## Advanced Module on Evidence and Reasoning



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



### Session Agenda

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

- Extension Discussion Using the Evidence Rubric!
- 1. Video: Approach, Reasoning
- 1. Presentation: Reasoning Rubric
- 1. Activity: Using the Reasoning Rubric to Evaluate Student Arguments
- 1. Takeaways

RGUMENTATION

• Extension – Using the Reasoning Rubric!

## Extension Discussion: Using the Evidence Rubric!

After the last session, we asked you to use the Evidence Rubric to evaluate student use of evidence in a written or oral argument.

#### **Discussion Questions:**

GUMENTATION

- What were the strengths of your student use of evidence? What were the weaknesses?
- How could you use this information about student use of evidence to guide your instruction?
- What challenges did you encounter in using the rubric?

## 1. Video, Approach, Reasoning



Watch the video below, which provides an overview of reasoning.

#### **Discussion Questions:**

RGUMENTATION

- How do the activities featured in the video encourage students to use reasoning?
- What challenges do you think students will encounter in using reasoning?
- What challenges have you encountered in providing feedback to students in their reasoning in arguments?

## 2. Presentation: Reasoning Rubric

#### **Reasoning Rubric**

Level	Connecting (Do you connect your claim to your evidence?)	Science Ideas (Do you use science ideas to justify your evidence?
o	Student does not provide any connections between their evidence and the claim.	Student provides no science ideas or does not provide science ideas that are relevant to the claim.
1	Student connects some, but not all evidence to the claim.	Student provides a relevant science concept or term, but does not explain it.
2	Student connects all of the evidence to the claim.	Student provides a relevant science concept that is correctly explained.

## Sample Student Argument

This excerpt is from a class discussion about data collected from a simulation of metabolic processes in athletes playing soccer at low and high altitudes. In this excerpt, a student is making an argument that soccer players at high altitude cannot play soccer as well as players at low altitude.

"For us we got the same thing, claim B, soccer players at high altitudes cannot play soccer as well as players at low altitude and well, our evidence, kind of the same as them, our sim extreme at low altitude it lasted for 1 minute and 15 seconds and breath rate was 44 and heart rate was 177 and then when it was high altitude it died and 44 seconds and the breath rate was 59 and the heart rate was 179."



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

#### The Task:

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

#### **Discussion Questions:**

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



## **Classroom Context**

Content: Igneous= volcanic rock

**Sedimentary=** formed by the sedimentation and cementation of material

**Metamorphic=** *previously formed rock changed by heat and pressure* 

Activity Context: In this classroom activity, each student was assigned a different type of rock found near the Grand Canyon. Students observed rock samples in class and read scientific articles. Students wrote a scientific argument about the type of rock they were assigned.





### Discussion

Ask teachers to discuss the following questions:

- What strengths and weaknesses does using this rubric help you identify in student reasoning?
- How does this help you provide feedback to students?
- What future class activities might support these students in better articulating their reasoning?



#### 4. Session Takeaways

Common challenges students have with reasoning include connecting evidence with their claim and relating science ideas to the claim.

Classroom activities can support students in articulating their reasoning, such as: hands-on investigations, group discussions, and evidence card sorts. Students can receive feedback on their reasoning by both their teacher and peers using the rubric.





#### The Learning Design Group



#### PARTNERS AND RECOGNITION



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