and information. While there may be a natural basis for human inquisitiveness, there is **nothing natural about learning a framework for analyzing** [problems, issues, or situations within a specific discipline]. **Analytical frameworks must be taught** explicitly and constructed consciously, beginning simply and increasing in complexity and subtlety” (Meyers, 1986, p. 10).

Curricula that emphasizes breadth of knowledge prevents effective organization of knowledge because there is **not enough time to learn anything in depth**. Instruction that enables students to see **models of how experts organize and solve problems is helpful** if the level of complexity of the models is tailored to the learners’ current levels of knowledge and skills. (Bransford, et.al., 1999)

People who have developed expertise in particular areas are, by definition, able to think effectively about problems in those areas. **Understanding expertise** ...provides insights into the nature of thinking and problem solving...Principles of expert knowledge include the following:

1. Experts **notice features and meaningful patterns** of information that are not noticed by novices.
2. Experts have acquired a great deal of **content knowledge that is organized** in ways that reflect a deep understanding of their subject matter.
3. Experts’ knowledge can not be reduced to sets of isolated facts or propositions but, instead, **reflects contexts of applicability**: that is, the knowledge is “conditionalized” on a set of circumstances.
4. Experts are **able to flexibly retrieve important aspects** of their knowledge with little attentional effort.
5. Though experts know their disciplines thoroughly, this **does not guarantee that they are able to teach** others.
6. Experts have **varying levels of flexibility** in their approach to new situations.

(Bransford, et. al, 1999)



(Zull, 2002)

Defining Critical Thinking

In this section we present a number of definitions of critical thinking.

Critical thinking is that mode of thinking - about any subject, content, or problem - in which the thinker improves the quality of his or her thinking by **skilfully taking charge of the structures** inherent in thinking and imposing intellectual standards upon them.

Critical thinking is the **intellectually disciplined process** of actively and skilfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information that is generated by observation, experience, reflection, reasoning or communication, in order to guide belief and action.

In its exemplary form, it is based on **universal intellectual values** that transcend subject matter divisions: clarity, accuracy, precision, consistency, relevance, sound evidence, good reasons, depth, breadth, and fairness.

(Scriven, M., & Richard, P. National Council for Excellence in Critical Thinking Instruction. Retrieved February 14, 2005 from <http://www.criticalthinking.org/>)

Critical thinking is often thought to be a general ability that students either possess or lack, but much of what critical thinking entails is **specific to particular fields** and can be learned. However, learning to think rarely enters the educational scene when "covering" a fixed quantity of "content" occupies center stage in teaching. **Must acquisition of knowledge precede thinking, as many educators seem to believe?** (Kurfis, 1989)

"Critical thinking... means **making reasoned judgments**". It involves **using criteria to judge** the quality of something, from cooking to a conclusion of a research paper. In essence, critical thinking is a disciplined manner of thought that a person uses to assess the validity of something (statements, news stories, arguments, research, etc.). (The University of Tennessee at Chattanooga, 1998)

Critical thinking is ...

- (1) an attitude of being disposed to consider in a thoughtful way the problems and subjects that come within the range of one's experience;
- (2) knowledge of the methods of logical enquiry and reasoning; and
- (3) some skill in applying those methods.

Critical Thinking calls for persistent effort to examine any belief or supposed form of knowledge in the light of the evidence that supports it and the further conclusions to which it tends. (Glaser, 1980)

Critical thinking is skilled and active interpretation and evaluation of observations and communications, information and argumentation. (Fisher and Scriven, 1997)

Critical thinking is the **mental work involved when we investigate complex questions**. The quality of the outcome depends upon many factors, including:

- How much we **know about the subject** and how easily we can retrieve relevant information;
- What we **know about how to conduct inquiry** in a particular subject (which includes the kinds of questions we ask and how we attempt to answer them);
- How well we **organize our inquiry** (for example, the goals we set and the ways we monitor and revise them);
- How much we **care about the work**. (Kurfis, 1989)

Critical thinking entails the examination of **structures or elements of thought** implicit in all reasoning:

- purpose, problem, or question-at-issue;
- assumptions;
- concepts;
- empirical grounding;
- reasoning leading to conclusions;
- implications and consequences;
- objections from alternative viewpoints; and
- frame of reference.

Critical thinking - in being responsive to variable subject matter, issues, and purposes - is incorporated in a family of interwoven **modes of thinking**, among them: scientific thinking, mathematical thinking, historical thinking, anthropological thinking, economic thinking, moral thinking, and philosophical thinking.

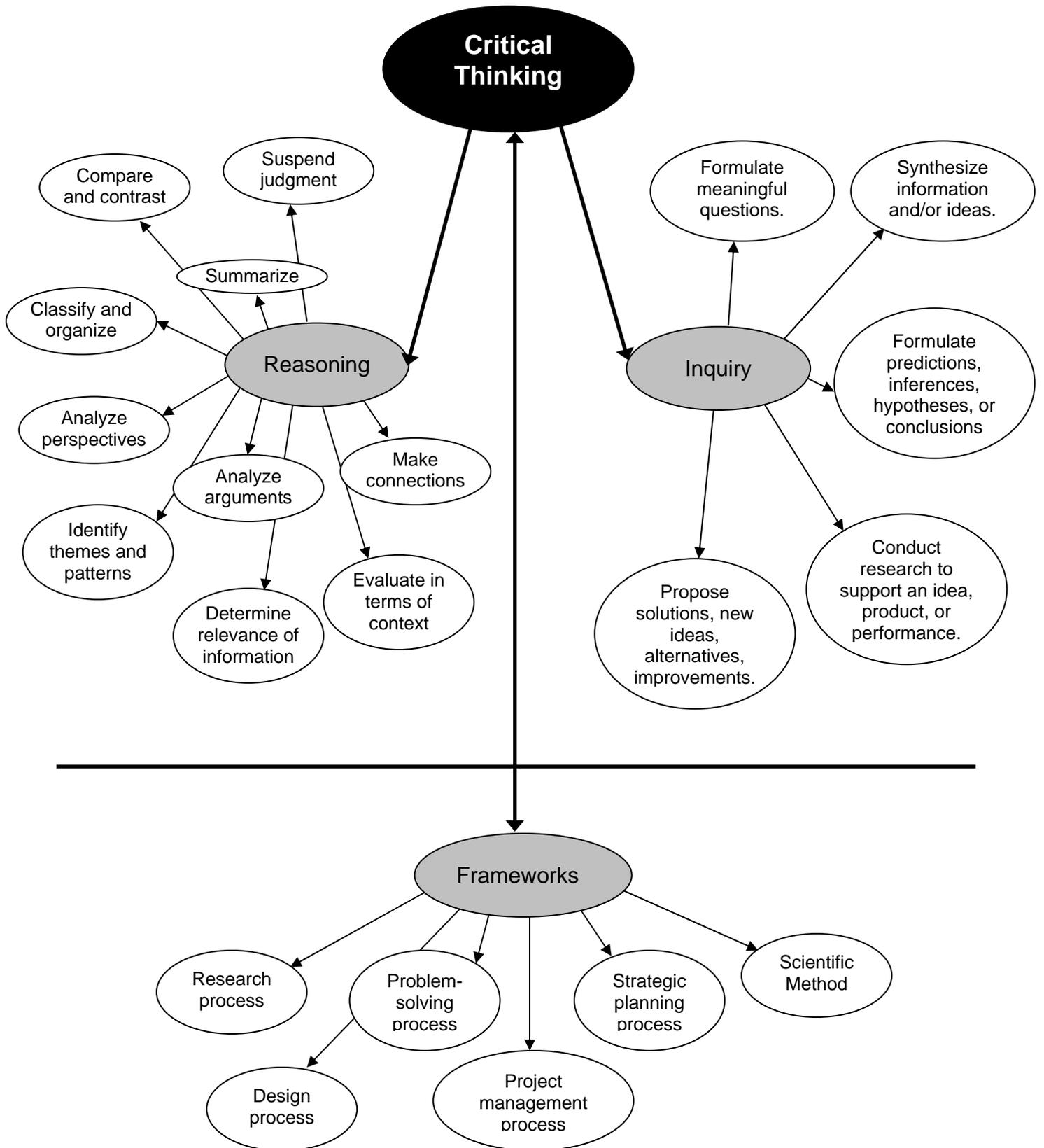
Critical thinking can be seen as having two components:

- 1) a set of information and belief generating and processing skills, and
- 2) the habit, based on intellectual commitment, of using those skills to guide behaviour.

It is thus to be contrasted with:

- 1) the mere acquisition and retention of information alone, because it involves a particular way in which information is sought and treated;
- 2) the mere possession of a set of skills, because it involves the continual use of them; and
- 3) the mere use of those skills ("as an exercise") without acceptance of their results.

Visual Overview of Critical Thinking Outcomes



Critical Thinking Skill Outcomes

Thinking skills can be practiced in all disciplines and be applied to information, ideas (perspectives, arguments, interpretations, theories), problems, products, and/or performances.

Three dimensions of critical thinking skills include **Reasoning, Inquiry, and Frameworks**.

A. Reasoning

Which thinking skills do you expect or try to promote in your courses when you ask students to **analyze** information, ideas, problems, products, or performance?

- Classify and organize
- Identify themes and patterns
- Summarize
- Compare and contrast
- Distinguish between relevant and irrelevant info or evaluation criteria
- Analyze perspectives and arguments and their related assumptions and biases
- Evaluate in terms of context (historical, political, social, etc.) and influences (values, cultural, political, etc.)
- Make connections
- Recognize impact of personal biases, values, and experiences on thinking
- Suspend judgment

B. Inquiry

Which thinking skills do you expect or try to promote in your courses when you ask students to **extend thinking** about information, ideas, problems, products, and performance?

