



Critical Thinking

Learning, Teaching, and Assessment

A Teacher's Handbook

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INTRODUCTION

The Critical Thinking Assessment Rubric was developed as a key deliverable of the 'Building Capacity to Measure Essential Employability Skills' project funded by the Higher Education Quality Council of Ontario (HEQCO)¹. This handbook serves as a resource to teachers in using the Critical Thinking Assessment Rubric.

Critical thinking is one of the six skill categories within the 'essential employability skills' (EES) curriculum requirements for Ontario college programs – specifically, EES numbers 4 and 5². Each of these essential employability skills must be addressed (learned, practiced, evaluated) within a program. How and when these are implemented should be based on decisions regarding the program as a whole and by individual teachers.

The wording of the learning outcomes associated with the critical thinking essential employability skill: 'Apply a systematic approach to solve problems' and 'Use a variety of thinking skills to anticipate and solve problems' are too vague for direct measurement in an assignment; more concrete and measurable learning outcomes are needed.

In this project we used the skill of critical thinking as an example to demonstrate possible ways of incorporating a broadly described essential employability skill into the curriculum – what needs to be taught and practiced, how it can be demonstrated by the learner, and how it can be measured by the teacher.

We aimed to develop a common language with which teachers could talk about critical thinking in the classroom. Our objective was to create a practical critical thinking measurement or marking tool, grounded in the literature, and developed by George Brown College teachers, which would have sufficient flexibility to allow it to be adapted by teachers for use in any college classroom in which critical thinking is being taught and measured.

¹ Higher Education Quality Council of Ontario <http://www.heqco.ca/en-ca/Research/LearningOutcomes/Pages/home.aspx>

² Ontario Ministry of Training, Colleges and Universities

ABOUT THE SIX CRITICAL THINKING CONSTRUCTS

The project began with a review of the literature about critical thinking. While there are many valid definitions of critical thinking, we chose the following three definitions in the earliest discussions with faculty about the development of the first version of the critical thinking rubric.

'Purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference as well as explanation of the evidential, conceptual and methodological considerations on which a judgment is based' (American Philosophical Association)³

'Critical thinking is a habit of mind characterized by the comprehensive exploration of issues, ideas, artifacts, and events before accepting or formulating an opinion or conclusion' (American Association of Colleges and Universities, Critical Thinking Value Rubric)⁴

'[Critical thinking] entails (1) identifying assumptions that frame our thinking and determine our actions, (2) checking out the degree to which these assumptions are accurate and valid, (3) looking at our ideas and decisions (intellectual, organizational, and personal) from several different perspectives, and (4) on the basis of all this, taking informed actions' (Brookfield, 2012)⁵

The literature confirmed that there is no single standard definition of critical thinking, which results in a wide range of critical thinking constructs being taught and evaluated. Faculty in Phase 1 of the project agreed on six relevant, concrete and measurable critical thinking constructs which could be taught, and then evaluated within an assignment. These were the critical thinking constructs that were already most commonly taught and evaluated, according to project faculty.

1. Clarifies the issue to be discussed and/or the position to be argued in this paper
2. Identifies the sources of ideas or evidence used in developing the argument or conclusions
3. Analyses the ideas or evidence to develop the argument or conclusions
4. Critiques contradictory evidence, information, experts' opinions and/or methodologies
5. Acknowledges personal biases or assumptions
6. Describes conclusions

During the project, we recognized that a student's mastery of the English language, as used in their assignment, could strongly influence the teacher's rating of critical thinking skills, and provide a focus other than specifically on the critical thinking skills. For this reason, English language-specific criteria were excluded from this rubric.

ABOUT THE CRITICAL THINKING ASSESSMENT RUBRIC

The Critical Thinking Assessment Rubric:

- is brief and easy for a marker to use.
- has demonstrated high inter-rater reliability through a validation process with GBC faculty.
- focuses on only a select and manageable number of the many possible critical thinking constructs identified in the literature - uses six distinct critical thinking criteria (i.e. constructs) judged by GBC faculty to be most relevant to the types of assignments used at GBC.
- provides meaningful descriptors for a range of performance levels, clearly distinguishing from inadequate to exemplary performance in regard to expectations (which, in turn, would be identified in the assignment instructions).
- uses 4 distinct levels of performance for each construct:
 - 'inadequate'
 - 'below expectations'
 - 'meets expectations'
 - 'exemplary/exceeds expectations'
- includes a description or example of performance in each of the 24 cells to assist the marker in differentiating the 4 levels of performance for each criterion.
- uses sufficiently generic language in the descriptors that would allow applicability to different types of assignments.
- provides sufficient flexibility to be used either as a stand-alone rubric (with the addition of a grading scheme and criteria weights) or to be integrated into an existing rubric wherever relevant.
- can be used for formative feedback rather than marks.
- may be adapted to use some but not all of the criteria, depending upon what is taught in the course.

