

Analyzing Evidence: More About Student Responses

In this science and language example, students are learning why things sink and float and how to explain their thinking with the help of evidence from their observations.

Here is a table that lays out the Learning Goal, Success Criteria, and evidence gathering opportunity. Note that there is both a science content goal and a language goal.

Learning Goal	Success Criteria	Activity
Content Goal: Understand why things sink and float Language Goal: Understand how to explain why things sink and float using observations as evidence	Give an evidence-based explanation of why things sink or float Establish relationships between ideas such as cause and effect and contrast Describe scientific concepts using technical vocabulary	Observe how the objects of various sizes and materials react when placed in a large cylinder of water. Give an oral explanation of why things sink and float using observations as evidence.

Next, we'll see a range of anticipated student responses that differentiate the three levels for both the science and language learning goals.

Emerging

At the emerging level for their science understanding, students can explain why things sink or float in terms of mass or volume only. At this level in language, they begin to establish a relationship between ideas with single word connectors and use only one or two technical vocabulary words.

Here are some student examples at the emerging level. The students establish a cause and effect relationship with the word "because", and explain scientific concepts using the words "mass" and "volume."

- *Things sink because they have a lot of mass.*
- *Things float because they have more volume.*

Maturing

At the maturing level in their science understanding, students can explain the relationship between mass and volume and what this has to do with sinking and floating. In language, they do this through establishing cause and effect and contrast relationships. Students also increase their use of technical vocabulary to explain scientific concepts.

In these examples of student responses, students establish cause and effect using the sentence beginning, “if”, and create contrasts with adjectives such as “lighter”, “heavier”, and “different”. Students use some technical vocabulary, such as the word “density”.

- *If something is huge, it does not mean it will sink; if something is small, it does not mean it will float. It matters what the density of the object is – one is lighter material and one is heavier and denser material.*
- *Water has a density of 1 – other liquids have different densities. An object sinks or floats based on the kind of liquid it is in.*

Consolidated

At the consolidated level in their science understanding, students can clearly explain the mass/volume relationship and use relative density to further explain why things sink and float. In language at this level, this is done through establishing relationships between ideas through various means and through using a variety of technical vocabulary. In particular, students use word groups structured as expanded noun phrases to precisely communicate scientific ideas.

In this example, the student establishes cause and effect with the word “because” and explains concepts precisely using technical vocabulary in expanded noun phrases, such as, “mass/volume ratio” and “the density of liquids.” The first phrase also serve to establish a relationship between ideas with use of the word “ratio”.

- *Things sink or float because of their mass/volume ratio and the density of the liquid they are in.*

Teachers can extend the discourse opportunities in lessons like this by asking students to discuss where and when they encounter scientific phenomena in their own, everyday lives. This will also help students see the connections between the science they are studying and their lived experiences.