- Formulate meaningful questions
- Propose solutions, new ideas, alternatives, improvements
- Synthesize information, ideas, or products
- Formulate predictions, inferences, hypotheses, and conclusions using inductive and deductive reasoning
- Conduct research to support ideas, products, problems, or performance

C. Frameworks (Modes of Inquiry)

Which thinking frameworks do you use or expect students to use?

- Problem-solving Process
- Scientific Method
- Argumentation
- Research Process
- Strategic Planning Process
- Design Process
- Project Management Process

Thinking Processes in Higher Education

After researching approaches to thinking across disciplines at the postsecondary level, Donald (2002) concludes that although the various disciplines organize thinking using different frameworks and methods, there is considerable overlap in the thinking processes listed below. (Donald, pp. 26-27)

Description – thinking to describe details about:

- | | |
|--|--------------------------------------|
| <input type="checkbox"/> Context, environment | <input type="checkbox"/> Situations |
| <input type="checkbox"/> Conditions | <input type="checkbox"/> Elements |
| <input type="checkbox"/> Functions, roles | <input type="checkbox"/> Events |
| <input type="checkbox"/> Goals, aims, objectives | <input type="checkbox"/> Assumptions |

Selection – thinking to select information based on things such as:

- | | |
|---------------------------------------|---|
| <input type="checkbox"/> Relevance | <input type="checkbox"/> Critical elements |
| <input type="checkbox"/> Importance | <input type="checkbox"/> Critical relations |
| <input type="checkbox"/> Significance | |

Representation - thinking about how to represent information based on:

- | | |
|--|---|
| <input type="checkbox"/> Organizing principles | <input type="checkbox"/> Disciplinary laws, methods, or rules |
| <input type="checkbox"/> Relationships | <input type="checkbox"/> Connections |
| <input type="checkbox"/> Categories | <input type="checkbox"/> Priorities |

Inference - thinking to infer or propose things such as:

- | | |
|--|---|
| <input type="checkbox"/> New relationships | <input type="checkbox"/> New connections |
| <input type="checkbox"/> Equivalences | <input type="checkbox"/> New perspectives |
| <input type="checkbox"/> Conclusions | <input type="checkbox"/> Hypotheses |

Synthesis – thinking about multiple pieces of information and seeking to:

- | | |
|--|--|
| <input type="checkbox"/> Combine parts | <input type="checkbox"/> Generate missing links |
| <input type="checkbox"/> Elaborate | <input type="checkbox"/> Expand on ideas, directions, etc. |
| <input type="checkbox"/> Fill in gaps | <input type="checkbox"/> Repurpose or reformat information |

Verification – thinking to reflect and

- | | |
|---|--|
| <input type="checkbox"/> Compare alternatives | <input type="checkbox"/> Compare outcomes to predetermined standard |
| <input type="checkbox"/> Judge validity | <input type="checkbox"/> Examine similarities or differences of results, consequences. |
| <input type="checkbox"/> Act on feedback | <input type="checkbox"/> Employ results to regulate, adjust, adapt. |
| <input type="checkbox"/> Confirm results | |

General Principles for Teaching Critical Thinking Skills

A. Apply Lesson Planning and Instructional Design Principles

Instructional design principles to keep in mind when teaching higher-order skills include:

1. Design Authentic Tasks
2. Structure for Success
3. Make the Process Explicit
4. Model the Process

B. Incorporate Proven Methods

Peirce, W. (1995). <http://academic.pg.cc.md.us/~wpeirce/MCCCTR/improv~1.html>

1. Improve students' metacognitive abilities

- Model thinking processes
- Ask students to unpack and explain/show/articulate their thinking
- Ask for monitoring and reflection through informal and low stakes assignments

2. Use effective questioning strategies

- Ask questions that require clarification, evidence, reasoning -- not just recall or one correct answer
- Ask questions requiring several kinds of thinking (see lists by Blooms or Beyer)

3. Have students use oral and written language often and informally

- Have students write answers to questions, before speaking
- Use small-group tasks
- Teach students reading and note-taking strategies

4. Design tasks that require thinking about content as a primary goal

- Ask students to process information, not just recall it
- Sequence tasks developmentally

5. Teach students how to do the thinking needed for the tasks

- Break down complex tasks for students
- Provide scaffolding resources to support thinking skills

6. Create a classroom atmosphere that promotes risk-taking

- Arrange physical space to promote student-student interaction
- Avoid competition; Foster interaction among students

C. Use a Structured Process

(Adapted from Educational Services, Instructional Frameworks for Thinking Skills)

1. Identify skill to be taught and content it will be applied to
2. Introduce skill, give several examples that are relevant and interesting
3. Explain the mental processes involved in the application of the skill
4. Model the process
5. Set up learning activities where students practice the skill several times using relevant and easy to understand content
6. Provide feedback on the students application of the skill
7. Introduce a more complex application in your content area. Make sure the application is authentic. Model the thinking skill or process.
8. Create an assessment activity where students have to apply the skills to a complex, authentic, problem or situation.

Instructional Strategies for Developing Critical Thinking Skills

1. General Strategies

Have students...

- a. Summarize or restate what the teacher or another student has said using their own words
- b. Elaborate on an initial response to include rationale, clarification, reasoning, evidence, support, examples etc.
- c. Relate course content to their own knowledge and experience.
- d. Make connections between related concepts.
- e. Describe how their point of view on an issue compares to the point of view of the instructor, other students, the author, etc.
- f. Generate questions related to the topic.

(Adapted from: <http://www.criticalthinking.org/K12/k12class/tactics.html>)

2. Collaborative Learning Tasks

Have students work in pairs or small groups to apply various thinking skills to a portion of the course content. Select any of the outcomes listed in this document as the skill to apply. The scaffolding resources contain visual organizers for the following skills:

- a. Formulating questions (Scaffold #1)
- b. Comparing and contrasting (Scaffold #2)
- c. Extracting themes and patterns (Scaffold #3)
- d. Analyzing perspectives (Scaffold #4)

Visit the following site for more visual organizers for facilitating critical thinking skills.

<http://edservices.aea7.k12.ia.us/framework/framework.html>

3. Assignment and Test Questions

Design assignment and test questions that require various critical thinking skills.

Scaffold #5 outlines assignment questions that facilitate development from less complex critical thinking skills to more complex ones (Wolcott and Lynch, 2003).

4. Critical Thinking Questions

- A. Have students brainstorm to generate 10-15 questions about a topic or issue. Organize the questions and then divide up the task of answering the key ones. Use Scaffold #1 to support students as they begin the process of formulating questions.
- B. Design teacher-directed questions that facilitate movement from lower to higher levels of thinking. The following site provides an excellent list of questions that move students through the various levels of Bloom's taxonomy: Fowler, B. (2002).

<http://www.kcmetro.cc.mo.us/longview/ctac/blooms.htm>

5. Annotating Text

Ask students to annotate a text from a variety of perspectives – A Supporter, A Skeptic, A Devil's Advocate. Use Scaffold #6 to support students in annotating text.

6. Problems and Cases

Have students work through authentic problems and cases using a problem-solving framework. Use Scaffold #8 to provide students with support and direction.

7. Classroom Assessment Techniques

Classroom assessment techniques (Angelo & Cross, 1993) are popular strategies for getting students thinking and interacting with course ideas and content. In their book, Angelo and Cross describe 50 strategies. A few of the most common ones include:

a) One-Minute Paper. Students write for one (or two) minutes responding to critical thinking questions in concise, well-planned sentences. These responses are submitted to the instructor. Some sample questions are as follows:

- i. What are the two [three, four, five] most significant [central, useful, meaningful, surprising, disturbing] things you have learned during this session?
- ii. What question(s) remain uppermost in your mind?

The Minute Paper helps students organize a "chunk" of information and makes it easier (and more private) to express their uncertainty. Minute Papers generally provide positive reinforcement for the professor and help to reveal student thinking at a number of levels. (Angelo & Cross, 1993, p.148-53)

b) The Muddiest Point. This technique consists of asking students to jot down a quick response to one question: "What was the muddiest point in?" Planning a "muddiest point activity requires consideration the following:

- i. Determine what you want feedback on: the entire class session or one self-contained segment? A lecture, a discussion, a presentation?
- i. If you are using the technique in class, reserve a few minutes at the end of the class session. Leave enough time to ask the question, to allow students to respond, and to collect their responses by the usual ending time. (You could also structure this activity online)
- ii. Let students know beforehand how much time they will have to respond and what use you will make of their responses.
- iii. Pass out slips of paper or index cards for students to write on.
- iv. Collect the responses as or before students leave. Stationing yourself at the door and collecting "muddy points" as students file out is one way; leaving a "muddy point" collection box by the exit is another.
- v. Respond to the students' feedback during the next class meeting or as soon as possible afterward.

c) Application Cards. After teaching about an important theory, principle, or procedure, ask students to write down at least one real-world application for what they have just learned to determine how well they can transfer their learning. Quickly read once through the applications and categorize them according to their quality. Pick out a broad range of examples and present them to the class.

d) Student-Generated Test Questions. Have students to write possible test questions and model answers for specified topics, in a format consistent with course exams. This will give students the opportunity to evaluate the course topics, reflect on what they understand, as well as what are good test items. Make a rough tally of the questions your students propose and the topics that they cover. Evaluate the questions and use the goods ones as prompts for discussion. You may also want to revise the questions and use them on the upcoming exam.

