The Mystery of the Missing Hummingbirds

Text by
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and Kerry Zarlengo

Illustrations by
Lisa Gardiner

Elementary GLOBE™

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"Our classroom is too hot," complained Simon. He opened a window and a warm breeze rushed in.

Ms. Patel got her students' attention and said, "Isn't it funny that even though school has started it is still summer? Class, what does summer mean to you?"

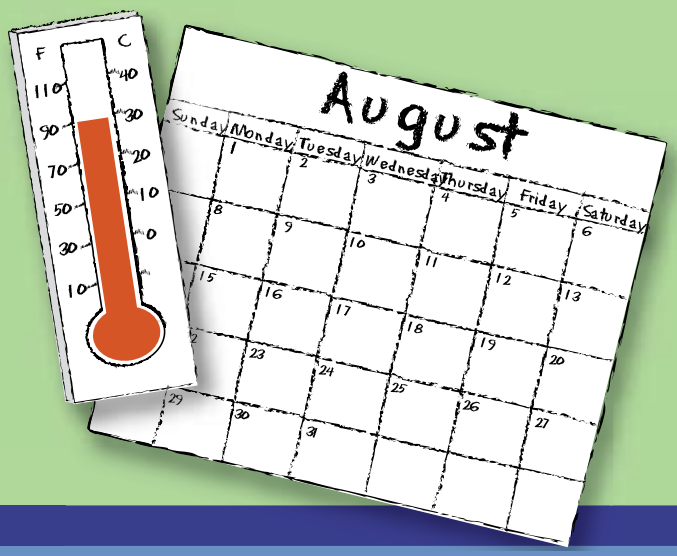
"Not being in school," blurted Simon. The class giggled.

Dennis raised his hand, "Swimming at the pool makes me think of summer," he said.

"It is still light out after dinner so I can play outside. That's what summer means to me," commented Anita.

Simon added, "Seeing lots of flowers, bees, and butterflies in the garden reminds me of summer."

"Great ideas, class," commented Ms. Patel. "One of our projects this school year is to do a scientific investigation about how our school's garden changes during summer, fall, winter, and spring. Let's go outside now to observe the garden in summer."



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The class went outside to the garden to make their observations.

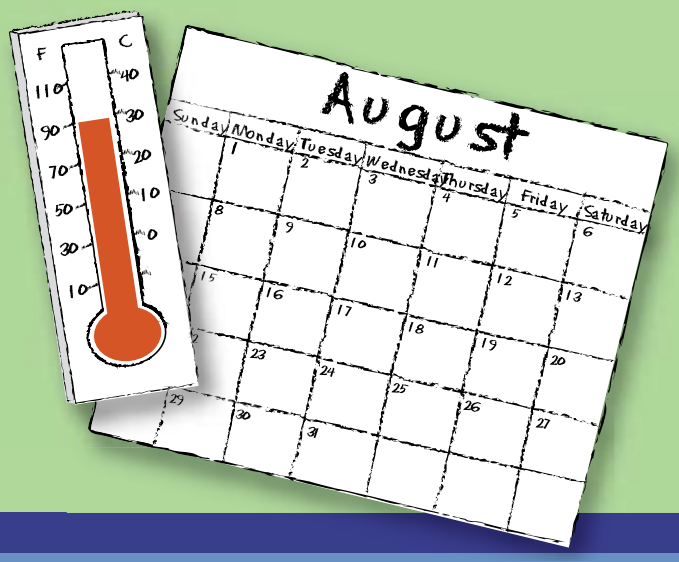
"I smell flowers," said Simon.

"I hear birds chirping," said Dennis. "Hey, where did Anita go? She was just here but now I don't see her."

Ms. Patel wandered around the garden to watch what the children were recording in their journals. When she got to the bench where Anita sat, Ms. Patel commented, "Wow, Anita, I love all the details you are putting in your hummingbird sketch."

Anita looked up with a sparkle in her eye. "This bird is so cool, Ms. Patel! Listen to the buzzing from its wings – I had no idea hummingbirds were that noisy! I also didn't know how small they are – this one is smaller than my hand!"

Simon looked up from his journal and said, "Here we go again! Last year Anita always talked about critters in the soil. I guess this year it's going to be hummingbirds."



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One autumn morning a few months later, Anita rushed into class to find Ms. Patel.

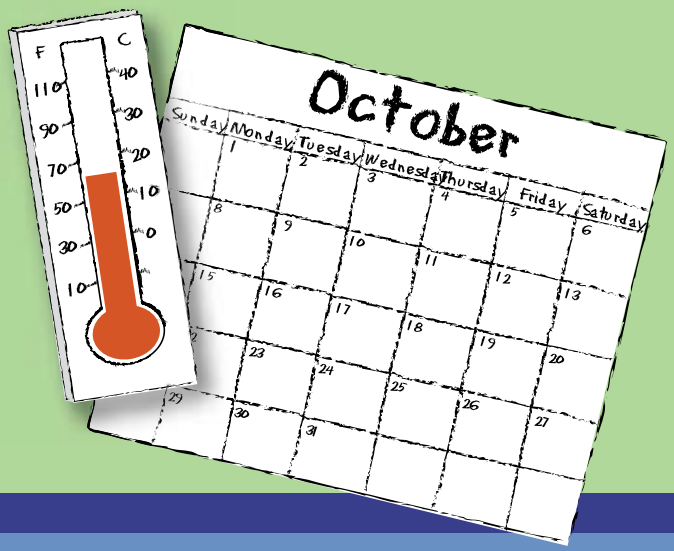
Ms. Patel said, "Anita, you look upset. What is wrong?"

Anita replied, "They're gone!"

"Who is gone?" asked Ms. Patel.

"The hummingbirds! Ever since I saw them in our garden I have been watching them every day. Sometimes I see them by the flowers and sometimes they are by the hummingbird feeder, but I was always able to see them somewhere. Where are the hummingbirds? It has been three days since I have seen any of them!" Anita exclaimed.

