

Advanced Module on Evidence and Reasoning



How are evidence and reasoning similar and different?



Session Agenda

How are evidence and reasoning similar and different?

1. Video: Introduction to the module
1. Discussion: Evidence and Reasoning
1. Presentation: Evidence and Reasoning, Definitions and Challenges
1. Activity: Identify Evidence and Reasoning in a Written Argument
1. Takeaways

• Extension – *Try it with your students!*



1. Video: Introduction to the Module



Watch a segment (0:00-2:30) of the small group discussion considering student use of evidence and reasoning.

Discussion Questions:

- What evidence do students use in their discussion?
- How do students use this evidence?
- What reasoning do students use in this discussion?

The Task:

1. Discuss in pairs (think-pair-share)
2. Discuss as a whole group

2. Discussion: Evidence and Reasoning



Discussion Questions:

- How did you identify evidence in the previous activity?
- How would you define evidence?
- How did you identify reasoning in the previous activity?
- How would you define reasoning?



3. Presentation: Evidence and Reasoning, Definitions and Challenges

High Quality Evidence

Evidence is information about the natural world that is used to support a claim. In a scientific argument, Evidence often consists of data, which Can be measurements and observations.

- Data becomes evidence when it is used to support a claim.
- The quality of the evidence supporting a claim can be more important than the quantity.
- Quality of evidence depends on a variety of factors, including reliability of the source and reproducibility.

Evidence Challenges

- Students have difficulty understanding what makes something high quality evidence versus poor quality evidence.
- Students often use personal stories of anecdotes as evidence to support or refute claims.
- Students often assume that if their teacher provides the evidence, it must be of high quality.
- Students have difficulty deciding what to use as evidence when gathering evidence from a source such as text.
- Students are often uncomfortable evaluating evidence.

Reasoning

Reasoning is the process of making clear how your evidence supports your claim.

- In scientific argumentation, clear reasoning can include using scientific ideas or principles to make logical connections between evidence and a claim.
- The overall quality of an argument is dependent on having strong evidence and clear reasoning.

Reasoning Challenges

- Students often provide evidence for a claim, but don't provide clear reasoning showing how their evidence supports the claim.
- Teachers and students alike don't always know what clear reasoning should look (or sound) like.
- Students often assume that their audience already understands what they are talking about so they don't fully explain their reasoning.

4. Activity: Identify Evidence and Reasoning in a Written Argument

The Task:

- Read through the four sample arguments. In pairs or small groups, work together to answer the following discussion questions. Be prepared to discuss as a whole class.

Discussion Questions:

- Identify how students are using evidence and reasoning in their arguments.
- What challenges did you face in identifying student reasoning?
- What challenges do your students have with evidence and reasoning?

What causes some earthquakes to have more destructive power than others? How do you know?

Location of Earthquake	Destructive Power at the Epicenter (center of the earthquake) (Scale: 0 to 12)	Average Yearly Crust Temperature 1 mile Below Surface (°F)	Hardness of Ground Material
Earthquake A	8	77	Soft
Earthquake B	8	65	Soft
Earthquake C	7	59	Hard
Earthquake D	6	53	Hard
Earthquake E	5	51	Very Hard

- **Main Science Ideas:**
 - Earthquakes travel through the Earth in waves. The waves begin at the focus, which is where the earthquake starts underground.
 - The epicenter is directly above the focus on the Earth's surface.
 - More powerful earthquakes happen when the focus of the earthquake occurs in soft ground material, because the earthquake waves can travel more easily through soft ground.



5. Session Takeaways

Evidence is information about the natural world that is used to support a claim. In a scientific argument, evidence often consists of data, which can be measurements and observations.

Reasoning is the process of making clear how your evidence supports your claim. Clear reasoning can include using scientific ideas or principles to make logical connections between evidence and a claim.

Evidence and reasoning are both part of the justification for a claim. There's not always a clear distinction between evidence and reasoning, but the important thing to focus on is the role they both play in supporting claim.

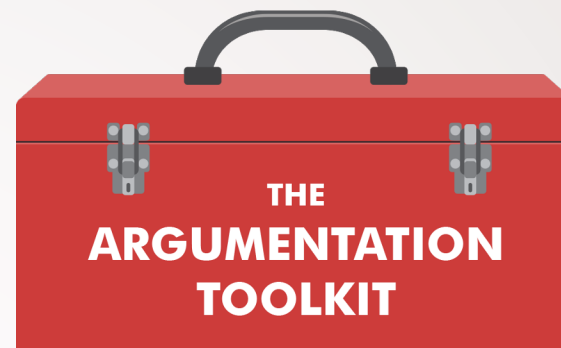


Extension: *Try it with your students!*

- Engage your students in a written argumentation activity in which students need to use evidence and reasoning
- In the next session, you will be asked to share an example, and identify the evidence and reasoning students used. Be prepared to discuss the challenges you encountered in identifying and distinguishing between evidence and reasoning in student written arguments.



The Learning Design Group



PARTNERS AND RECOGNITION



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**THE
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