Problem Solving Rubric

Adapted from © 2003, Susan K. Wolcott. *Steps for Better Thinking Rubric*. <http://www.WolcottLynch.com>.

Step 1: Problem Identification				
	4	3	2	1
Identifying and using relevant information	Uses a range of carefully evaluated, relevant information, and expresses criteria for including it.	Uses a range of carefully evaluated, relevant information.	Uses limited information, primarily evidence and information supporting own conclusion.	Uses very limited information; primarily "facts," definitions, or expert opinions
Articulating uncertainties	Explains uncertainties clearly; discusses their complexities and relative importance.	Articulates uncertainties and the relationships among them.	Identifies at least one reason for significant uncertainty.	Either denies uncertainty or attributes uncertainty incorrectly
Step 2: Problem Exploration				
	4	3	2	1
Evaluating multiple perspectives and clarifying assumptions	Evaluates information across perspectives; and clearly evaluates a number of assumptions and personal biases.	Discusses information from multiple perspectives and identifies several assumptions and personal biases.	Acknowledges more than one perspective but does not acknowledge own assumptions or biases.	Portrays perspectives and information in a black and white way (e.g., right/wrong, good/bad)
Analyzing information and creation of meaningful organization	Analysis is in-depth and based on significant criteria; Organized into a viable framework that deals with the problem's complexities and can accommodate new information.	Analysis is based on several significant criteria; Organized into viable framework that deals the complexities of the problem.	Analysis is based on at least three criteria, but is superficial; Organization is logical, but simplistic.	Analysis is based on two or less criteria; Organization is haphazard or illogical.
Step 3: Solution Prioritization				
	4	3	2	1
Selecting guidelines or principles to judge various options.	Uses well-founded, guidelines or principles that apply across alternatives to objectively compare and choose a solution;	Uses guidelines or principles to reach a well-founded conclusion but criteria do not apply meaningfully across alternatives.	Provides some evaluation of alternatives; uses superficial principles or guidelines.	Fails to use guidelines or principles to judge various options.
Determining solution strengths and limitations	Acknowledges several significant strengths and limitations for the selected solution and contrasts this to the other alternatives.	Acknowledges several significant strengths and limitations for the selected solution	Acknowledges at least one significant limitation and one strength for the selected solution.	Only acknowledges the strengths of the selected solution.

Critical Thinking Rubric – Supporting a Position

Adapted from: Facion, P.A., & Facione, N.C. (1994). <http://www.insightassessment.com/HCTSR.html>

	4	3	2	1
Analyzing Information	Accurately interprets all evidence, statements, graphics, questions, etc.	Accurately interprets most evidence, statements, graphics, questions, etc.	Recognizes but misinterprets evidence, statements, graphics, questions, etc.	Offers biased interpretations of evidence, statements, graphics, questions, information, or the points of view of others.
Presenting arguments and counter arguments	Identifies all the important arguments on both sides of an issue (reasons and claims)	Identifies several relevant arguments (reasons and claims) pro and con.	Fails to identify strong, relevant counter-arguments.	Fails to identify or hastily dismisses strong, relevant counter-arguments.
Evaluating view points	Thoughtfully analyzes and evaluates all major alternative points of view.	Offers analyses and evaluations of obvious alternative points of view	Ignores or superficially evaluates obvious alternative points of view.	Ignores or superficially evaluates obvious alternative points of view.
Drawing conclusion	Draws warranted, judicious, non-fallacious conclusions.	Draws warranted, non-fallacious conclusions.	Draws unwarranted or fallacious conclusions.	Argues using fallacious or irrelevant reasons, and unwarranted claims.
Explaining conclusions	Justifies key results and procedures, explains assumptions and reasons.	Justifies some results or procedures, explains reasons.	Justifies few results or procedures, seldom explains reasons.	Does not justify results or procedures, nor explain reasons.
Reflecting on reasoning (metacognition)	Fair-mindedly follows where evidence and reasons lead.	Fair-mindedly follows where evidence and reasons lead.	Regardless of the evidence or reasons, maintains or defends views based on self-interest or preconceptions.	Regardless of the evidence or reasons, maintains or defends views based on self-interest or preconceptions. Exhibits close-mindedness or resistance to reason.

Scaffolding Resources for Critical Thinking

- Scaffold #1: Formulating Meaningful Questions
- Scaffold #2: Comparing and Contrasting
- Scaffold #3: Extracting Themes and Patterns
- Scaffold #4: Analyzing Perspectives
- Scaffold #5: Designing Assignment Questions
- Scaffold #6: Annotating Text
- Scaffold #7: Identifying Logical Fallacies
- Scaffold #8: Framework for Problem-Solving
- Scaffold #9: Evaluating Information Sources
- Scaffold #10: Expressing Agreement and Disagreement for Constructive Dialogue
- Scaffold #11: Developing and Supporting an Argument

Scaffold #1: Formulating Meaningful Questions

Thinking is not driven by answers but by questions. Every field stays alive only to the extent that fresh questions are generated and taken seriously.

To think through or rethink anything, one must ask questions that stimulate thought. **Answers, on the other hand, often signal a full stop in thought.** Only when an answer generates a further question does thought continue its life as such. Only students who have questions are really thinking and learning.

It is possible to **give students an examination on any subject by just asking them to list all of the questions** that they have about a subject, including all questions generated by their first list of questions. (Center for Critical Thinking)

Thinking Questions

Questions that lead to thinking about information, ideas, products, or performances generally have the following characteristics:

- a. Are **open-ended** – begin with why, how, what, where, when, who, what if,
- b. Have **many possible responses**
- c. Explore **context** (historical, social, political, religious, cultural, economic)
- d. Focus on **complexities, problems, and/or issues**
- e. **Probe** for things such as
 - assumptions, bias
 - reasons, logic, evidence
 - connections to prior experience, other topics, current realities, larger themes
 - causes and effects
- f. Lead to **hypothesizing, predicting,** and making inferences
- g. Encourage **reflection** on values and/or motivations
- h. Focus on application, analysis, synthesis, and evaluation

Four Kinds of Questions for Any Position

A. Origins

- How did you come to think this?
- Can you remember the circumstances in which you formed this belief?

B. Support

- Why do you believe this?
- Do you have evidence for this?
- What are some of the reasons why people believe this?
- In believing this, aren't you assuming that such and such is true?
- Is that a sound assumption do you think?

C. Conflict with Other thoughts

- Some people might object to your position by saying . . . How would you respond to them?
- What do you think of the following contrasting view?
- How would you answer the objection that . . . ?

D. Implications and Consequences

- What are the practical consequences of believing this?
- What would we have to do to put it into action?
- What follows from the view that . . . ?
- Wouldn't we also have to believe that . . . in order to be consistent?
- Are you implying that . . . ?

Question Stems

1. How does this (info, idea) apply to . . . ?
2. What happens when . . . ?
3. How is _____ related to . . . ?
4. What is the motive for . . . ?
5. What is the connection between...?
6. What is the evidence for . . . ?
7. What is the relationship between . . . ?
8. What is the distinction between . . . ?
9. What is the function of . . . ?
10. What is the justification for . . . ?
11. What would be the affect of a change in ...?
12. What would happen if . . . ?
13. What are the reasons for . . . ?
14. What are some alternatives to ...?
15. How do the facts/concepts apply to...?
16. What are other examples of ...?
17. What is the meaning of ...?
18. How does ____ fit into the broader context (historical, political, social, etc.)?
19. What is the significance of...?
20. What are the motivations, values, bias' of...?
21. What is the value or importance of . . . ?
22. How would it be better if . . . ?
23. Why did they . . . ?
24. How does ____ compare to _____ ?
25. What might be the outcome if _____ ?
26. How can we prove/disprove _____ ?
27. What are the implications of _____ ?
28. What predictions can be made based on _____ ?

Scaffold #2: Comparing and Contrasting

(Adapted from Educational Services, 2001)

Comparing and contrasting involves identifying similarities and differences among items and articulating them in an organized, structured way.

Questions to Explore

- What are the main attributes of the info, ideas, products, or performances being compared?
- How are the two items similar? How are they different?
- What organizational structure is most appropriate for discussing differences and similarities?

Steps in the Process

1. Select the items you want to compare.
2. Select the attributes of the items on which you want to base your comparison.
3. Explain how the items are similar and different with respect to the attributes selected.
4. Go beyond the facts to examine and discuss relationships, rationales, judgments, etc.
5. Organize the comparative points using one of the two standard frameworks

Note: Before, having students work with the compare and contrast chart, you may want to set up a simple research chart for them to collect information. Stronger students will not need you to structure this step.

Attributes	Item #1	Item #2

Graphic Organizer for Comparing and Contrasting

This chart can be used to gather and organize information for comparing and contrasting.

Items to be Compared

- 1.
- 2.

Attributes	Similarities and/or Differences (Include supportive details, explanations, etc.)

Conclusions

--

Organizational Structures for a Compare and Contrast Report

Either of the following structures can be used as a guide for creating a report outline.

Item by Item Structure

Introduction

Item 1

- Discussion of how the attributes of this item compare to those of the other items

Item 2

- Discussion of how the attributes of this item compare to those of the other items

Conclusions

Attribute by Attribute Structure

Introduction

Attribute A

- Discussion of the significant similarities and differences between items

Attribute B

- Discussion of the significant similarities and differences between items

Attribute C

- Discussion of the significant similarities and differences between items

Conclusions

Self Assessment Questions

(Adapted from: Marzano, R., & Pickering, D, (1997). Dimensions of Learning 2nd edition. ASCD.)

1. Are the attributes compared clearly identified? Are they appropriate, sufficiently complex, and significant?
2. Is the discussion of similarities and differences clear, complete, accurate, and meaningful?
3. Is there evidence of analysis including judgments, relationships, rationale, etc.