"Slow down, Anita," said Ms. Patel calmly as the bell rang and the other students came into the classroom. "I am not sure what has happened to the hummingbirds, but your question comes at the perfect time. Today our class is going to choose a question for our science investigation. Tell the class about this hummingbird mystery. It might make an interesting investigation."



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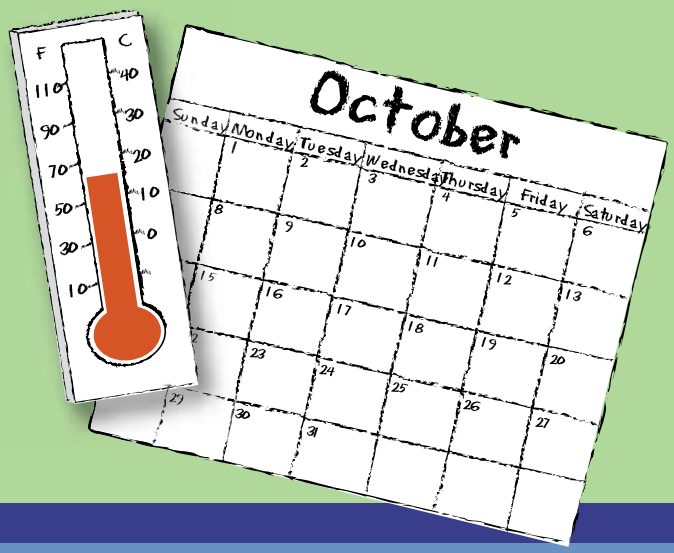
That afternoon Ms. Patel gathered the class together. "We have made observations in our garden during the seasons of summer and autumn," she told the class. "What kinds of changes have you noticed? Use your journals to come up with some ideas. Then we will choose a question for our science investigation."

As the students took turns describing their observations and asking questions, Ms. Patel recorded their ideas on a chart. Eventually, Anita raised her hand and said, "I am worried about the hummingbirds. They used to be in the garden or at the feeder, but I haven't seen them for three days."

Dennis replied, "Me, too! I wonder if something has changed in our garden that made the hummingbirds go away?" The whole class chimed in that they agreed with Anita and Dennis.

"Well, it sounds like we have our research question. First the hummingbirds were in our garden and now they are gone. We will investigate why they left and where they went."



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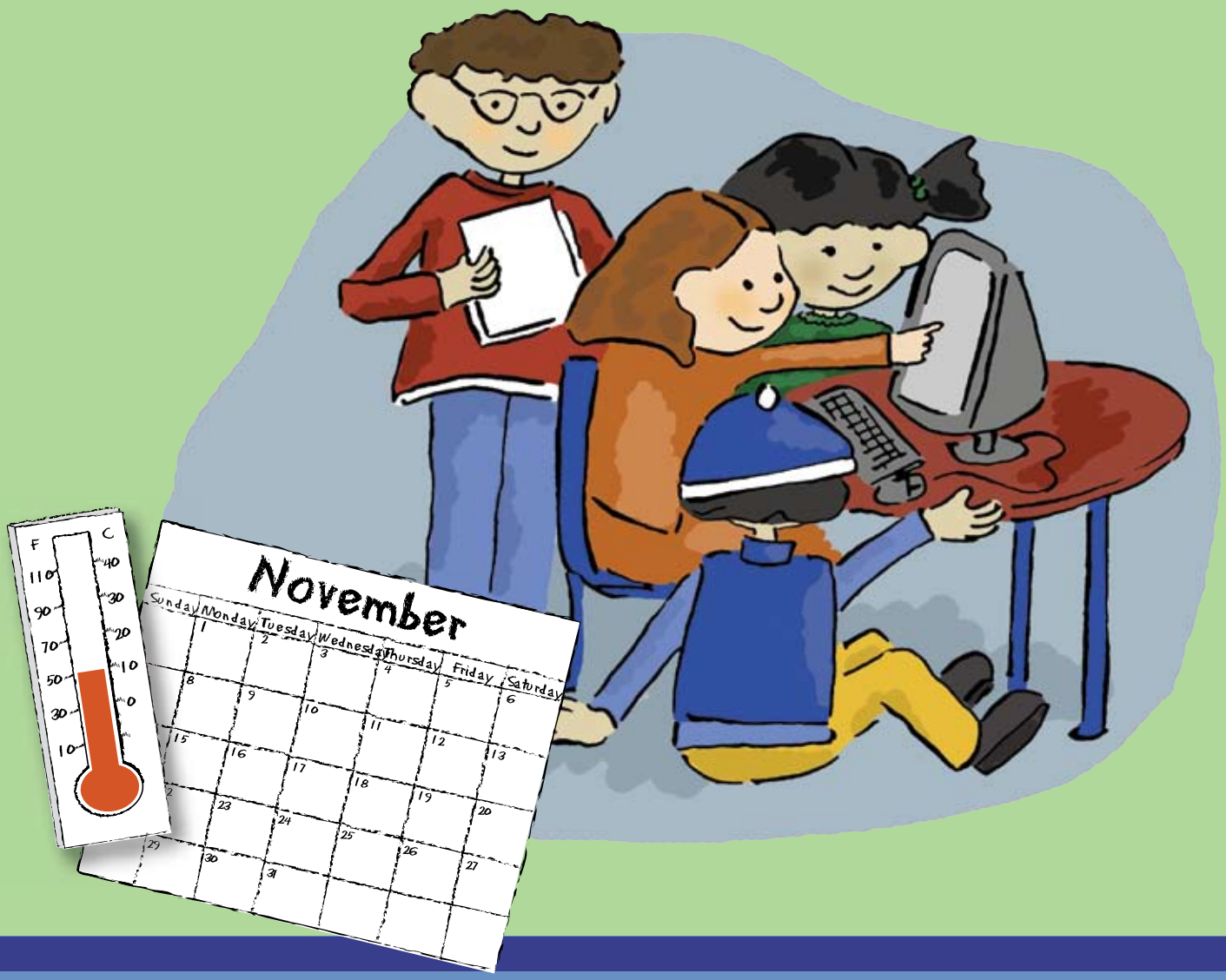
"It's going to take some work to answer this question," said Dennis.