³ Facione, P. (1990)

⁴ American Association of Colleges and Universities

⁵ Brookfield, S.D. (2012) page 1

HOW TO USE THE CRITICAL THINKING ASSESSMENT RUBRIC

Refer to Appendix A for a copy of the Critical Thinking Assessment Rubric.

The Critical Thinking Assessment Rubric can be used to develop or modify curriculum, both teaching and learning activities, and assignments. The six constructs can inform what is to be discussed, taught and practiced about critical thinking in a course or across courses in a program.

This rubric should be used to evaluate only those assignments that have specifically incorporated the relevant critical thinking criteria from the rubric. It is assumed that the constructs to be evaluated have been discussed/taught/practiced by students, that students already know the specific performance expectations for each critical thinking construct (criterion) to be evaluated, and that this information is clearly identified in the assignment instructions.

Options for using the Critical Thinking Assessment Rubric:

1. The rubric can be used as a stand-alone marking rubric either for formative/teaching purposes or for summative evaluation with the addition of a grading scheme and criteria weights.
2. No specific weight is currently attached to the six criteria in this rubric. Teachers may choose to attach relative weights or a grading scheme to the rubric.
3. Any or all of the six critical thinking constructs (criteria) as relevant to the assignment can be incorporated into an existing grading rubric.
4. Teachers may choose to use fewer than the six criteria provided in this rubric, as is relevant to the specifics of their assignment.
5. Teachers may add additional critical thinking criteria, reflecting other relevant critical thinking constructs, as needed.

Examples of assignments using the Critical Thinking Assessment Rubric

Refer to Appendix B for several examples of assignments that were created by the General Education volunteer faculty in Phase 2 of this project. These are examples of assignments that were developed or modified in order to reflect or incorporate the critical thinking constructs, and illustrate how the rubric was actually used.

REFERENCES AND RESOURCES

- American Association of College and Universities (n.d.). Critical thinking value rubric. Retrieved <http://assessment.aas.duke.edu/documents/CriticalThinking.pdf>
- Brookfield, S.D. (2012). Teaching for critical thinking. Tools and techniques to help students question their assumptions. San Francisco, John Wiley and Sons.
- Facione, P. (1990). Critical thinking: A statement of expert consensus for purposes of educational assessment and instruction. American Philosophical Association Delphi Research Report. Millbrae, CA, The California Academic Press.
- Nair, G. G. (2011) Preliminary Psychometric Characteristics of the Critical Thinking Self-Assessment Scale. Doctoral thesis. University of Saskatchewan, Saskatoon, CANADA.
- Ontario Ministry of Training, Colleges and Universities (undated). Retrieved from: <http://www.tcu.gov.on.ca/pepg/audiences/colleges/progstan/essential.html>