Rubric

	4	3	2	1
A. Selection of items.			Selects items that present some challenge in comparing.	Selects items that are simple, but meet the requirements of the task.
B. Selection of attributes		Selects attributes that help extend and refine understanding of the items in an unusual or creative ways.	Selects attributes that help extend and refine understanding of the items.	Selects attributes that provide a partial comparison of the items but do not lead to a complete understanding of the items.
C. Discussion of similarities and differences	Discussion is complete and in-depth. All sections contain insightful analytical and/or inferential comments.	Discussion is complete and contains several analytical and/or inferential comments.	Discussion is complete but mainly fact based.	Discussion is fact based and incomplete

Scaffold #3: Extracting Themes and Patterns

(Adapted from Educational Services, 2001)

Extracting themes and patterns involves identifying and articulating underlying theme(s) or general pattern(s) in several items (i.e. Students are presented the major parts and functions of the central nervous system, and then asked to describe the general pattern and identify another system that has parallel parts and functions).

Questions to Explore

- What are the important properties of the info, idea, product, or performance?
- Where else does this pattern/theme apply? What else has the same general pattern?
- What are the general patterns or themes characteristic of the info, idea, product, or performance?

Steps in the Process:

1. Identify what is considered important or basic to the information or situation with which you are working.
2. Write the basic information in a more general form by:
 - replacing words referring to specific things with words referring to more general things;
 - summarizing information where ever possible.
3. Find new information or a situation where the general pattern applies.

Graphic Organizers

Properties of Nervous System	Abstract patterns or themes	Properties of Skeletal System

The literal patterns of the two items are listed in the two outside panels.

The abstract pattern that connects them is listed in the middle panel.

Examples	Property 1	Property 2	Property 3	Property 4	Property 5	Property 6
World War 1						
World War 2						
War in Iraq						
Generalization All examples have the following patterns/themes: <ul style="list-style-type: none"> • • • 						

Self-Assessment Questions

Completeness

- Are the main points of the information clearly identified?
- Has a general pattern or theme been identified?
- Is it clear how the general pattern or theme relates to other information, ideas, products, or performances?

Accuracy

- Are the main points identified effective in leading towards abstract themes or patterns?
- Does the abstract pattern or theme connect logically to the original source?
- Is the abstract pattern at a level general enough to be applicable to other situations but not so general as to trivialize the nature of the original information?
- Is the abstract pattern or theme important or significant?

Rubric

	4	3	2	1
A. Identifies the basic information or elements in a situation or information.	Identifies the basic information or elements that might lead to an unusual interpretation.	Identifies the basic information or elements.	Identifies some of the basic information or elements.	Identifies only trivial information or elements.
B. Constructs a general or abstract pattern from the original situation or information.	Constructs a general or abstract pattern that highlights unusual or intriguing aspects of the basic information or elements in the original situation or information.	Constructs a general or abstract pattern that accurately represents the basic information or elements in the original or information.	Constructs a general or abstract pattern that accurately represents only some of the basic information or elements in the original situation or information.	Constructs a general or abstract pattern that does not accurately represent the basic information or elements in the original situation or information.
C. Applies the general or abstract pattern to a new situation or new information.	Applies the general or abstract pattern in a way that enhances understanding of the new information in unusual ways.	Applies the general or abstract pattern in a way that enhances understanding of the new information.	Applies the general or abstract pattern in a mundane way.	Applies the general or abstract pattern in a way that creates some confusion about the new situation or information.

Scaffold #4: Analyzing Perspectives

(Adapted from Educational Services, 2001)

Analyzing perspectives involves identifying multiple perspectives on an issue and examining the reasons or logic behind each. (i.e. Analyze the pros and cons of mandatory drug testing at the work place.)

Questions to Explore

- What is my personal point of view? What are the reasons for my point of view?
- What is another point of view? What might be some reasons for this point of view?
- How does what you have learned about others' perspectives impact on your point of view?

Steps in the Process

1. Identify your own perspective on an issue or topic.
2. Determine the reasons (i.e. values, beliefs, bias', experiences) and logic behind your perspectives.
3. Identify a number of other different perspectives
4. Determine the reasons (values, beliefs, bias', experiences) and logic behind each of those perspectives.

Graphic Organizers

1. Clarification Matrix

Issue/Topic/Problem/Controversial Statement:			
Points of Disagreement: 1. 2. 3.			
Perspective	Personal:	Alternative perspective #1:	Alternative perspective #1:
Reasons (i.e. values, beliefs, bias' experiences) and logic behind perspective.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

2. Analyzing Point of View Chart

Statement	Personal Point of View		Another's Point of View	
	Agree/Disagree	Why?	Agree/Disagree	Why?
1.				
2.				
3.				

Self-Assessment Questions

- Is the issue/problem/controversy clearly defined?
- Are several perspectives, including the relevant points of disagreement defined and clearly articulated?
- Do the points of disagreement convey the complexity of and range of thinking related to the issue?
- Are the reasons and logic for each perspective examined thoroughly?

Rubric

	4	3	2	1
A. Identifying points of disagreement	Identifies both explicit and implicit points of disagreement and gets at the underlying causes of conflict.	Identifies all the significant explicit points of disagreement.	Identifies some explicit points of disagreement, but identifies other elements as points of disagreement that are not.	Identifies elements of an issue as points of disagreement that are not.
B. Articulating personal perspective		Accurately identifies a personal perspective and discusses details that demonstrate an in-depth and thorough understanding of that perspective.	Accurately identifies a personal perspective and discusses enough detail to demonstrate a basic understanding of that perspective.	Identifies and articulates a personal perspective in a way that demonstrates some confusion or limited understanding of that perspective.
C. Articulating the reasons or logic underlying personal perspective.	Identifies and articulates an in-depth rationale for personal perspective including a thorough explanation of reasons and logic	Identifies and articulates and solid rationale for personal perspective including several key reasons and logic.	Articulates only the most obvious reasons or logic underlying personal perspective; demonstrates some confusion related to the reasons or logic.	Simply restates or paraphrases the perspective; articulates reasons and logic but demonstrates significant confusion.
D. Articulating alternative perspectives.		Accurately identifies alternative perspectives and discusses details in-depth; demonstrates a thorough understanding of those perspectives.	Accurately identifies alternative perspectives and discusses enough detail to demonstrate a basic understanding of those perspectives.	Identifies and articulates a alternative perspectives in a way that demonstrates some confusion or limited understanding of that perspective.
E. Articulating the reasons or logic underlying alternative perspectives	Identifies and articulates an in-depth rationale for alternative perspectives including a thorough explanation of reasons and logic	Identifies and articulates and solid rationale for alternative perspectives including several key reasons and logic.	Articulates the most obvious reasons or logic underlying alternative perspectives; demonstrates some confusion related to the reasons or logic.	Simply restates or paraphrases the perspectives; articulates reasons and logic but demonstrates significant confusion.

Scaffold #5: Designing Assignment Questions

© 2003. Wolcott, S. K., & Lynch, C. L.. *Templates for Designing Assignment Questions* [On-line].
Available: <http://www.WolcottLynch.com>.

← Less Complex Elements		More Complex Elements →	
Step 1—Identifying	Step 2—Exploring	Step 3—Prioritizing	Step 4—Re-Visioning
<p>Identifying Relevant Information:</p> <ul style="list-style-type: none"> * List data or types of information relevant to _____ * Identify relevant information in _____ (a textual passage such as a case, article, authoritative literature, etc.) * Access relevant standards or rules for _____ * Identify factors related to _____ * Identify various potential solutions to _____ * Describe arguments in favor of _____ <p>Identifying Uncertainties:</p> <ul style="list-style-type: none"> * Explain why _____ cannot completely eliminate risk of _____ * Describe uncertainties concerning _____ * Identify and describe uncertainties about the interpretation or significance of _____ * Identify risks associated with _____ * Describe why there is no single, “correct” way to _____ * Identify reasons why _____ might change or vary 	<p>Interpreting Information From Multiple Viewpoints:</p> <ul style="list-style-type: none"> * Describe the pros and cons of _____ * Analyze the costs and benefits of _____ * Explain how ambiguities affect your analysis of _____ * Identify assumptions associated with _____ (a point of view or alternative) * Interpret _____ from the viewpoint of _____ * Appropriately use _____ (a technique) to analyze _____ * Objectively evaluate _____ information * Explain how alternative solutions might affect _____ (one or more stakeholders) * Analyze the quality of information and evidence related to _____ * Identify own biases and explain how those biases were controlled when _____ * Identify the effects of _____ on _____ <p>Organizing Information:</p> <ul style="list-style-type: none"> * Develop meaningful categories for analyzing information about _____ * Organize the various aspects of _____ to assist in decision making 	<p>Prioritizing and Concluding:</p> <ul style="list-style-type: none"> * Develop and use reasonable guidelines for drawing conclusions regarding _____ * Assess the degree of risk of _____ * Objectively consider _____ when making a decision about _____ * Prioritize _____ * Consider _____ in reaching a conclusion * Develop reasonable recommendation for _____ * Address the costs and benefits of _____ in reaching a conclusion about _____ * Develop reasonable policies for _____ * Develop an effective plan for addressing _____ <p>Effectively Involving Others in Implementation:</p> <ul style="list-style-type: none"> * Take actions to implement the best solution to _____ * Organize _____ (a communication) so that it is meaningful to the receiving party * Communicate _____ effectively for _____ (a given setting and audience) 	<p>Acknowledging Limitations:</p> <ul style="list-style-type: none"> * Identify and describe potential future developments in _____ * Describe limitations to a recommendation about _____ * Strategically consider contingencies and future developments related to _____ <p>Creating and Monitoring Strategies</p> <ul style="list-style-type: none"> * Develop and monitor strategies for _____ * Implement appropriate corrective action for _____ over time * Acknowledge changing circumstances and reconsider _____ (a solution) as appropriate * Continuously monitor and update _____, as needed * Develop strategic uses of _____ * Manage _____ under changing or unusual demands * Apply continuous improvement principles to _____

Scaffold #6: Annotating a Text

Adapted from: VanderMey, R., Meyer, R. Van Rys, J. Kemper, D. & Sebranek, P. (2004). *The college writer: A guide to thinking, writing, and researching*. New York: Houghton Mifflin Company. pp. 16-17.