"We'll all have to work hard," Anita agreed.

The students broke into three groups. Anita's group did Internet research in the computer lab. Dennis' group went to the school library to gather information from books and maps. And Simon's group sent out emails to friends and family around the country to see if any of them had information on these hummingbirds.



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When the class shared their research findings a few weeks later, each group was bursting with excitement about what they had learned.

Ms. Patel asked each group to reveal their most important fact. Anita gushed, "We now know what kind of hummingbird comes to our garden. It is called the ruby-throated hummingbird! Only the adult males actually have a red throat, but that's how they got their name."

Next, Dennis explained, "We learned that these hummingbirds migrate south to Mexico and other countries in Central America. They leave where we live in Pennsylvania by October and don't come back until the spring."

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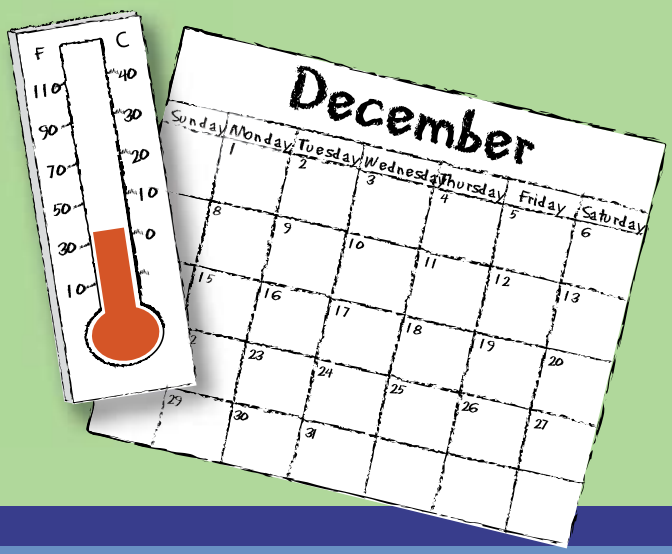
Last, Simon's group shared that they talked to family and friends from around the United States. They learned that the ruby-throated hummingbirds had also left those locations. Simon added, "My Uncle Bill lives in South Carolina, and he saw the last hummingbird there a few weeks after we saw our last one. We also emailed my cousin Ernesto in Costa Rica to find out if ruby-throated hummingbirds live there in the winter."



The class could hardly wait to hear back from Ernesto. They hoped he could help them solve this mystery.

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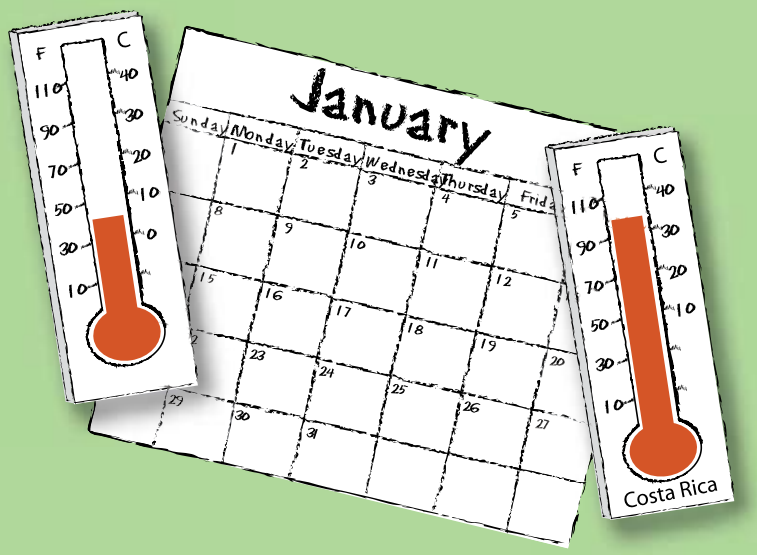
In Costa Rica, Ernesto's teacher Señor Chavez said to his class, "Buenos días, clase. Ernesto has some news for us from his cousin in the United States. They have asked us to do some research for them!"

Ernesto read Simon's email out loud. "My cousin Simon asked us to make some observations outside. We need to find out if the ruby-throated hummingbirds have migrated here. Our Spanish word for this kind of bird is "colibrí garganta rubí." If we find them, Simon wants to know what the birds do down here."

Señor Chavez smiled, "This will be a great way to learn more about what is happening outside of our school! Hopefully we can also learn from Simon's class what it is like where they live. Let's take our journals outside and record what we find."



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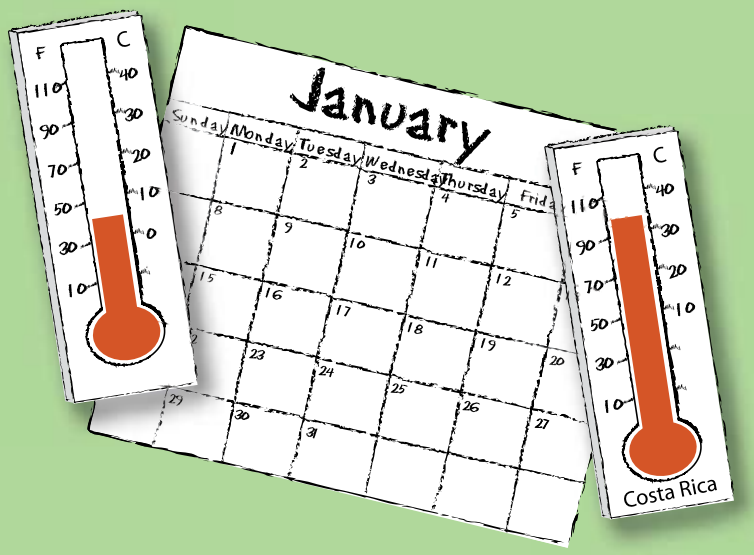
Once outside, some of the students made sketches of the different flowers, trees, and other plants they saw. Others went to their instrument shelter and recorded the current temperature. Ernesto and a few others actually saw some hummingbirds!

