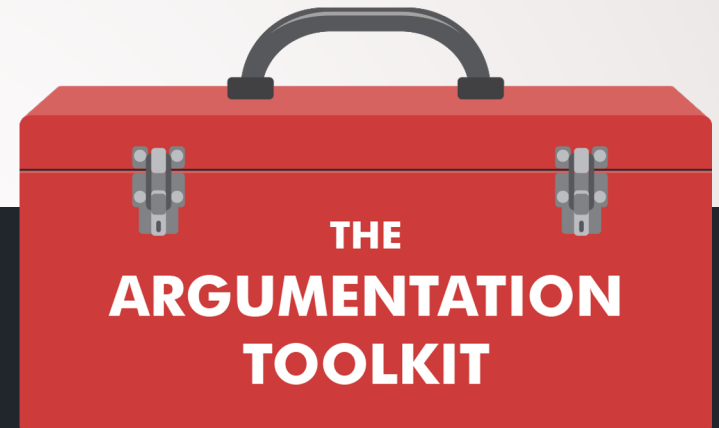


Advanced Module on Evidence and Reasoning



*How can you support student use of
evidence in a scientific argument?*

Session Agenda

How can you support student use of evidence in a scientific argument?

- *Extension Discussion – Try it with your students!*
 1. Video: Student Use of Evidence
 1. Presentation: Evidence Rubric
 1. Activity: Using the Evidence Rubric to Evaluate Student Arguments
 1. Video: Student Peer Review
 1. Takeaways



Extension Discussion: *Try it!*

After the last session, we asked you to reflect on the evidence and reasoning your students used in written arguments.

Discussion Questions:

1. What evidence did students use?
2. How did students use reasoning?
3. What challenges did you encounter in reviewing your students' arguments?

1. Video: Student Use of Evidence



Watch the video of a student reading her argument at the link below.

Discussion Questions:

- What evidence did this student use in her argument?
- What feedback would you provide to her to improve her argument?

2. Presentation: Evidence Rubric

Evidence Rubric

Level	Source (Where does your evidence come from?)	Relevance (Does your evidence support your claim?)	Sufficiency (Do you have enough evidence?)
low 0	Student only provides the weakest types of sources (e.g. appeals to authority, personal story.)	Student does not provide evidence supporting the claim.	Student provides no evidence (observations or measurements).
1	Student provides a mix of more important sources (empirical measurements and observations) as well as some less strong types of sources (appeals to authority, prior experience).	Student provides a mixture of supporting evidence as well as non-supporting evidence to support the claim.	Student provides one piece of evidence (observations or measurements) but more evidence is needed to support the claim.
high 2	Student limits all of the scientific evidence to the strongest types of sources (empirical measurements and observations).	Student limits all of the evidence to that which is relevant to the science in the claim and supports the relationship in the claim.	Student provides more than one piece of evidence (observations or measurements) to support the claim.