What is the purpose of annotating text?



Annotating a text is **reading strategy** that forces readers to interact critically with text. Annotating text can be a first step in writing an annotation, but an annotation is a short written piece that generally has three components: (i) summary of the main idea or concepts of a text; (ii) evaluation of the information or ideas in the text; (iii) reflection on the information or ideas in a text. (A scaffolding resource for writing an annotation is under development.)

Annotating a text is like **having a conversation** with the author. Think of the author as someone who...

- ... has a point of view and a certain bias, but so do you;
- ... has taken the time and effort to write down their point of view, which is not an easy process;
- ... deserves respect for what they are saying even if it is weak and you disagree.



What does annotating text look like?

The following websites provide examples of annotated text.

http://www.csupomona.edu/~lrc/crsp/handouts/marking_textbook.html

<http://www.bucks.edu/~specpop/annotate-ex.htm>

Annotating requires **dirtying up the text** with highlighting, underlining, markings, and writing in the margins. If the book does not belong to you, use small post it notes and stick them to the pages. **In a digital environment**, MS Word offers several features for annotating text

- the **highlight** and **underline** tools on the task bar;
 - the **draw** features (at the bottom of the screen) to create shapes, arrows, or boxes
 - the **comment** feature. To insert a comment in Word, follow the steps below:
 - Highlight the word or phrase that you want to attach the comment to.
 - Click on "Insert" in the menu at the top of the page.
 - Select and click on "Comment" (Note: You may have to expand the drop down menu list by clicking on the double down arrows.)
 - Type your comment
 - Close the comment box and depending on the version of Word you are using either the comment will appear right in the margin (Word XP) or a number reference (i.e. [L4] will appear after the word or phrase (Word 2000)
- To view comments on the computer scree**
- Click on "View" in the menu at the top of the page
 - Select and click on "Comments"

What does annotating text sound like?

When you annotate a text, you are doing the following as you read:

1. Identifying key words, phrase, concepts, terms, or ideas
2. Asking (and writing down) questions that come to mind
3. Making connections between ideas in the text and other information, experiences, ideas, etc.
4. Recording thoughts, reflections, and feelings about what the author is saying

Detailed information on each of the four aspects of annotating a text.

1. Identifying key words, phrase, concepts, terms, or ideas

- Highlight, circle, and/or underline key words or phrases that identify main ideas or concepts. Be careful not to overdo these types of markings or they will become meaningless.
- Highlight, circle or underline testable information, or something you might use for a future assignment.
- Consider using different colours or markings for various types of information.
- Define any difficult vocabulary words
- If the text does not already contain clear headings and subheadings, create a marginal index by writing key words in the margin to identify themes, main ideas, topics, and subtopics

2. Asking questions

- Put a "?" in the margin to indicate a question.
- Consider open ended questions (i.e. What if...? Who? What, Where? When? Why? How?) that relate to things such as the following:
 - what the author is saying,
 - why the author(s) says something,
 - what the author means by something,
 - details, words, concepts that need more clarification,
 - what certain sections mean or how they relate to your area of study,
 - things that you disagree with or are skeptical of,
 - bias, reliability, validity, completeness, clarity, accuracy, currency.
- Explore "What if...?" questions

3. Making connections

- Make notes that connect information in the text to things such as:
 - your reading goal
 - other information on the topic
 - something you heard or experienced related to the information in the text
 - applications of the concepts or ideas in the text
 - a possible test question
 - something that contradicts what the writer is saying
- Draw arrows that connect one section of the text to another one

4. Recording thoughts, reflections, and feelings

- Write notes in the margin to indicate the following:
 - how you feel about what the author is saying
 - whether you agree or disagree and why
 - any thoughts you have related to the information and ideas

Scaffold #7: Identifying Logical Fallacies

From: Vandermeij, R. et. al. (2004). The college writer: a guide to thinking, writing, and researching. Houghton Mifflin Company. pp. 261-264

Fallacies are false arguments – that is, bits of fuzzy, dishonest, or incomplete thinking. They may crop up in our own thinking, in your opposition's thinking, or in such public arguments as ads, political appeals, and talk shows.

Because fallacies may sway an unsuspecting audience, they are dangerously persuasive. By learning to recognize fallacies, however, you may identify them in opposing arguments and eliminate them from your own. This document organizes fallacies according to how they falsify an argument.

Distorting the Issue

The following fallacies falsify an argument by twisting the issue out of a logical framework.

1. **Bare Assertion.** The most basic way to distort an issue is to deny that it exists. This fallacy claims, "That's just how it is."
2. **Begging the Question.** Also known as circular reasoning, this fallacy arises from assuming in the basis of your argument the very point you need to prove.
3. **Oversimplification.** This fallacy reduces complexity to simplicity. Beware of phrases like "It's a simple question of: ' Serious issues are rarely simple.
4. **Either-Or Thinking.** Also known as black-and-white thinking, this fallacy reduces all options to two extremes. Frequently, it derives from a clear bias.
5. **Complex Question.** Sometimes by phrasing a question a certain way, a person ignores or covers up a more basic question.
6. **Straw Man.** This fallacy argues against a claim that is easily refuted. Typically, such a claim exaggerates or misrepresents the opponents' actual arguments.

Sabotaging the Argument

These fallacies falsify the argument by twisting it. They destroy reason and replace it with something hollow or misleading.

1. **Red Herring.** This fallacy puts forth a volatile idea that pulls readers away from the real issue, readers become distracted.
2. **Misuse of Humor.** Jokes, satire, and irony can lighten the mood and highlight a truth; when humor distracts or mocks, however, it undercuts the argument.
3. **Appeal to Pity.** This fallacy tugs on the heartstrings. Instead of using a measured emotional appeal, it seeks to manipulate the audience into agreement.
4. **Use of Threats.** A simple but unethical way of sabotaging an argument is to threaten opponents. More often than not, a threat is merely implied: "If you don't accept my argument, you'll regret it."
5. **Bandwagon Mentality.** Someone implies that a claim cannot be true because a majority of people are opposed to it, or it must be true because a majority support it. (History shows that people in the minority have often had the better argument.)
6. **Appeal to popular Sentiment.** This fallacy consists of associating your position with something popularly loved: hockey, pets, apple pie. Appeals to popular sentiment sidestep thought to play on feelings.

Drawing Faulty Conclusions from the Evidence

This group of fallacies falsifies the argument by short-circuiting proper logic in favor of assumptions or faulty thinking.

1. **Appeal to Ignorance.** This fallacy suggests that because no one has proved a particular claim, it must be false; or, because no one has disproved a claim, it must be true. Appeals to ignorance unfairly shift the burden of proof onto someone else.
2. **Hasty or Broad Generalization.** Such a claim is based on too little evidence or allows no exceptions. It jumps to conclusions, often using words like *all*, *every*, or *never*.
3. **False Cause.** This well-known fallacy confuses sequence with causation: If *A* comes before *B*, *A* must have caused *B*. However, *A* may be one of several causes, or *A* and *B* may be only loosely related, or the connection between *A* and *B* may be entirely coincidental.
4. **Slippery Slope.** This fallacy argues that a single step will start an unstoppable chain of events. While such a slide may occur, the prediction lacks real evidence.

Misusing Evidence

These fallacies falsify the argument by abusing or distorting the evidence.

1. **Impressing with Numbers.** In this case, the writer drowns readers in statistics and numbers that overwhelm them into agreement. In addition, the numbers haven't been properly interpreted.
2. **Half-Truths.** A half-truth contains part of, but not the whole truth. Because it leaves out "the rest of the story," it is both true and false simultaneously.
3. **Unreliable Testimonial.** An appeal to authority has force only if the authority is qualified in the proper field. If he or she is not, the testimony is irrelevant. Note that fame is not the same thing as authority.
4. **Attack Against the Person.** This fallacy directs attention to a person's character, lifestyle, or beliefs rather than to the issue.
5. **Hypothesis Contrary to Fact.** This fallacy relies on "if only" thinking. It bases the claim on an assumption of what would have happened if something else had, or had not, happened. Being pure speculation, such a claim cannot be tested.
6. **False Analogy.** Sometimes a person will argue that *X* is good (or bad) because it is like *Y*. Such an analogy may be valid, but it weakens the argument if the grounds for the comparison are vague or unrelated.

Misusing Language

Essentially, all logical fallacies misuse language. However, three fallacies falsify the argument especially by the misleading use of words.

1. **Obfuscation.** This fallacy involves using fuzzy terms like *throughput* and *downlink* to muddy the issue. These words may make simple ideas sound more profound than they really are, or they may make false ideas sound true.
2. **Ambiguity.** Ambiguous statements can be interpreted in two or more ways. While ambiguity can result from unintentional careless thinking, people sometimes use ambiguity to obscure a position.
3. **Slanted Language.** By choosing words with strong positive or negative connotations, a person can draw readers away from the true logic of the argument.