Many different kinds of hummingbirds live in Costa Rica, so they made careful observations of what the birds looked like. They knew that adult male ruby-throated hummingbirds have a red throat.

Eventually, they noticed a red-throated hummingbird drinking nectar from a lantana flower. They took a picture of the bird so they could email it to Simon to show that the ruby-throats were in fact in their area.

After finishing their observations, Ernesto's class went inside to record their data and to send some information back to Simon's class.



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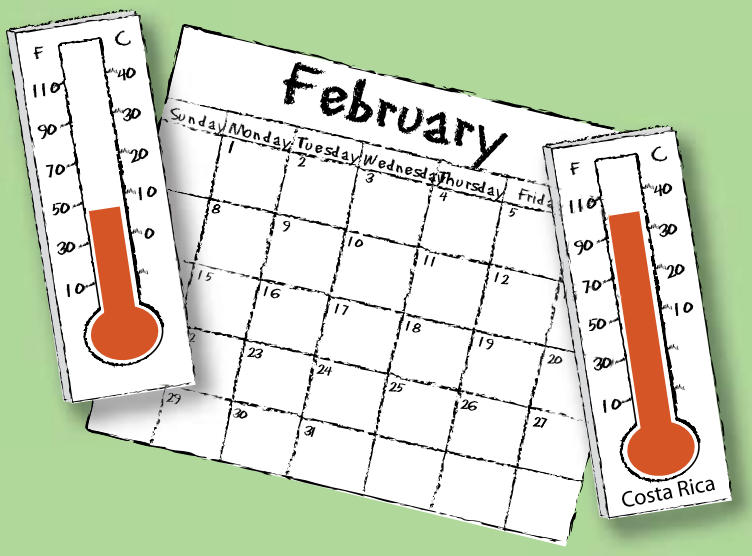
Back in the U.S., it was a cold winter day in Ms. Patel's classroom. Anita was staring at the empty hummingbird feeder covered with snow.

Simon looked up from the computer where he was checking his email. "Ms. Patel! Look at this email I just got from Ernesto. His class has seen some ruby-throated hummingbirds. They made a chart for us of their observations, and he even sent a picture of the bird!"

The class gathered around Simon to see the information. Dennis said, "The landscape looks so different there compared to what it looks like here in winter."

"Do you think they know how different it is here?" asked Anita.

"We should send them a chart about the weather in February where we live," said Simon.



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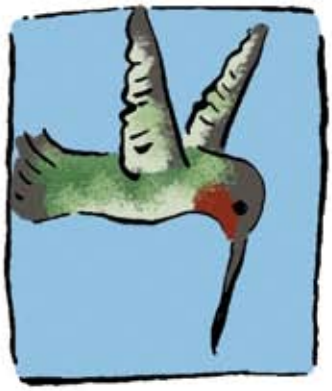

We saw ruby-throated hummingbirds!

Where: Our school's garden in Costa Rica

Plants that we saw:
Jocote trees, turk's cap, and lantana

The weather was:
27 degrees Celsius (80°F), sunny, hot, no rain

We saw 7 birds perched in shrubs and on Jocote tree branches. They drank nectar from flowers, hovered around the bird feeder, and flew around the students in the garden.

The birds were 8 cm (3 in) long and had long, thin beaks. Some have a red spot on their throats.

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During the next few months, the two classes continued to write to each other. Anita always looked forward to the pictures they received of the ruby-throated hummingbirds. She missed them.

One day, Simon got an email from Ernesto that said, "Be on the alert! The ruby-throated hummingbirds have been eating lots of insects instead of nectar. We learned that's because they are preparing for their long journey north. There aren't as many birds here now, so we think you might see some soon! Please let us know what happens...."

The email also said, "Are there any leaves on your trees? Have any flowers bloomed yet? The birds will need food and shelter and we want to make sure they will be okay."

"Are there enough flowers outside yet?" fretted Anita, "I don't think I've seen many."

"Let's go out every day so we can notice when the buds burst on the trees and when the birds arrive," Ms. Patel replied. "I know it's hard, but we will have to be patient."

Dennis smiled, "Hey everyone, I have a feeling we will be able to answer all of our research questions soon."

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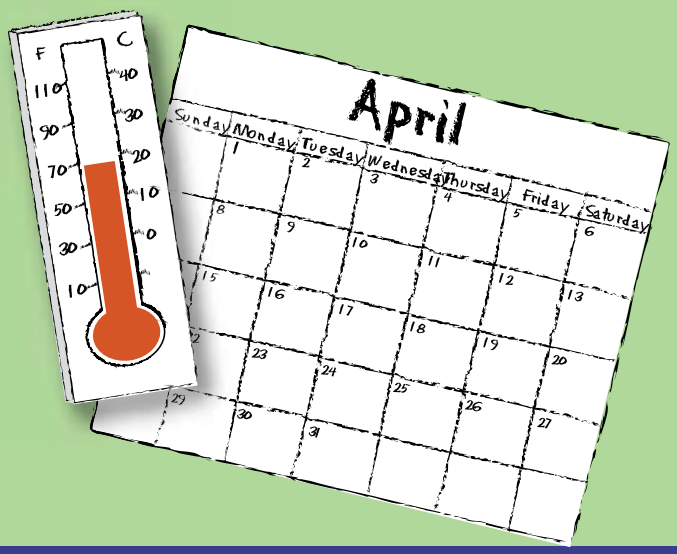
Over the next few weeks, the class started to notice flowers blooming and green leaves on the trees. On one sunny day, the students were scattered throughout the garden, sketching flowers and animals and collecting weather data at the instrument shelter. Anita was concentrating on her drawing of a trumpet honeysuckle vine when she heard a loud buzzing noise. Right away she knew it was a hummingbird!

