

Pattern Analysis of Student Thinking (PAST)

3-LS3-2 ASSESSMENT TASK – *Environmental Influence on Traits - Hydrangeas*

PE - Use evidence to support the explanation that traits can be influenced by the environment.

DCI –

Inheritance of Traits:

- Some characteristics result from individuals’ interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment.

Variation of Traits:

- The environment also affects the traits that an organism develops.

TASK 1 – Analyze experimental data and draw conclusions about environmental effects on hydrangea plants.

Purpose	Student Response Themes	Examples of Student Responses	Possible Teacher Instructional Moves
<p>This task is designed to engage students in analyzing experimental data from a table showing four different manipulated plant growing conditions and use their analysis to draw a practical conclusion.</p> <p>Students should notice patterns in the data indicating that four different substances added to the soil (coffee grounds, lemon peels, egg shells, and fertilizer) cause a change in flower color from pink to various shades of purple and blue. They should be able to explain the use of a control plant (to which no additional substances are added) as a way to compare changes occurring as a result of the addition of the substances. It is not necessary for students to use the word “control.”</p>	<p>Question 1</p> <ul style="list-style-type: none"> • Student notices that all 4 substances change the flowers from pink to blue • Student notices that the pattern of change is pink → purple → blue • Student notices that the change from pink to blue occurs at different rates for the different substances • Student notices changes in color but does not see the pink → purple → blue progression as a function of the rate or amount of color change • Student could not identify a pattern 	<ul style="list-style-type: none"> • “Plants changed color when the food was added.” • “All of the plants but the last one tried to change the flowers to blue.” • “Flowers went from pink to purple then blue. Some didn’t make it all the way.” • “They changed, but some went slower than others.” • “The one that had water stayed pink. The others changed.” • “The plants were all different at the end. Only the egg shell one was blue.” • “No pattern. All of them changed different.” 	<p>Students can participate in a whole class discussion of the data to help them find patterns.</p> <p>Students can be given opportunities to analyze similar types of data in different contexts. This gives them an opportunity to see data analysis modeled in different ways and scaffolds them to be able to analyze and interpret data on their own.</p>
	<p>Question 2</p> <ul style="list-style-type: none"> • The plant receiving only water (control) is used to compare the color change with plants that had substances added. • The plant receiving only water is used to make sure everything is the same for all the plants except the added substances. 	<ul style="list-style-type: none"> • “That plant shows how it looked at first.” • “It is used to show what changed since it didn’t get any food.” • “The plant with just water should have stayed the same.” • “She just had an extra plant and didn’t have anything else to put on it.” 	<p>Students can do their own investigations in which they try different variables such as amount of materials added, light, water, or growing location on real plants. They</p>

Students use evidence from the patterns in the data to make a practical recommendation (in the form of a claim) as to which added substance produces the most desirable result. All four of the substances change the flower color but at different rates.

Question 3

Students make a claim. Kelsey’s aunt should use _____ to change her hydrangeas from pink to blue.

- Lemon peels
- Egg shells
- Coffee grounds
- Fertilizer
- Some combination of the above
- Nothing

can design the investigations and record the data themselves to give them an authentic context in which to understand how data is collected and analyzed to test one variable at a time.

Question 3A

- Explanations use evidence from the table that is consistent with the claim.
- Explanations use data from the table but are not logical or consistent with the claim.
- Explanations do not use data from the table.

- The data in the chart show:
 - The flowers with lemon peels changed to blue first, fastest, in two months, etc.
 - The flowers with egg shells changed to blue in 3 months.
 - Lemon peels or egg shells because they are the only ones that turned blue.
- All four of them together because they all change flowers to blue and will work faster together
- Fertilizer from the store will work best because it is made specially for the hydrangeas.

Focus SEP/CCC: Students are **analyzing patterns** from a table containing experimental data to use as **evidence to construct an explanation** for **environmental effects on plant growth and physical traits**.

TASK 2 – Identify different environmental factors that might be investigated to determine their effect on the growth and traits of hydrangeas.

Purpose	Student Response Themes	Examples of Student Responses	Possible Teacher Instructional Moves
This task is designed to engage students in thinking about various types of environmental interactions that could affect the growth and traits of the hydrangea plant.	Students provide examples of variables (causes) that could be tested for effects on a hydrangea plant such as water, sunlight, animal interaction, etc.	<ul style="list-style-type: none"> • “She could investigate different amounts of water on the plants to see if they grow better.” • “Investigate if extra sunlight changes the color of hydrangeas.” • “Maybe she could see if dog poo causes flowers to die.” 	Have students engage with multiple examples of environmental or human interactions with plants or animals that cause changes to the way the organism looks

Focus SEP/CCC: Students are **identifying different types of variables** that could be **investigated** to determine **environmental effects** on **plant growth and physical traits**.