Scaffold #8: Framework for Problem-Solving

Although there are different frameworks, processes, and heuristics for problem-solving, depending on your discipline, most of them include the following elements.

- A. Identifying and Defining the Problem**
- B. Gathering Information Related to the Problem**
- C. Generating Alternatives**
- D. Evaluating Alternatives**
- E. Selecting a Solution**
- F. Implementing a Solution**
- G. Evaluating the Solution**

What follows are questions to consider related to each of the elements and possible strategies for answering the questions.

A. Identifying and Defining the Problem

Questions to consider

- How do various people define the problem?
- How can the problem be broken down into sub-problems?
- What led up to the problem? - who, what, where, when, why
- What other issues is this problem connected to? What is the relationship?
- What conflicts exist related to the problem? What are the sources of the conflicts?
- What are the goals?
- What are the gaps between the goals and the current reality?
- What are the boundaries and constraints?

Strategies: Research, Interviews, Surveys, Concept Mapping, Observations

B. Gathering Information Related to the Problem

Questions to consider

- Who are the stakeholders and what are their responsibilities, needs, wants, and interests related to the problem?
- What are the relevant facts and data? How can we verify their accuracy and completeness?
- What are the symptoms/evidence of the problem? What are the underlying causes?
- What are the various opinions and assumptions that exist in relation to the problem?
- What are the ethics, values, and principles that impact on the problem?
- What is the historical, political, cultural, and/or sociological context?

Strategies: Research, Interviews, Surveys, Concept Mapping, Observations

C. Generating Alternatives

Questions to consider

- What are all the possible solutions?
- What can be done to generate more creative and innovative alternatives?
- How can we include more perspectives in the alternatives?
- How can alternatives be combined or elaborated?
- Which alternatives could benefit from more research, data, or information?

Strategies: Brainstorming, Six Thinking Hats, Mind Mapping

D. Evaluating Alternatives

Questions to consider

- What type of decision-making process is most appropriate?
- What are the primary criteria for evaluating a solution or strategy? What are the priorities?
- What are the secondary criteria?
- What are the advantages and constraints of each solution?
- How flexible, feasible, and/or suitable are each of the alternatives?
- What type of opposition do you anticipate with each alternative? What revisions might address the opposition?
- What are the predicted results/consequences for each solution? How do they compare with the goals?

Strategies: SWOT analysis, Charts (i.e. pro/con, PMI – plus, minus, interesting), Spreadsheets, Matrices, Buriden's Ass Analysis (For more information on decision-making techniques, see Harris, 1998).

E. Selecting a Solution

Questions to consider

- What is the best solution given all the known factors?
- Are there any things that may have been missed (considerations, alternatives)? Who might fill in those gaps?
- How can the solution be adapted to create more win-win?

Strategies: Same as evaluating alternatives.

F. Implementing a Solution

Questions to consider

- What are the implementation considerations? Contingencies?
- What is the implementation plan – timeline, resources, 5 W's – who, what, when, where, how
- What is the communication plan for implementing the solution or strategy?

Strategies: Critical path diagram, RACI Chart – Responsibility, Approve, Consult, Inform, Project organization chart

G. Evaluating the Solution

Questions to consider

- How can you monitor the implementation? What criteria and factors will you use?
- How do the results compare to what you expected? What are possible reasons if they don't?
- What can be learned from the process about people, procedures, etc.?

Strategies: Surveys, Interviews, Tracking sheets, Reflective dialogue, Reflective writing,

Scaffold #9: Evaluating Information Sources

Based on work done by William MacKenzie (Liberal Arts)

Part A – Evaluation Questions

1. Purpose

- What is the purpose of the information – (i.e. inform, persuade, describe, entertain, leisure, stimulate dialogue or controversy)
- What words or phrases in the text are evidence of this purpose?

2. Audience

- Who is the information written for - scholars, trades people, popular culture, professionals?
- What influence does the intended audience have on what is being said or not said?

Part B – Evaluation Questions

3. Authorship

- Who is writing the information? What type of expertise, qualifications, agendas does the writer have?
- Who is sponsoring the writing of the information (i.e. government, university, business, professional association, news conglomerate, individual)?

4. Bias

- What evidence does the writer provide for his/her main points?
- Given the authorship of the information, is there a built in slant (political, religious, cultural, gender)?
- How reliable is the data? Are the facts verifiable through other sources?

5. Currency

- How old is the information?
- How old are the references or the data used?

6. Scope

- How much information is given on the topic?
- Is the information too broad, too general, or too narrow? What makes you say this
- How in-depth is the information?
- How many sources are cited in the bibliography? What types of sources?

7. Format and Organization

- In what sort of format is the information being presented? Is this format appropriate for the content?
- What type of information is it - World Wide Web site, a news article, a text file, a newsgroup posting, an e-mail message, a scholarly article, a trade journal, a popular magazine?

8. Clarity

- Is the information clearly presented and well-written? What makes you say this?
- Is it well organized? What makes you say this?
- Is it easy to extract key points from the information and/or find specific points? Why?

9. Validity

- How true or trustworthy do you think the information is?
- What makes you think so?

Rubric for Evaluation of Information Sources

	3	2	1	0
Analysis	<ul style="list-style-type: none"> Information sources are thoroughly analyzed in all areas of evaluation. Almost all analytical statements demonstrate use of the guiding questions to probe for depth and breadth. 	<ul style="list-style-type: none"> The information source is thoroughly analyzed in at least 7 of the areas of evaluation. Some of the analytical statements demonstrate use of the guiding questions to probe for depth and breadth. 	<ul style="list-style-type: none"> The information source is analyzed in at least 5 of the areas of evaluation. At least two of the analytical statements demonstrate use of the guiding questions to probe for depth and breadth. 	<ul style="list-style-type: none"> The information source is analyzed in less than 5 of the areas of evaluation.
Support	<ul style="list-style-type: none"> 9 areas of evaluation are supported with at least one example and/or evidence. 	<ul style="list-style-type: none"> 7 areas of evaluation are supported with at least one example and/or evidence. 	<ul style="list-style-type: none"> 5 areas of evaluation are supported with at least one example and/or evidence. 	<ul style="list-style-type: none"> Less than 5 areas of evaluation are supported with examples and evidence
Clarity	<ul style="list-style-type: none"> Writing throughout is clear and easy to read. Ideas are organized into paragraphs and sentences flow smoothly from one to the next. No spelling and/or grammatical errors 	<ul style="list-style-type: none"> Most of the writing is clear and easy to read. Almost all paragraphs are organized around a single idea. Almost all sentences flow smoothly. Less than four spelling and/or grammatical errors 	<ul style="list-style-type: none"> At least half of the writing is organized into paragraphs that focus on a single idea. Ideas are clear to the reader on the first read through. Four or more spelling and/or grammatical errors 	<ul style="list-style-type: none"> Less than half of the paragraphs are organized around a single idea. Many ideas are unclear to the reader. Spelling and/or grammatical errors make it difficult to read

More on Evaluating Information Sources

Cornell University Library. **Critically Analyzing Information Sources**. Retrieved October 29, 2004 from <http://www.library.cornell.edu/olinuris/ref/research/skill26.htm>

Colorado State University Library. **Popular Magazines vs. Trade Magazines vs. Scholarly Journals**. Retrieved October 29, 2004 from <http://lib.colostate.edu/howto/poplr.html>

University of California. (1996-2004). **Evaluating Web Pages: Techniques to Apply and Questions to Ask**. Retrieved October 29, 2004 from <http://www.lib.berkeley.edu/TeachingLib/Guides/Internet/Evaluate.html>

University of California. (1996-2003). **Critical Evaluation of Resources**. Retrieved October 29, 2004 from <http://www.lib.berkeley.edu/TeachingLib/Guides/Evaluation.html>

Scaffold #10: Expressing Agreement or Disagreement for Constructive Dialogue

In business, there are expressions that say:

If two people always agree, only one is doing the thinking. **or**
If two people always agree, one of them is probably not needed.

Participating constructively in controversial discussions is not easy. It's challenging to figure out how to say what you want to say without sounding harsh, offending someone, or creating bad feelings. Most of us **have never been taught** how to express agreement or disagreement in a positive way. In fact, often, we learn early on that it is best not to disagree with others.

Discussions about complex topics can happen at three different levels, which are described below. Although we might label these levels in different ways, the **goal in academic environments (and in good stimulating dialogue anywhere)**, should be the type of dialogue described in Level 3.

Level 3 (Dialogue)

- The goal is primarily to try and understand where each person is coming from and what makes them think the way they do
- People spend as much effort on really listening and probing to understand others as they do trying to explain what they think and why they think that way.

Level 2 (Discussion)

- The goal is primarily to get to “say your piece”.
- People are more interested in getting a chance to speak than listening to other's perspectives and trying to understand where they are coming from.

Level 1 (Debate)

- The goal is to prove that you're right and the other person is wrong
- Things are presented as very black and white/ right or wrong

Good dialogue, although challenging, is incredibly thought provoking and interesting. It helps us **learn about ourselves, others, and this complex world.** The **sentence starters** below can help participants **formulate input** in dialogue.

Agreement (and continuing the dialogue)

1. The point you made about “....” is excellent. I'd like to add that...
2. I agree with your comment “...”. What do you think about...?
3. I'm with you on that point. What I still wonder about is....
4. I think what you're saying about.... is so right. What would happen though if...?
5. Yes, and in fact....
6. Yes, and what is more...
7. Absolutely. Actually, I would go further, and say...