"They're back!" Anita exclaimed. The other students rushed over to Anita. They all cheered and jumped up and down with excitement.

Simon added, "Let's go send an email to Ernesto's class to let them know the birds are arriving safe and sound."

Ms. Patel called out, "And after that we can figure out why it was time for the hummingbirds to come back here. In your season journals you have all the information you need to figure out this mystery."



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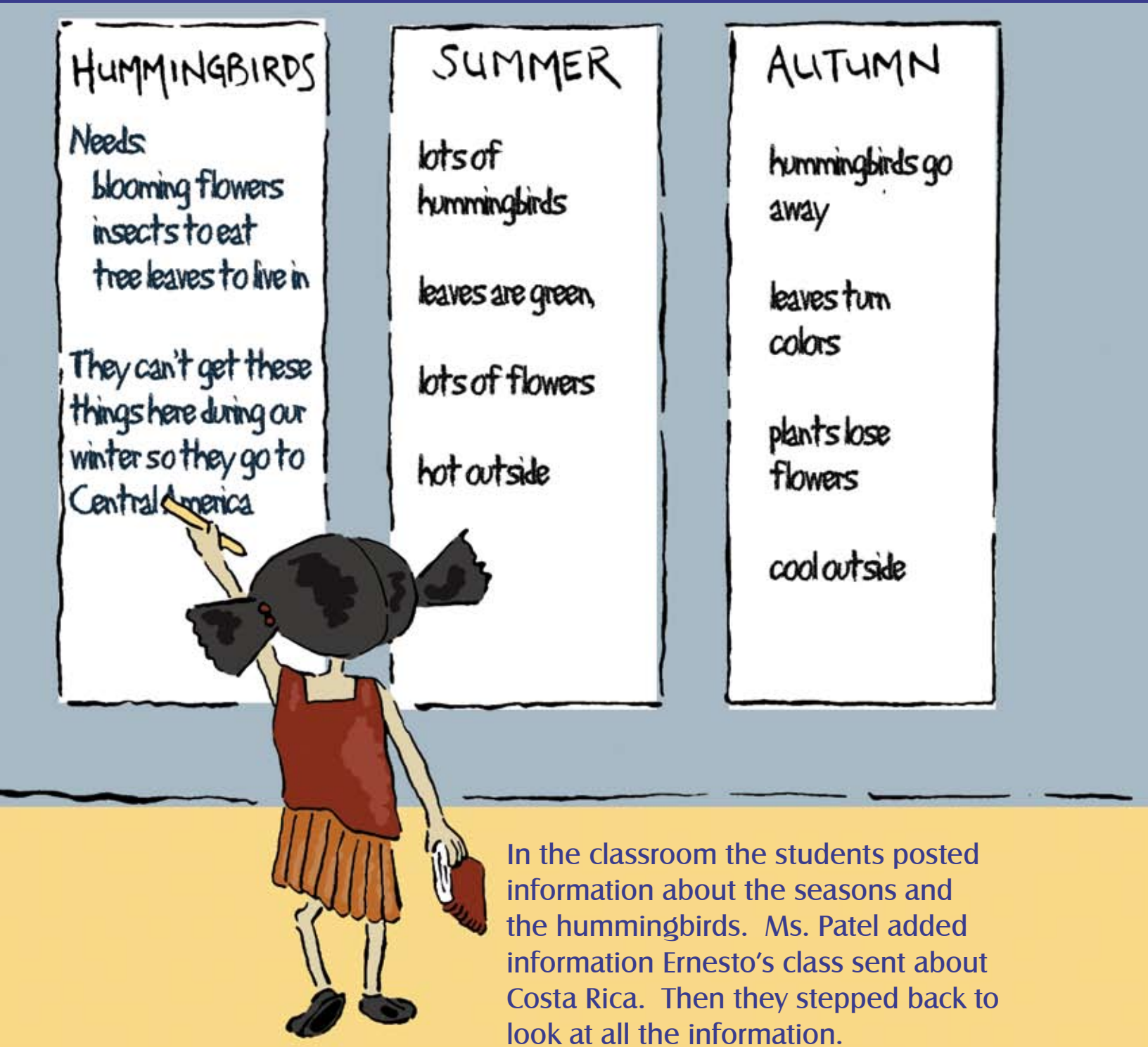

In the classroom the students posted information about the seasons and the hummingbirds. Ms. Patel added information Ernesto's class sent about Costa Rica. Then they stepped back to look at all the information.

They worked together to draw some conclusions from this big research project. The hummingbirds were in their garden only when flowers and other plants were blooming and there were insects around. They decided the hummingbirds could stay there only when they had enough food and shelter.