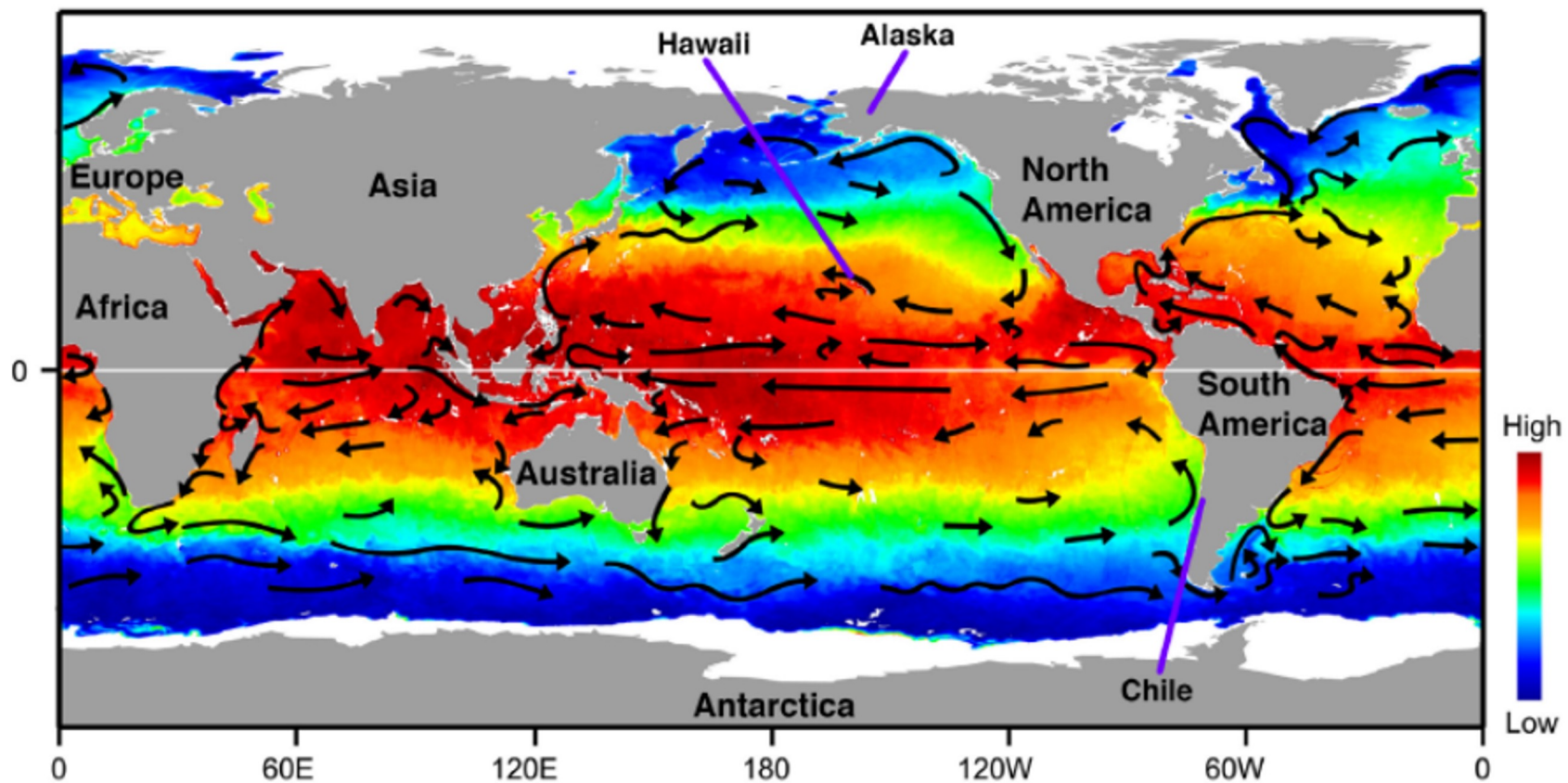
Sample Student Argument

This is an argument that took place during a pair discussion about where hurricanes are likely to occur.

“The hurricanes occur, like hurricane Sandy, it was on the East Coast, and on the diagram, it showed, remember it was really red and warm, and so that probably means, and like there’s never hurricanes here in California it seems like because the water’s so cold you know, and so it’s probably the reason why hurricanes only occur where there is warm water.” 6th grade student

Sample Student Argument: Evidence

Temperature of Currents and Water at the Surface of the Ocean



AMSR-E Science Team, National Space Development Agency of Japan



Sample Student Argument: Evidence

1 Distance from Equator

Los Angeles:	2349 miles
Denver:	2735 miles
New Orleans:	2058 miles
Miami:	1771 miles
Washington DC:	2675 miles

Source: United States Geologic Survey
(usgs.gov)

2 Average Elevation Above Sea Level

Los Angeles:	290.56 feet
Denver:	5278.77 feet
New Orleans:	0.84 feet
Miami:	6.12 feet
Washington DC:	24.02 feet

Source: United States Geologic Survey
(usgs.gov)