Partial Agreement

1. I agree with....., but what about
2. That's a good point, but in my opinion....
3. That could apply in some situations, but what about when....?
4. I understand your point about..., but I don't understand.....
5. It's certainly true that..., but on the other hand....
6. I can see that...., but I think it's also important to consider....
7. That makes sense, but could it also be true that....
8. I'd agree with you if...., but not if...
9. I see what you mean with..., but I also think we need to consider....

Constructive Disagreement

1. I can appreciate your point about..., but I would disagree because....
2. That's interesting, however, from my point of view....
3. That may be the case, but in my experience.....
4. I'm afraid I can't agree with... because
5. I disagree. What about the situations where...?
6. I don't think that's the case because
7. I'm not so sure about that because...
8. I don't think your point about...necessarily follows because...
9. I don't really see it that way because....

Things to Avoid

1. Avoid using words like never and always.

This type of language can easily lead to arguments about the wrong thing, and take a discussion completely off track.

2. Avoid expressing disagreement without explaining why or supporting your point.

In a discussion, if you are going to disagree, it is only fair to explain why you disagree.

3. Avoid criticizing the person who made the comment.

Everyone is entitled to their opinion. Just because someone thinks differently doesn't make them better or worse than you. Sticking to comments about ideas keeps the dialogue interesting and avoids making it personal.

Scaffold #11: Developing and Supporting an Argument

Developed by Judy Mussio and Annique Boelryk

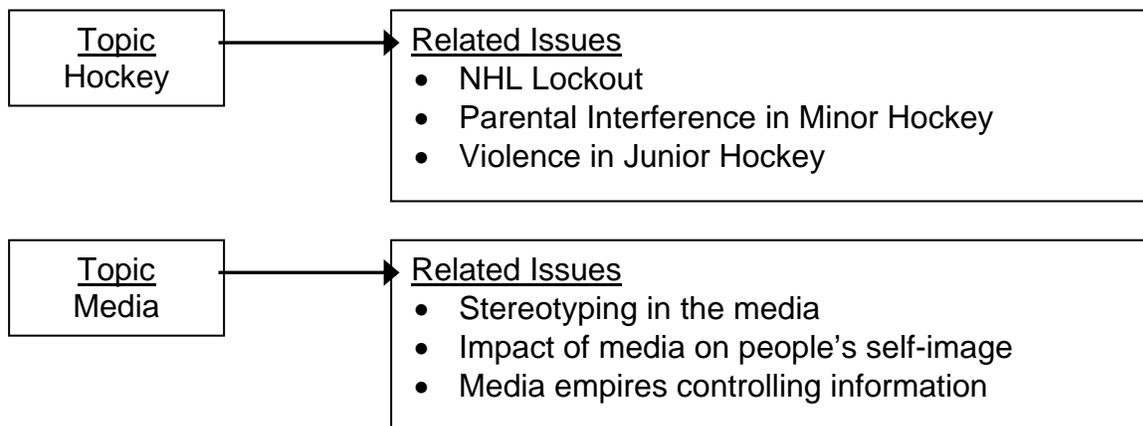
Going from a topic, to supporting an argument or position on a debatable issue is a challenging thinking process. This document outlines a series of steps to support you in that process.

Step 1: Select a Topic

Select a **topic of interest** to you either personally or professionally.

Step 2: Identify an Issue

Identify an **issue of interest** related to your topic. Below are some examples of topics and related issues.



Step 3: Find and Read Related Information

Reading to explore several different perspectives on an issue leads to a better and broader understanding. Use the Internet or the library databases for this step.

Step 4: Generate Ideas

Use a **brainstorming technique** to generate ideas about possible positions on the issue. These techniques could include listing, free-writing, mapping, etc.

Think about answers to the following questions:

- Who are the various stakeholders (i.e. people, groups of people with a particular perspective, types of people, organizations, political groups, business groups, etc.) that might have an opinion on this issue? This will help you think about the issue from a number of points of view.
- What are their opinions (positions/perspectives) and why? A stakeholder group may have more than one opinion or position. The positions must be **debatable** (i.e. things that other people could possibly disagree with).

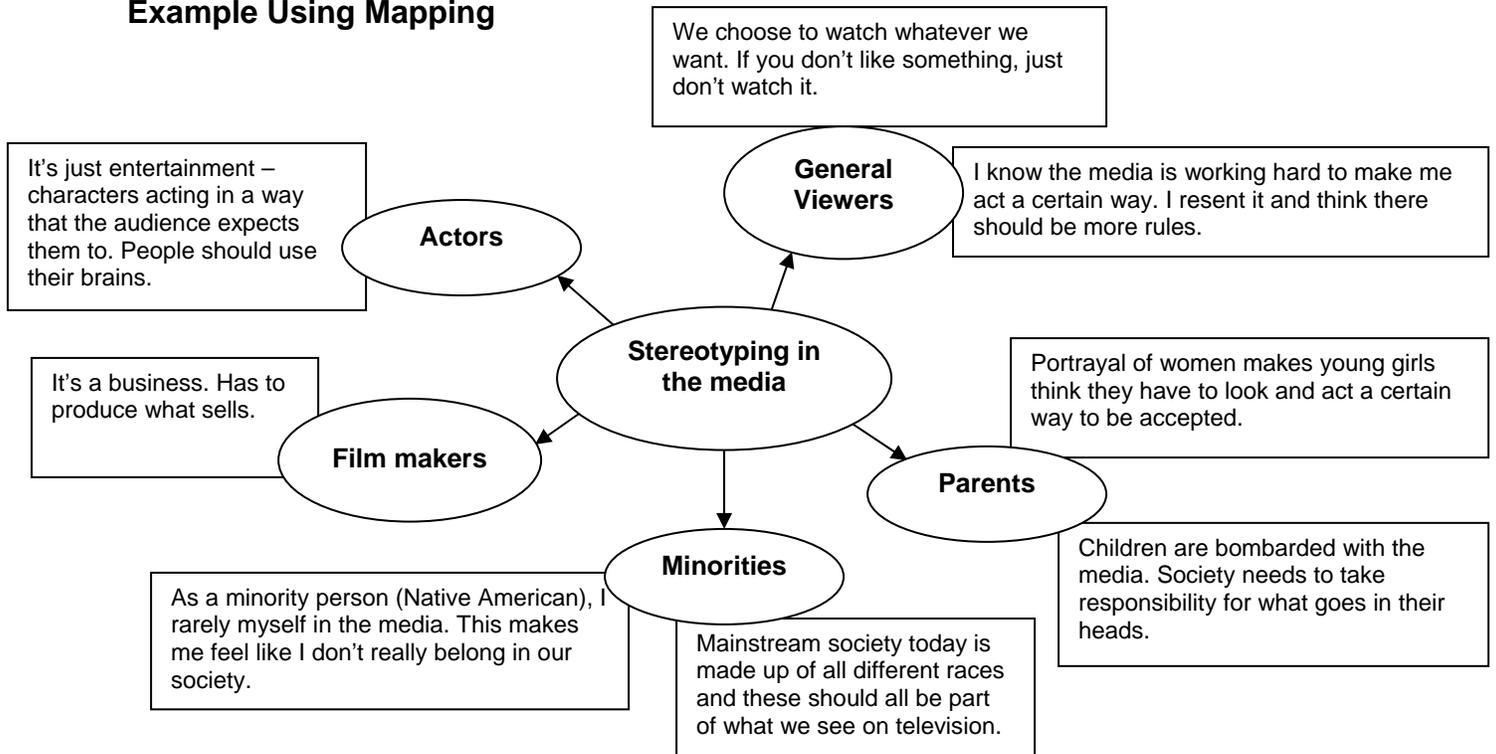
When planning out your ideas, include the following four layers:

Layer 1: The issue

Layer 2: Stakeholders

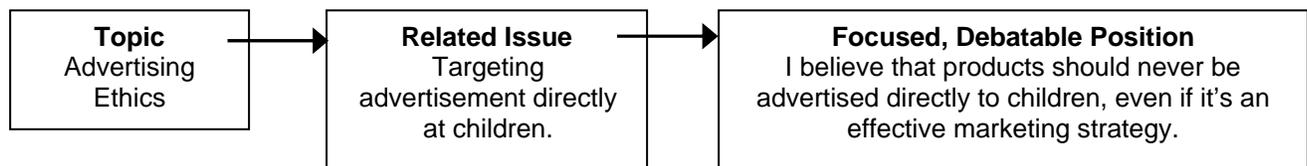
Layer 3: Positions held by various stakeholders

Example Using Mapping



Step 5: Develop a Position Statement

Select a focussed, debatable position that can be developed. One strategy for developing a position statement is to complete a sentence beginning with **“I believe that...”**



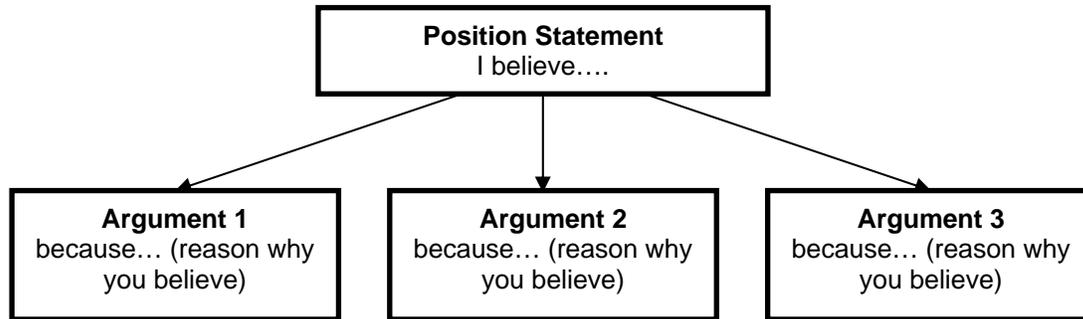
Ensuring your Position is Debatable

Debatable means that there are several different opinions on the issue and that people will have disagreements about various aspects of those opinions.