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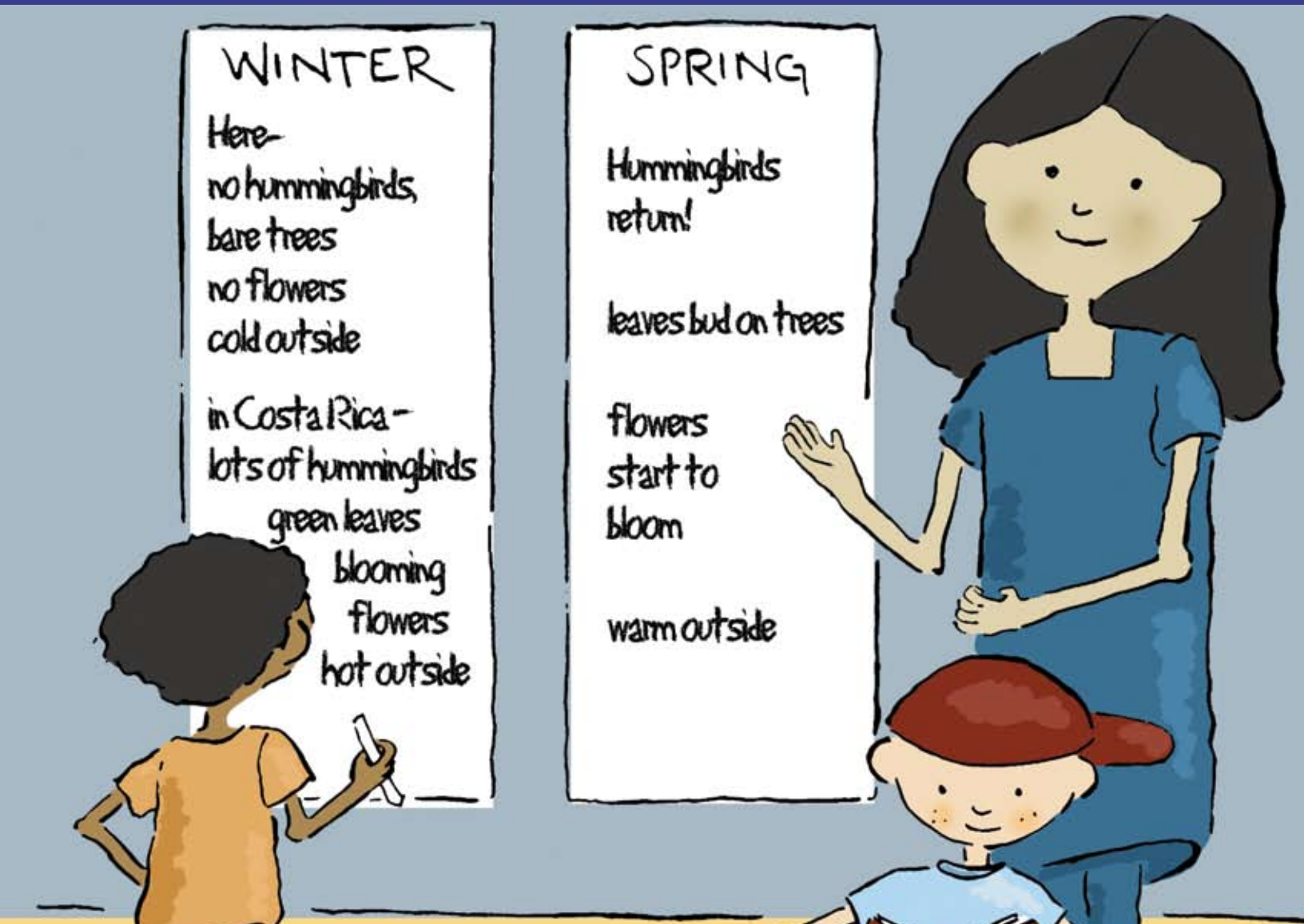

"You have done a wonderful job," announced Ms. Patel. "Do you all realize that you have been scientists this year? You made observations, asked a question, collected data, shared your results, and made conclusions. I am very proud of you."

Anita smiled and added, "This was so much fun. And even though the hummingbirds will leave again next autumn, they will always come back in the spring."

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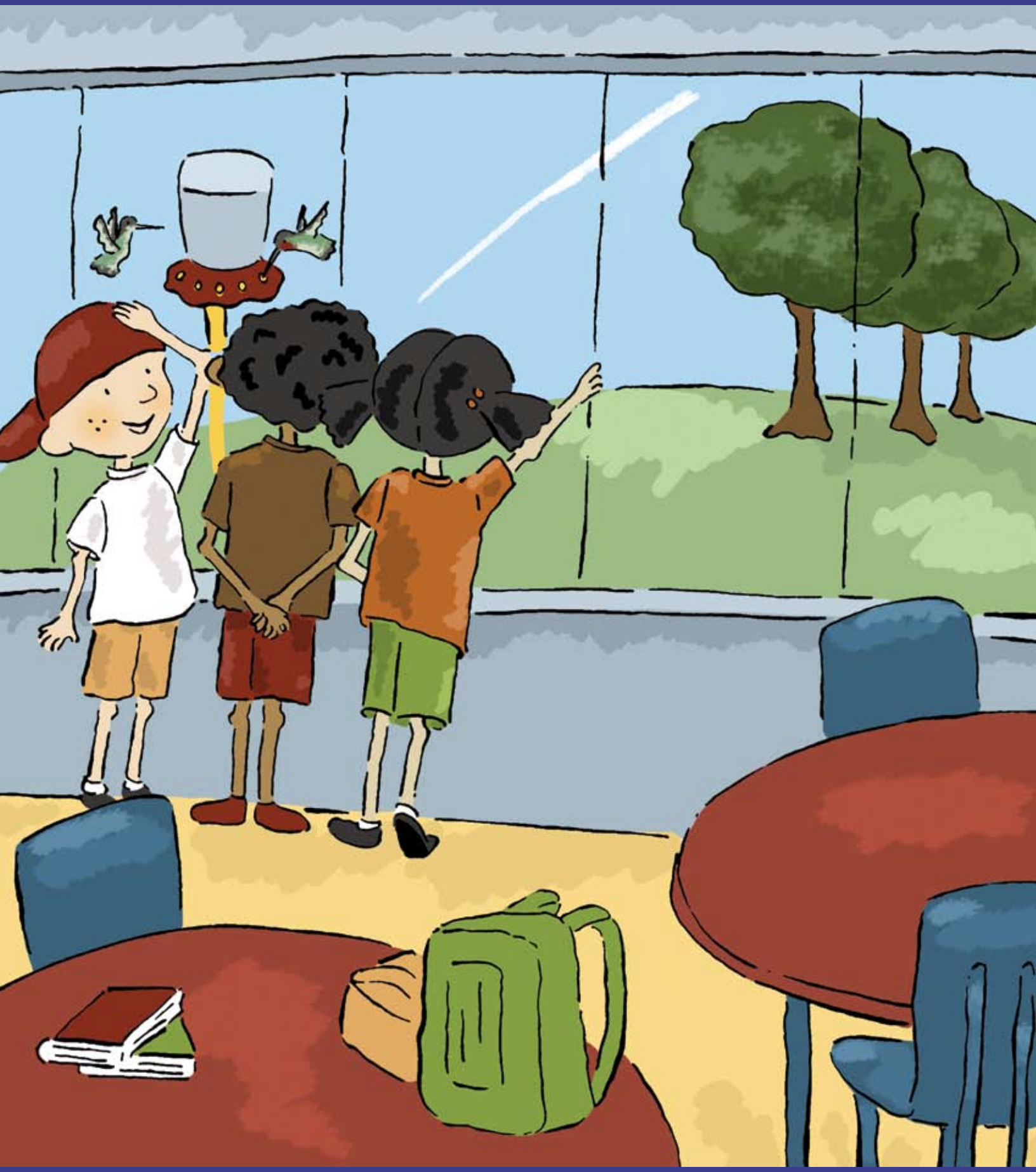