APPENDIX A

CRITERIA	DESCRIPTIONS OF LEVELS			
	EXEMPLARY/ EXCEEDS EXPECTATIONS	MEETS EXPECTATIONS	BELOW EXPECTATIONS	INADEQUATE
Clarifies the issue to be discussed and/or the position to be argued in this paper	<ul style="list-style-type: none"> Clearly states the specific issue/position to be discussed or argued in the paper Provides additional information about why and how this issue was selected 	<ul style="list-style-type: none"> Clearly states the specific issue/position to be discussed or argued in the paper 	<ul style="list-style-type: none"> Identifies but does not clearly state the specific issue/position to be discussed or argued in the paper 	<ul style="list-style-type: none"> Does not acknowledge the issue/position to be discussed or argued in the paper
Identifies the sources of ideas or evidence used in developing the argument or conclusions	<ul style="list-style-type: none"> Identified sources of ideas/evidence are relevant to the assignment and credible Identifies a broader or more comprehensive range of sources than is required 	<ul style="list-style-type: none"> Identified sources of ideas/evidence are relevant to the assignment and credible 	<ul style="list-style-type: none"> Some identified sources are either irrelevant to the assignment, questionable or not credible 	<ul style="list-style-type: none"> Does not identify the sources of ideas/evidence
Analyses the ideas or evidence to develop the argument or conclusions	<ul style="list-style-type: none"> Analysis both integrates and synthesizes all of the identified sources of ideas/evidence Analysis is logical Analysis is on topic Analysis leads to, strengthens and focuses the argument or conclusions 	<ul style="list-style-type: none"> Analysis includes all the identified sources of ideas/evidences Analysis is logical Analysis is on topic Analysis leads to and supports the argument or conclusions 	<ul style="list-style-type: none"> Analysis reflects some but not all of the identified sources of ideas/evidences Analysis is not logical Analysis is not on topic Analysis does not lead to or support the argument or conclusions 	<ul style="list-style-type: none"> Does not include an analysis
Critiques contradictory evidence, information, experts' opinions and/or methodologies	<ul style="list-style-type: none"> Identifies and questions/ challenges contradictory evidence, information, experts' opinions and/or methodologies as presented Analyses the strengths and limitations of the evidence being challenged 	<ul style="list-style-type: none"> Identifies and questions/ challenges contradictory evidence, information, experts' opinions and/or methodologies as presented 	<ul style="list-style-type: none"> Accepts contradictory evidence, information, experts' opinions and/or methodologies without question or criticism 	<ul style="list-style-type: none"> Does not acknowledge contradictory evidence, information, experts' opinions and/or methodologies
Acknowledges personal biases or assumptions	<ul style="list-style-type: none"> Articulates/ explains personal biases or assumptions Acknowledges the relevance or impact of personal biases or assumptions on their analysis or conclusions 	<ul style="list-style-type: none"> Articulates/ explains personal biases or assumptions 	<ul style="list-style-type: none"> Acknowledges but does not articulate personal biases or assumptions 	<ul style="list-style-type: none"> Does not mention or recognize personal biases or assumptions
Describes conclusions	<ul style="list-style-type: none"> Conclusion is logical Conclusion arises from effectively synthesized and thoroughly evaluated evidence in the argument Solutions are prioritized where there is more than one 	<ul style="list-style-type: none"> Conclusion is logical Conclusion is rooted in/linked to the evidence in the argument Solutions are prioritized where there is more than one 	<ul style="list-style-type: none"> Conclusion lacks logic Conclusion is weakly linked, if at all, to evidence in the argument Where an attempt has been made to prioritize solutions, there are gaps in logic and/or understanding 	<ul style="list-style-type: none"> Conclusion is absent, incorrect or irrelevant to the evidence in the argument Where there is more than one solution presented, these are incorrectly or not at all prioritized

APPENDIX B

The following are real examples of five course assignments which were developed or modified by the project faculty in order to incorporate the critical thinking constructs. To illustrate and assist you in identifying this, we have purposely colour-coded the relevant sections of these assignments to demonstrate where the critical thinking constructs are incorporated.

In creating or modifying your own assignments, you may choose to evaluate all or some of the criteria, depending upon what you have taught and what is important within the context of your course and your assignment.

Colour coding for illustration purposes only:

Criterion #1	Identify the issue/position
Criterion #2	Support sources
Criterion #3	Analysis
Criterion #4	Contradictory evidence
Criterion #5	Personal bias
Criterion #6	Conclusions

EXAMPLE ASSIGNMENTS #1 AND #2

COURSE TITLE/CODE TROUBLED WATERS: OUR FUTURE AND THE GLOBAL OCEAN/LSCI 1301

COURSE DESCRIPTION The global ocean is our life-support system. Covering nearly three-quarters of Earth's surface, the oceans produce half of the oxygen in our atmosphere, regulate temperature and climate, and govern nutrient and chemical cycles that sustain all living things, including you. The oceans, however, are in distress. Pollution and unsustainable seafood harvesting are causing fundamental changes throughout the ocean system that will result in dire consequences unless our habits change substantially.

Students investigate what is happening to our oceans and the ecological consequences of human-influenced changes in ocean temperature, oxygen, acidity, and biodiversity. Through readings,

videos, and class discussion, students learn about human impacts on the ocean and how ocean change will affect not only us but life in general. Students learn the importance of scientific study of the world's oceans and apply analysis and critical thinking to issues learned in class and through independent research.

OUTCOME(S) BEING EVALUATED BY ASSIGNMENT Relate human activities to ocean changes and explain the effect these changes have on ecological, social, and economic dimensions.

Research, compare, and critique potential solutions to mitigate the effects of ocean changes.

Analyze and interpret quantitative data on ocean systems and formulate conclusions.