To determine if something is debatable ask, “Is it something that almost everyone would agree or disagree with”? If your answer is “yes”, then it is not debatable.

Step 6: Identify Your Supporting Arguments

Determine **supporting arguments** or reasons why you believe your position to be true. The **diagram below** might help you begin this process if you are a visual learner.



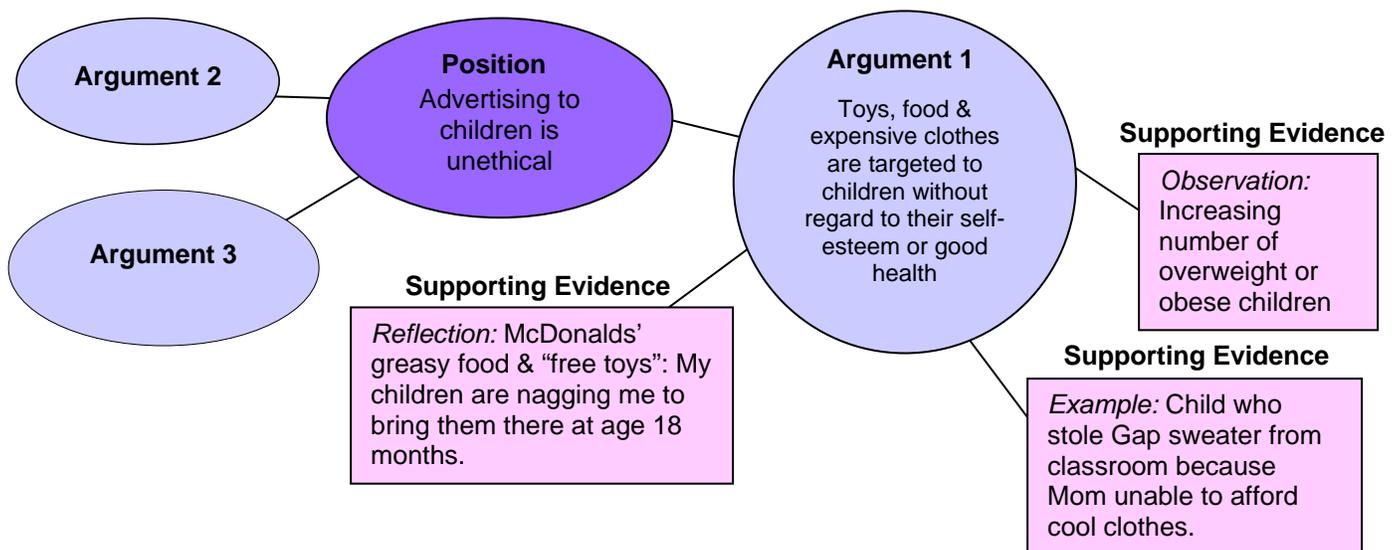
Formulate your position statement and arguments into **clear and complete sentences**. The position statement combined with your arguments will formulate a thesis.

Step 7: Develop Supporting Evidence

Supporting evidence explains and shows others why you think what you think about an issue and gives weight to your arguments. Depending on the type of argument being developed, evidence can include any or all of the following

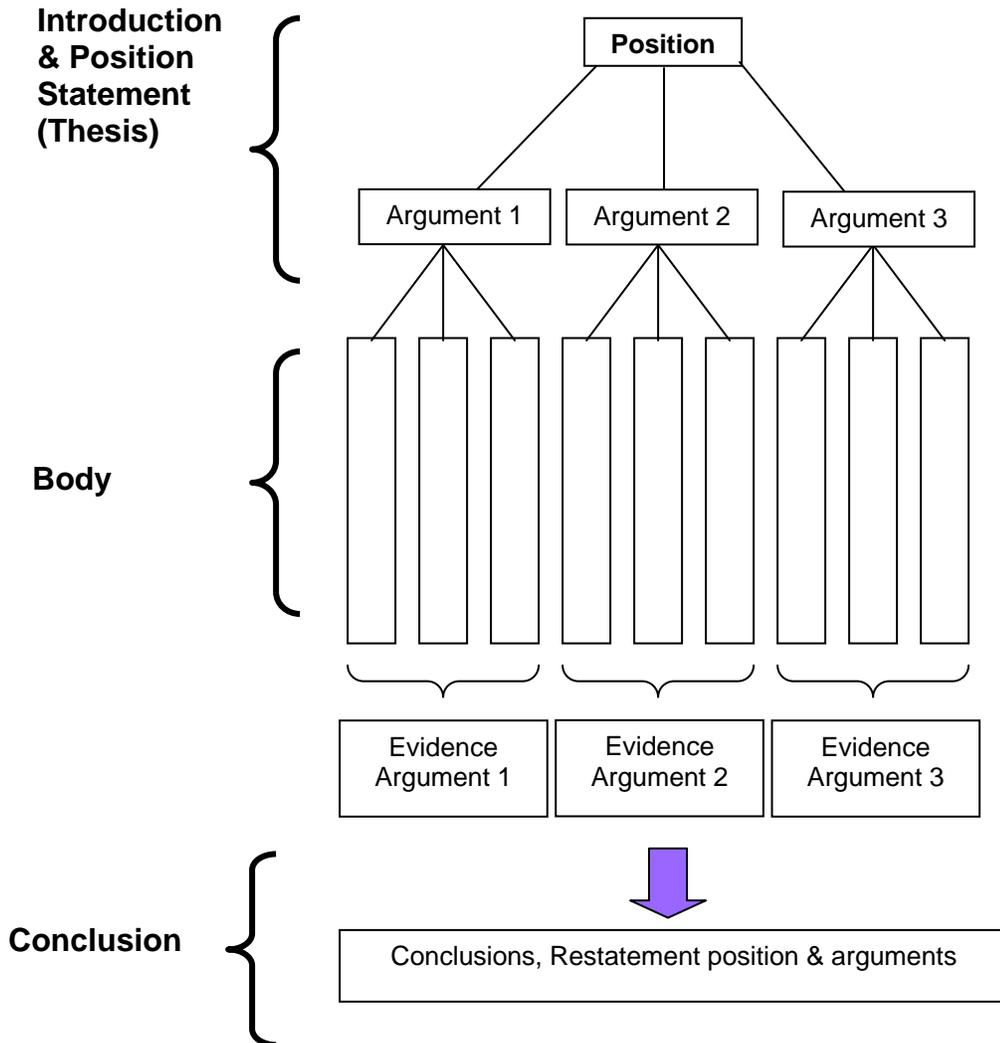
- Personal experiences
- Observations
- Quotations from secondary research (i.e. articles, books)
- Data and Facts
- Quotations from primary research (i.e. interviews, surveys, case studies)

Example Using Mapping



Step 8: Organize Your Ideas for Reporting

Once you have developed evidence for each of your arguments, you may wish to visually assess the flow and logic of your position, arguments and evidence by completing a tree diagram, such as the one below. This can act as an outline and basis for communicating your argument in either a written or spoken format.



References and Additional Resources

Angelo, T.A. and Cross, K. P. (1993) Classroom Assessment Techniques, 2nd ed. San Francisco: Jossey-Bass.

Bransford, J.D., Brown, A.L., & Cocking, R.R. (1999). How people learn: Brain, mind, experience, and school. National Academy of Sciences.

Bransford, J.D., & Stein, B. S. (1984). The ideal problem solver: A Guide for improving thinking, learning, and creativity. New York: W.H. Freeman and Company

Centre for the Development of Teaching and Learning. (2003). Critical thinking and pedagogy. University of Singapore. Retrieved April 13, 2004 from <http://www.cdtl.nus.edu.sg/ctp/index.htm>

The Critical Thinking Community. (n.d.). The role of questions in thinking, teaching, and learning. Retrieved January 26, 2004 from <http://www.criticalthinking.org/resources/articles/the-role-of-questions.shtml>

Donald, J.G. (2002). Learning to think: Disciplinary perspectives. San Francisco: Jossey-Bass.

Educational Services. (2001). Instructional framework for thinking skills: The online guide. Cedar Falls, Iowa. Area Educational Agency 7. Retrieved October 24, 2003 from <http://edservices.aea7.k12.ia.us/framework/framework.html>

Fowler, B. (2002). Bloom's taxonomy and critical thinking. Longview Community College. Retrieved January 26, 2004 from <http://www.kcmetro.cc.mo.us/longview/ctac/blooms.htm>

Harris, R. (1998). Decision-making techniques. Retrieved March 22, 2004 from <http://www.virtualsalt.com/crebook6.htm>

Hirose, S. (1992). Critical thinking in community colleges. ERIC Digest. Retrieved April 12, 2004 from http://www.ericfacility.net/databases/ERIC_Digests/ed348128.html

Kurfis, J.G. (1989). Critical thinking by design. Retrieved April 20, 2004 from <http://www.cstudies.ubc.ca/facdev/services/newsletter/89/nov89-S2.html>

Meyers, C. (1986). Teaching students to think critically: A guide for faculty in all disciplines. San Francisco: Jossey-Bass.

Scriven, M. & Paul, R. (1996). Defining critical thinking: A draft statement for the National Council for Excellence in Critical Thinking. Retrieved April 22, 2004 from <http://www.criticalthinking.org/University/defining.html>

Zull, J. E. (2002). The art of changing the brain: Enriching teaching by exploring the biology of learning. Stylus Publishing.