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A few weeks later, summer vacation was about to begin. The students were busy packing up their supplies.

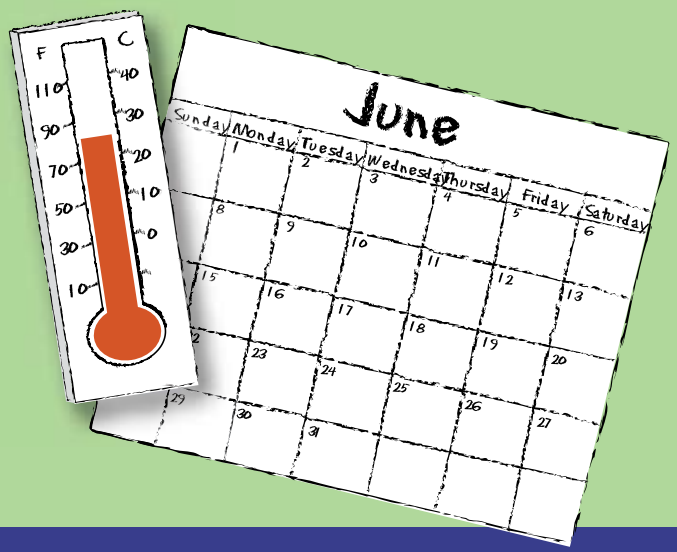
"Our classroom is too hot," complained Simon as he opened a window.

Anita glanced out the window because something caught her eye. She stopped what she was doing.

Dennis called out, "Anita, are you still looking for the hummingbirds? You know they are out there and you will have all summer to watch them."

Anita turned around with a sparkle in her eye. "No, it is something new this time. I just noticed a long white line trailing behind an airplane in the sky. I wonder what that is...."

Simon put his hand on top of his head and said, "Oh no, here she goes again. Anita, we are going to have to wait until we are together again next school year to answer that question!"



Ms. Patel smiled and said, "That's for sure. Thankfully we will never run out of things to investigate."

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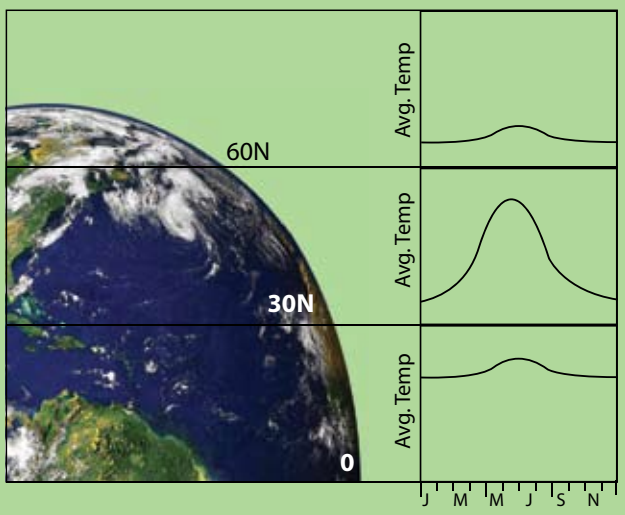
Teacher's Notes

What Is Phenology?

Phenology is the study of living organisms' response to seasonal and climatic changes in their environment. Seasonal changes include variations in day length or duration of sunlight, precipitation, temperature, and other life-controlling factors. Examples of the recurrent biological phenomena (event or fact observable through senses) in response to seasons and climate are **green-up** and **green-down** of plants; **migration** of birds; fish spawning; etc.

Why Study Phenology?

The study of phenology integrates the different parts of the **Earth system**; it is affected by, and it affects, Earth's different cycles (including the water cycle, energy cycle, etc.). Changes in plant or animal phenology can be used as an indicator of climate change. Also, phenological observations and measurements are relatively inexpensive and easy to do, and have been popular pastimes in Europe and other parts of the world.



Seasons in Mid-latitudes vs. the Tropics

This book takes place in two different regions of the planet. The GLOBE school in the United States is in the **mid-latitudes** and the Costa Rican GLOBE school is in the **tropics**. Seasons are different in these two regions (and they are also different in **polar** regions).

Latitude has a powerful influence in determining seasonal conditions and the annual patterns of environmental and climatic parameters such as precipitation and temperature. Because of the differences in the duration and directness of the sun's energy hitting Earth, the world can be divided into three different zones. Therefore, the same season can be quite different in the tropical, temperate (mid-latitude), and polar zones.

