

FOSS® Environments Teacher Preparation Video Transcript

<Larry Lowery Introduction to FOSS Program>

Lowery: Hello. Welcome to the Full Option Science System. This program was funded by the National Science Foundation. Its goal was to develop materials that would involve youngsters with both the processes and the content of science.

The program is developed at the Lawrence Hall of Science, with scientists, science educators, and teachers working together as a team to develop the materials. The materials are tested in the hands of teachers and children in classrooms. It takes about two years to turn out a module.

Each module begins with firsthand experiences. This is done because it has been found that firsthand experiences are the best way for youngsters to learn about the concepts of science. As the module progresses, children are introduced to abstractions and to reading materials. The sequence from firsthand experiences to reading materials is deliberate because it has been found that youngsters, when they have some experience before they read, learn and understand more from the reading. Authors of reading materials can then take youngsters to greater abstractions.

Trust the materials that you are getting acquainted with. They have been well tested. We found that they work extremely well in the hands of all teachers and are effective for youngsters in learning about science.

<Larry Lowery Introduction to Environments>

This module introduces students to the concept of environments. An environment is a place where plants and animals live. To study an environment, one needs to look at the conditions in an environment that affect the living creatures there.

In this module, students begin by exploring how various organisms satisfy their needs. They see that environmental factors can affect the organisms and that the organisms can affect the environmental factors. They learn that there are extremes in the environment that are not beneficial to the welfare of the organisms.

In this tape, you'll see youngsters engaged in investigating terrestrial environments and aquatic environments. You will see them working with individual organisms and with populations of organisms. You will find that the materials to be used in these studies can be easily managed in your

classrooms.

<Laura Louttit Introduction to Module>

Narrator/Laura Louttit: Hi, I'm Laura Louttit and I'm here to help you get started using the Environments module. The Environments module consists of six investigations. Each investigation is designed to give students firsthand experience exploring a variety of plants and animals and their environments. One of the most important points of the module is that students develop respect for all living things.

Most of the equipment you'll need to teach this module comes in the kit. Everything you see here comes in these two boxes. There is enough equipment in the kit for a class of 32 students.

You will need to check the inventory sheet in the materials folio to see which materials are consumable and which are permanent. From the measurement kit, you will need basins, 100-liter beakers, thermometers, the one-liter beaker, meter tapes, liter containers, pitchers, and hand lenses.

You will need to supply potting soil, goldfish, tiny crustaceans and pond snails, aquatic plants, isopods and beetles, plastic wrap, water treatment drops and water, newspaper, file folders or other stiff paper, lined paper, and paper towels.

You might be wondering how to get the living organisms. The materials folio provides details on sources for them. Your school may have purchased the FOSS Living Organisms Coupons. If so, complete the information requested on the coupons and send them to Delta to order the organisms. Or, you can order them from a local biological supply company or aquarium. Pet shops can sometimes supply you with these organisms.

Before you begin teaching, it is important to look through the entire Teacher's Guide. First, you will find the overview folio, which points out the national standards addressed in this module as well as information about how to make best use of the Teacher Guide. It also includes valuable background information specially written for teachers who have not had extensive science training. The suggested teaching schedule in the overview will be particularly helpful as you plan for the growth and survival of the plants and animals studied in this module.

Next, you'll find the materials folio. If you are the first teacher using a

new kit, you'll want to turn to the section that describes first-time prep. If the kit has been used before, check the section with directions for each classroom use. Both of these sections will give you helpful hints that will save you lots of prep time later. And check the folio for information on obtaining those living organisms.

The first six folios are the investigation folios. These are the heart of the program. Each investigation takes one or two weeks to complete. The first page provides overview information. The At A Glance chart summarizes the investigations and helps you plan for assessment and extension activities.

Next, you'll find background information specific to this investigation. There is a section called "Teaching Children About," which gives you some insight into research about how children think and learn.

Then, for each part of the investigation, you'll find the materials list, Getting Ready section, and step-by-step instructions for how to proceed through the investigation. At the end of the folio, you'll find interdisciplinary extensions. You can do some of these extensions with the class or save them for students to use as projects at the end of the module.

Next are the investigation duplication masters. Each master is labeled with a number, so it will be easy to find when you need it. Shortly before beginning this module, duplicate the letter to parents and send it home with students. This letter tells parents about the module and suggests some activities that they can do at home with their children.

