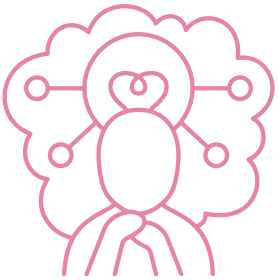


Navigating Uncertainty

Using a structured critical thinking approach for complex decision-making

THINKING | Critical Thinking

What you will need:

- 12-60
- Groups of 4
- 1 hr preparation
- 3 hrs execution

Related Tools:

Embracing Uncertainty

Menu:

"Critical thinking is an important skill needed for all kinds of decisions to be made in the future, but not all students are always as critical as they could or should be. This tool guides students towards structured decision-making."

—Wendelien van Eerde

I. Overview

When dealing with complex problems, decision-making can be challenging due to the presence of uncertainty. This uncertainty can arise from various factors, such as the nature of the problem itself, the available options for making a decision and the potential consequences that may result from the decision.

The structure of evidence-based practice can be helpful in tackling this. Therefore, this tool focuses on the first four steps of evidence-based practice for decision-making:

(1) ask – translating a complex problem into an answerable question;
(2) acquire – finding evidence from different sources;
(3) appraise – judging the trustworthiness of evidence;
(4) aggregate – combining the evidence towards a solution.

Students learn to use these steps to translate a problem into different questions that can be answered from different sources. This process involves seeking input from experts in the relevant field and expanding the viewpoint to three additional sources: considering stakeholder needs, gathering research evidence and thinking of ways to find local evidence.

Learning outcome

- The student is able to apply critical thinking as a structured way of decision-making for complex problems

II. Learning Activity

The ability to draw upon evidence from diverse sources is essential in navigating the uncertainty of complex problems. With this tool, students learn to take a structured approach to a specific complex problem.

1. Introduction

10 mins

In class, introduce a complex case through the perspective of an expert in the field, who has experienced this problem first-hand. Give students the opportunity to ask clarifying questions and provide additional context and details about the problem's complexity to help the students better understand the situation.

2. Asking

30 mins

In teams of four, students collaborate to translate the complex problem or claim presented by the expert viewpoint into relevant questions for all four sources: expert opinions, research findings, local evidence and the wider implications for stakeholders.

3. Acquiring

30 mins

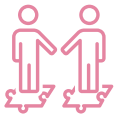
For each of the four sources, the students need to define their search strategy to gain research information on the topic. Starting points are the respective questions the student teams have defined for each of the sources. Outcomes of individual search strategies are compared within the student team.

Tip: students can use the AI research assistant Elicit to find scientific studies based on a question.

4. Appraising

30 mins

Each student team develops criteria for selecting information, including factors like societal impact, inclusiveness, costs and benefits, time investment and environmental impact. Subsequently, the students critically evaluate the validity of the evidence they have gathered and assess its relevance in addressing the predetermined questions.



5. Aggregate

80 mins

Each student team aggregates the different evidence they found towards a proposed decision related to the problem. It is essential that students take the consequences of that decision for the diverse stakeholders into account. Subsequently, they present the outcome of their work to the other student teams.

Following the presentation, the students engage in a dialogue where their peers are prompted to ask questions about evidence gathering, appraisal and aggregation.

Please note, as part of assessment *of* learning, students evaluate their peers using the rubric.

III. Assessment

In Step 5, the student teams present their solution. Every student team is assessed by their peers, by filling out the rubric (which can be downloaded below). To be able to judge the rebuttal part, the peers need to ask questions about the evidence gathering, appraisal and aggregation.

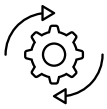
The rubric results can be seen as a measure of the combined critical thinking approach in complex problem-solving for the student team.

Purpose

Assessment *of* learning (summative assessment) aims to evaluate the extent to which students have achieved the intended learning outcomes.

Roles

Peer-assessment



Characteristics

Assessment of group work

Materials

Peer-assessment rubric

Assessment

Peer assessment rubric[1]

Component	Level		
	0	1	2
Claim (aggregate) A decision or solution to the complex problem has been posed	No decision or solution or an inaccurate decision of solution is posed	An accurate but incomplete decision or solution has been posed	Poses an accurate and complete decision or solution to the complex problem
Evidence (ask/acquire) Data that support the claim and is gathered from all four sources is included in the solution	Does not provide evidence, or only provides inappropriate evidence, not supporting the decision or solution	Provides appropriate but insufficient evidence. This may include inappropriate evidence from some of the sources	Provides appropriate and sufficient evidence from all sources

[1] based on CERR rubric by K. McNeill and J. Krajcik (2012)

Reasoning (appraisal) A justification that connects the different evidences to the decision or solution	Does not provide reasoning, or only provides reasoning that does not link the evidences to the decision or solution	Provides reasoning to link the evidences to the claim. The decisions in the use of evidences are not clear or inappropriate	Provides reasoning to link the evidences to the decision or solution AND decision and weight of using all evidences is clear and appropriate
Rebuttal (appraisal/aggregate) Recognises and describes alternative explanations, and provides counter-evidence and reasoning for why the posed decision or solution is chosen	Does not recognise alternative explanations exist and does not provide a rebuttal or an inaccurate rebuttal	Recognises alternative explanations and provides appropriate but insufficient counter-evidence and reasoning in the rebuttal	Recognises alternative explanations and provides appropriate and sufficient counter-evidence and reasoning in the rebuttal

IV. References

McNeill, K. L., & Krajcik, J. S. (2012). Book Study Facilitator's Guide for Supporting Grade 5-8 Students in Constructing Explanations in Science: The Claim, Evidence, and Reasoning Framework for Talk and Writing. Pearson.

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