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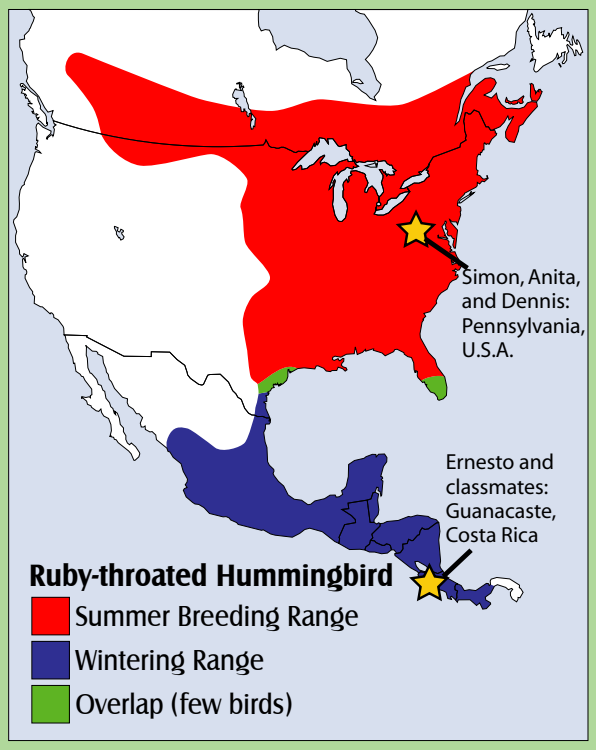
Ruby-throated Hummingbirds and Migration

The ruby-throated hummingbird (*Archilochus colubris*), known in Spanish as the colibrí garganta rubí, is the most widely distributed of all hummingbirds. They come readily to artificial feeders and are tolerant of humans. Ruby-throated hummingbirds (RTHU) are fascinating creatures that can capture a student's imagination and lead him or her into scientific investigation and discovery.



Ruby-throated hummingbirds are insect- and nectar-eating hummingbirds that range from Central America to Alberta, Canada, and from the East Coast of the United States to the middle of the Great Plains. They breed in the eastern U.S. and southern Canada, and over-winter from Mexico south to the Panama Canal (occasionally in southern Florida and along the U.S. Gulf Coast). The map at left shows the species' distribution. Some birds fly non-stop across the Gulf of Mexico; others fly overland through Mexico. Scientists think RTHU begin their migration north in the spring and south in the autumn due to changes in day length. Scientists are not sure why they migrate instead of staying in Central America year-round like some other types of hummingbirds.

For Further Information

More information and photos about RTHU biology, behavior, and ecology can be found on the Web site for *Operation RubyThroat: The Hummingbird Project* at www.rubythroat.org, on the Web site for *Journey North: A Global Study of Wildlife Migration and Seasonal Change* at www.learner.org/jnorth/, or see the Earth as a System chapter of the *GLOBE Teacher's Guide* at www.globe.gov.

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GLOSSARY

Adaptation
An organic modification by which a type of organism becomes suited to new conditions in its environment over many generations

Earth System
The components that comprise the environment of Earth, including the atmosphere, hydrosphere, lithosphere, pedosphere (soils), cryosphere (ice), and biosphere, and the processes (cycling of energy, water, and biogeochemicals) that cause them to interact

Equatorial
Located at the equator or in the plane of the equator

Green-down
When plants start changing colors and/or lose their leaves at the end of the growing season

Green-up
When plants sprout new growth (e.g., new grass blades, budburst, and lengthening of leaves in shrubs and trees)

Latitude
The angular distance of a part of Earth that is north or south of Earth's equator; a region of Earth considered in relation to its distance from the equator

Mid-latitude
The latitude that ranges generally between 30 and 60 degrees

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Migration
The movement of an animal from one region to another in order to breed, grow, or find food (most often this is periodic travel to and from a region at a particular season and along a well-established route)

Phenology
The study of natural responses of living organisms to seasonal and climatic changes in their environment. Examples of phenological events include migration of birds and butterflies, flowering, and salmon spawning. Plant phenology includes green-up and green-down.

Polar
Regions on Earth poleward of 60 degrees latitude

Seasonal Cycle
The regular annual progression through winter, spring, summer, and autumn

Solstice
When the sun is at its greatest distance from the equator, resulting in the longest day in one hemisphere and the shortest day in the other hemisphere

Tropical
Of, occurring in, or characteristic of the tropics

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The GLOBE Program is a hands-on international education and science program that joins students, educators, and scientists from around the world in studying Earth system science (ESS). The core objectives of GLOBE are to improve science education, enhance environmental awareness, and increase understanding of Earth as a system. For more information, please visit www.globe.gov.

Elementary GLOBE is designed to introduce K-4 students to the study of Earth system science (ESS). Elementary GLOBE forms an instructional unit that comprises five modules that address ESS and interrelated subjects including weather, water, seasons, and soils. Each Elementary GLOBE module contains a science-based storybook, classroom learning activities that complement the science content covered in each book, and teacher's notes. The storybooks explore a component of the Earth system and the associated classroom learning activities provide students with a meaningful introduction to technology, a basic understanding of the methods of inquiry, and connections to math and literacy skills. For more information, please visit www.globe.gov/elementaryglobe.

Book and Learning Activity Credits

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Anita REALLY likes Hummingbirds

She watches them.
She draws pictures of them.
But one day in the fall, the birds are mysteriously gone. Simon, Anita, Dennis, and their classmates discover why the hummingbirds left and where they went.

Elementary GLOBE™

This storybook is one of five books in the Elementary GLOBE unit. Elementary GLOBE is designed to introduce K-4 students to the study of Earth system science (ESS). The books form an instructional unit that addresses ESS and related subjects including weather, water, seasons, and soils. The science content provided in the books serves as a springboard to GLOBE's scientific protocols, and also provides students with a meaningful introduction to technology, a basic understanding of the methods of inquiry, and connections to math and literacy skills. Each book has associated hands-on Learning Activities to support learning exploration. For more information, please visit **www.globe.gov/elementaryglobe.**

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