3 Approximate Distance from Ocean

Los Angeles:	0 miles
Denver:	441 miles
New Orleans:	14 miles
Miami:	0 miles
Washington DC:	32 miles

Source: United States Geologic Survey
(usgs.gov)

4 Approximate Surface-Water Temperature of Ocean

Los Angeles:	63°F
Denver:	71°F
New Orleans:	73°F
Miami:	79°F
Washington DC:	60°F

Source: National Oceanic and Atmospheric Administration (noaa.gov)

5 Average Precipitation Per Year

Los Angeles:	15 inches
Denver:	15 inches
New Orleans:	63 inches
Miami:	62 inches
Washington DC:	40 inches

Source: National Oceanic and Atmospheric Administration (noaa.gov)

6 Rankings of Worst Storms in U.S. History

1. Katrina—New Orleans Area, 2005
2. The Great Miami Hurricane of 1926
3. The Galveston Texas Hurricane of 1910
4. Hurricane Andrew—Florida, 1992
5. Superstorm Sandy—All of east coast from Florida to New York, 2012
6. Colorado Blizzard of 1913
7. Long Beach California Tropical Storm of 1939
8. Hurricane Hazel—North Carolina; Virginia; Washington, DC, 1934

Source: weatherbang.blogland.com



Sample Student Argument

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3. Activity: Using the Evidence Rubric to Evaluate Student Arguments

The Task:

In small groups, use the rubric to evaluate student use of evidence in 3 sample written arguments.

Discussion Questions:

- What strengths and weaknesses does the rubric help you identify in student use of evidence?
- How does this help you provide feedback to students?
- What are the limitations of using a rubric like this?

Classroom Context

Activity Context: These arguments were written following a classroom investigation which was a simulation showing what a 1 pound ball would weigh if dropped on different planets.

Question:

How are the ball's weight and mass affected when dropped on different planets?



Data Collected in Classroom Simulation:

Planet	Distance from Sun (millions of miles)	Planet Mass (kilograms)	Ball Weight (pounds)	Ball Mass (kilograms)
Earth	93.0	5.972×10^{24}	1	.625
Mars	141.6	6.39×10^{23}	.3	.625
Jupiter	483.8	1.898×10^{27}	2.64	.625

Discussion

Discussion Questions:

- What strengths and weaknesses does using this rubric help you identify in student use of evidence?
- How does this help you provide feedback to students?
- What are the limitations

1. Video: Student Peer Review



Watch an excerpt (5:55-6:26) of the video below, which shows students giving each other feedback.

Discussion Questions:

- What are the strengths and weaknesses of the feedback students provide?
- How could this rubric be used as a tool to improve student feedback on evidence?
- What are the other ways you could support students in giving each other productive feedback?

5. Session Takeaways

Common challenges students have with evidence are: relevance, sufficiency, and source

Students can receive feedback on their evidence by both their teacher and peers using the rubric.

A rubric is a helpful tool for supporting student use of evidence.

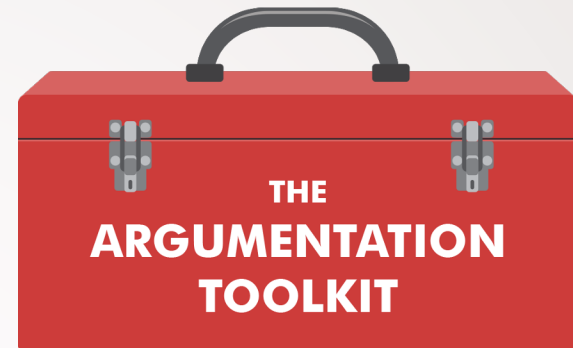


Extension: *Using the Evidence Rubric!*

- Use the Evidence Rubric to evaluate student use of evidence in a written or oral argument.
- In the next session, be prepared to share your experiences using the rubric, including how the rubric was helpful for your instruction and what was challenging.



The Learning
Design Group



PARTNERS AND RECOGNITION



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