Case Study: Grade 2 Exemplar

Related NGSS Performance Expectation:

2-LS2-1: Plan and conduct an investigation to determine if plants need sunlight and water to grow.

Transcript

Part I:

Ms. Manning's second grade class of 22 students is beginning a unit about ecosystems. She starts the first lesson by asking the students to sit on the rug in front of an easel and share their ideas about two questions: What do plants need to survive? What do animals need to survive?

As the students talk, Ms. Manning writes on chart paper on the easel under two headings: "What plants need" "What animals need."

Michael: I think they both need air.

Jessa: I think they both need water.

Amy: They don't all need water. Some plants can grow in deserts. Like a cactus. But all animals need water.

Jessa: I think a cactus needs a little water to grow.

Amy: Ms. Manning, how much water does a cactus need?

Ms. Manning: That's a great question. I'm going to write it down next to our list here. Any ideas how we could find out?

Sarah: We could have three cactus plants and give them each different amounts of water.

Amy: Yeah, we could see which one grows the tallest.

Part II: **THE NEXT DAY**

Ms. Manning: Yesterday you shared your ideas about what plants and animals need to survive. There were also lots of questions about how much sun and water plants need. So, you are going to plan an experiment with your group about this. The first step is writing a scientific question.

Ms. Manning writes two scientific questions on the board:

- *Do plants need water every day, every other day, or every three days to grow tallest?*
- *Will a plant grow more leaves in the sun or shade?*

She reads the questions aloud and tells the students that these are scientific questions because they can be answered by doing an experiment. Ms. Manning then asks for volunteers to come up and underline the part of the scientific questions that shows what a scientist would change in the experiment and circle the part that shows what a scientist will measure. She then has students sit in pairs at their tables to write a question of their own. She tells them to underline what the question says they will change and circle what they will measure.

Mary: I want to know about plants and water because my mom is always watering the plants she has in our kitchen.

Jesse: Okay, but what question should we write?

Mary: How about Does my mom's plant need so much water?

Jesse: My mom has lots of plants too. So what should we underline that we are going to change?

Mary: I don't know. Maybe the question should be Does my mom's plant grow better with more water? And I'll give four plants different amounts of water every day.

Jesse: How about How much water makes your mom's plants grow best? Then we can circle the water because that will change.

Mary: Okay. Then what will we measure? Ms. Manning's questions had things we could measure with a ruler or count like the leaves.

Jesse: Let's measure how tall the plants get. My mom's always saying her plants are not growing so tall.

Ms. Manning's class works in partners to refine their questions, identify the variables (what they are changing, what they are measuring) and decide how to conduct their investigations.

THE FOLLOWING WEEK (Day 1 of the investigations)

Ms. Manning: Would one person please share what they are going to do today?

Lisa: Today we get to start our experiments! I have my data table all ready. I am going to

put my plants in the shade, sun, closet, and under a big bowl so they each get different amounts of light. Then I will write down how tall they are today so every day I can write down how tall they are. That way I will see which one grows the tallest.

Part III: **After gathering data for three weeks, the students discuss their results.**

Ms. Manning: Today we are done gathering the data from our experiments. But you all have lots of numbers in your data tables. Some of you recorded how tall different plants were each day, some of you counted leaves, and some of you measured how wide the plants got. We need a way for each group to show what happened over time. Any ideas?

Eliza: We could draw pictures of every day.

Amy: What about a graph?

Eliza: Oh, right. That's kind of like having a picture of what happened.

Ms. Manning: Great ideas. Just like in math, a graph can help us understand what happened to our plants over time. Here's a graph I made about my experiment.

Ms. Manning displays an example graph she made. She does a think-aloud to explain the choices she made when constructing her graph, such as why she decided to do a bar graph and what intervals she used on each axis.

Ms. Manning: This is the graph I made for my experiment. But I'm not going to tell you what kind of graph to make for your experiment. You know your data so you will have to decide. Here's a checklist to help you remember some important parts of all graphs, like having a title.

The students work with their partners at tables to create graphs of their data. They then take turns presenting their graphs to the whole class. After each presentation, the students have a chance to ask questions and make comments. After Lisa's group presents, the following conversation takes place:

Laura: Wow. Your graph is so colorful, Lisa. What do all those colors mean?

Lisa: Oh, I should put down that those different colors are for the plants. The red bar shows the plant in the sun, the blue bar is the plant in the shade, green is closet and pink is blanket. You can see that the blue bar is actually the biggest.

Juan: My graph is the same way but I used different colors. Is that okay?

Isabel: Juan, my graph had different colors too but I made a key so everyone will know what the colors mean.

After the presentations and discussions, Ms. Manning sends the partners back to make more changes to their graphs. She then asks the students to write a few sentences under their graph that explains what the graph shows about their plants. She gives some students sentence starters to help them in their writing.