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ASSIGNMENT #1 Point-of-View

GOAL Write an argument letter to the Minister of Fisheries and Oceans, Canada. The purpose of this letter is to persuade the Minister to agree with your point of view that Canada needs more marine protected areas (MPAs) to protect its marine biodiversity and, in turn, effectively manage its fisheries.

WHAT TO DO Read the paper by Jones (2007) Point-of-View: Arguments for conventional fisheries management and against no-take marine protected areas: only half of the story? Rev. Fish. Biol. Fisheries 17:31–43, before writing your letter.

Focus on getting your reader's cooperation. Start by listing some concerns the reader may have to your point of view and provide evidence to contradict or deal with these concerns. This approach will help address any objections the reader may have about your point of view. Be sure to state why your judgment is credible,

in other words, why your opinion matters. Use examples from the course textbook, lectures, videos, the Jones paper and other references mentioned in the course, as sources to support your argument. Cite these sources in the text of your letter using the APA format.

Summarize your argument and your points clearly in a final concluding paragraph.

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ASSIGNMENT # 2 Lifestyle Reflection

GOAL Write a reflective piece on how you think you affect the global ocean.

WHAT TO DO Read the article posted online, Reflective Writing: A Basic Introduction, before writing your piece. Your work should be typed in 12-point font, double-spaced, with 1 or 1¼-inch margins, and 1-1½ pages long (not including references). Do not exceed the page limit.

Reflective writing is a demonstration of reflective thinking, which involves: looking back, analysis, and finding meaning. Basic reflective writing has three parts:

1. **Description:** Review your answers in Lifestyle Reflection, Part I, which you completed in Week 01 Lecture. Focus on ONE of your answers; one you wish to reflect on (i.e. one that is meaningful to you). How did you think you affected the global ocean?
2. **Interpretation:** Think about your answer from different perspectives. What is most important/interesting/useful and/or relevant about your answer? How can it be explained? How does it compare with what you have learned in the course? Use examples from the course textbook, lectures, videos shown in class, or other sources to support

your statements. Your references must be from reputable sources, such as journals, books, and institutional websites. No Wikis, blogs or encyclopedias. List all references at the end of your work.

3. **Outcome:** What does your answer mean for you; has your analysis of it changed the way you think you affect the global ocean? Why? Author Alanna Mitchell writes: "Here's my question at the end of this long journey. What do you stand for?" Given what you now know about the global ocean, what stand will you take and how will you act on it?

EXAMPLE ASSIGNMENT #3

COURSE TITLE/CODE FUNDAMENTAL THEMES IN GEOGRAPHY/GSSC 1055

COURSE DESCRIPTION This course will introduce students to the major themes in physical and human geography. With a focus on Canada, it will survey and investigate the role of maps and location, urban, regional, physical, cultural and environmental geography topics. It provides a framework to explain and familiarize students with fundamental geographical themes and concepts.

- OUTCOME(S) BEING EVALUATED**
1. Explain key concepts and introductory geographical themes.
 2. Analyze the different areas of geographical inquiry and develop a broad awareness of the world we live in.
 3. Describe the interactions between humans and the space around them.
 4. Analyze the effects of human activities on our environment.
 5. Apply primary geographical information such as that found in maps: interpretation of the landscape, scale, and urban features.
 6. Compare and contrast the relationship of geographic concepts in Canadian society with other cultures and environments.
 7. Apply the elements of a basic field study.

ASSIGNMENT #3 Urban Field Trip
DESCRIPTION

Select a study theme and an area of study (4 block radius) to investigate from the table below.

POTENTIAL STUDY THEMES	POTENTIAL STUDY AREAS*
Walkability	Old Town
Safety	Regent Park
Cycling opportunities	Leaside
Green spaces	Willowdale
Accessibility for people with disabilities	Forest Hill
Food options/choices	Rexdale
Traffic patterns/transportation options	Chinatown
Land-use patterns (e.g., residential/commercial/industrial)	The Annex

* Another area may be selected, with professor's approval

DELIVERABLES WEEK 4 – PROPOSAL

- Include group members, chosen geographical area and theme.

WEEK 7 – REPORT DRAFT AND ANNOTATED BIBLIOGRAPHY

- Include description of issue/problem.
- Include reasons why you chose this particular theme and area, and what your initial thoughts were before you began to gather evidence
- Include description of resources used for report.

WEEK 10 – FINAL REPORT

- Include the issue/problem and set it in context of previous research
- Include description of the visit to the study area and the evidence collected (i.e., in picture format) to support or contradict the defined issue/problem. Describe the observations as they pertain to the issue/problem.
- Evaluate the issue/problem in the selected area and its impacts on people and/or the surrounding environment.
- Provide suggestions for improvement.

REPORT

- The report should include all deliverables written in a paragraph format (with the exception of project title) up to and including conclusions
- References will be cited using APA formatting.

EXAMPLE ASSIGNMENT #4

COURSE TITLE/CODE INTRODUCTION TO PSYCHOLOGY/GSSC 1058

COURSE DESCRIPTION This course introduces the student to psychology, the scientific study of behaviour and mind, by examining the basic principles of psychology and their application to everyday experience. The course surveys various fields in psychology, including, the brain and genetics, learning, consciousness, motivation and emotion, social psychology, stress and health, psychopathology and psychological therapies.

OUTCOME(S) BEING EVALUATED Compare and contrast the main theoretical divisions within the discipline of psychology.

Explain the social psychological influences on human behaviour.

Discuss and evaluate a specific debate within psychology, in writing.

ASSIGNMENT #4 DESCRIPTION Research essay

SPECIFIC INSTRUCTIONS Introduction

- Clearly state the topic.

- The topic should be covered in the course or related to the topic covered in the course (see the textbook and the course outline.)

- Describe the question/argument that you plan to explore, and state your perspective.

- Briefly describe the reason why you chose the topic. Do not just say, "Because I am interested in this topic" or "It is relevant to me." Instead, state why we, as a society, need to pay attention to this particular topic.

Body

- Develop an argument; compare and contrast two or more ideas (e.g., nature vs. nurture; Unconscious vs. Conscious causes of behaviour; Observable behaviour vs. Internal Mental Processes; Free Will vs. Determinism; Individual Differences vs. Universal Principles; see p 8-10 in the textbook as an example). Make sure to describe both arguments by using evidence (i.e., Psychological Research).

- Using good logic and evidence, clearly state which augment you are supporting and why (i.e., Take position).
- Clarify which area of psychological perspective you plan to take and why (e.g., Personality, Cognition, Social, etc.).

Conclusion and references

- A brief statement of findings.
- Summary of the entire paper.
 - Connect your conclusion to the statement in the Introduction section.
- Identify a minimum of 3 references that are credible (e.g., Journal Articles, NOT Youtube or websites). One reference may be the textbook. References must be cited correctly.

EXAMPLE ASSIGNMENT #5

COURSE TITLE/CODE UNDERSTANDING GLOBALIZATION/GHUM 1058

COURSE DESCRIPTION Globalization is a term that is frequently utilized in the mass media and political discourse in general. Yet, we are rarely told what globalization actually means. This course explores the global nature of contemporary society, its impact on Canada, and the way it fosters social and political change. Globalization is a multi-faceted process that affects economic, political, social, technological, legal, artistic, and spiritual trends. The course is interdisciplinary in nature, combining perspectives from sociology, anthropology, political science, economics, and philosophy to explore the meanings of globalization and its central processes and institutional structures. It pays particular attention to the relationship between globalization, inequality and poverty; the notion of cultural diversity in a globalizing world; and issues such as gender, ethnicity, the environment, social justice, and human rights. Further issues to be explored will include the decline of the nation-state, the rise of global corporate power, terrorism and war, and the power of new technologies to re-shape political and legal relationships.

OUTCOME(S) BEING EVALUATED Evaluate differing global perspectives.

Analyze the impact of global realities on our daily lives.

DISCUSSION LEADER FORUMS In this assignment you will lead a group discussion based on the topic for a specific week. The readings you will use for this will be from the textbook and handouts or sites suggested by your teacher or chosen by you (please ensure that they are reputable sources).

Part 1

- Read a chapter from the textbook along with the related articles. Summarize the readings into a presentation (between 6 and 8 minutes), which includes a statement of the issue, the position taken in the articles, and any evidence you find which is contradictory to the position. Also include your own personal response to the issue and the impact you believe it has on our daily lives.
- Develop 2 discussion questions (open-ended, analysis rather than "yes/no" questions) that will guide your group members in their discussion of the issue.
- Hand this in via Blackboard by 9:00 a.m. on the day of your group leader presentation.

Part 2

- With your group, discuss the summarized points and their relationship to the definitions of globalization which you have previously analyzed, as well as their likely effects on your daily lives.
- As a group, develop a concluding statement summarizing your discussion. Write the statement, include the resources used (listed in APA format) and hand this into your teacher.
- The group leader will upload this concluding statement to Blackboard by midnight on the day of the presentation.