It's important to read the assessment folio before you begin teaching. It describes a system for assessing students throughout the investigations and also gives you ideas for end-of-the-module testing or portfolio assembly. The folio contains scoring guides for each of the assessments suggested.

Next are the assessment duplication masters. Here, you'll find the masters for the assessment charts and end-of-the-module assessments.

The Science Stories folio provides background information and recommends when to read the stories and provides follow-up activities. You may want to read the Science Stories during a reading period rather than science time, especially if you only teach science a few times a week. In the resource folio, you will find lists of trade books, videos, computer software, and other resources that you can use to enrich the program.

The next tab is the FOSS website folio. On the website, you'll find simulations for each module in the program. Students can contact scientists and FOSS students across the country. You'll need to check the website to see the many features available there, including resources for teachers.

<Investigation 1, Part 1>

Narrator: As students begin to investigate environmental factors, they will set up terrariums. The students observe the terrariums for several weeks and describe the factors that contribute to the terrarium environment.

For each part of the investigation, you'll want to set up a materials station. Here is what you'll need for the first part: From the kit, you'll need the six-liter containers and lids, plastic cups, minispoons and sticky notes, and seed packages.

From the measurement kit, you will need the basins, the pitcher, the one-liter containers and the 100-milliliter beakers. You will need to supply potting soil, plastic wrap, newspaper, and paper towels.

Duplicate Student Sheet No. 2 called “Terrestrial Environments Journal” and Student Sheet No. 3 called “Terrarium Map” and the Assessment Chart for Investigation 1. It's a good idea to read through all investigations before you begin so you are better prepared and know what's coming next. Plan for assessment by reading through the assessment folio and choosing from the options that best meet your needs.

You will need to plan for the distribution of the soil before you begin. Place potting soil in two basins just before it is to be used. Return unused soil to the bag and seal it tightly. You may want to have students cover their desk with newspaper when they use the soil.

It will be easier to distribute the seeds if each kind of seed is placed in two labeled cups. Minispoons are provided to measure the clover seeds.

Prepare the terrarium lids by covering the holes with plastic wrap and then covering the terrarium like this. If the plants get too tall, the lids can be removed. Plan to store the terrariums in the sunlight or in regular room light.

Assemble the student journals. Staple the student sheet called “Terrestrial Environments Journal” to about 10 sheets of white-lined paper.

Prepare the Content/Inquiry chart and the Word Bank by using large sheets of paper or a flip chart. Make a Project Ideas Folder for the class. As students come up with project ideas throughout the investigation, write them on pieces of paper and put them in the folder so that they can be used at the end of the module.

Teacher: What I want you to do right now is I want you to think back of some gardens. How many people have gardens at their houses? Cool. Well, now, with gardens in mind, tell me about a garden that you know about, one at your house or maybe one you've been to somewhere. Do you have a garden at your house, Erica?

Student: Uh-huh. We just planted flowers in it.

Teacher: Today we'll plant a special type of a garden called a "terrarium." Anybody ever had a terrarium in your house? So you've seen them at like a flower store or something.

This is going to be your garden. And it's a rare, a special kind of garden. It's going to be an enclosed garden. And we're going to use it for a science experiment to study organisms. Organisms are any living thing.

Narrator: The getters place eight of each of the large seeds in one cup and one minispoonful of clover seeds in the second cup. They bring them back to their group.

The getters place one liter of soil in their terrariums. The teacher introduces the Terrarium Map sheet and explains that the students will first draw a map to show where they will plant their seeds. They will put a sticky note on the terrarium to mark the front and each group can choose the symbols that will show where the different kinds of seeds will go.

Teacher: So you're going to plant the barley first. Come up with some sort of symbol for the barley. It doesn't matter what it is. You can make it a B. You can make it a star. You can make it whatever it is that appeals to you.

Student: A coloring dot.

Student: Okay. What color?

Student: Black.

Narrator: When the students in the group have agreed on the symbols they will use, they plan the placement of the seeds. It's really important that they follow their map as they plant.

Student: Right here.

Student: I think the small one is (inaudible).

Student: Another radish. Another radish.

Narrator: After they plant their seeds, the students begin to water the terrarium. They can use as much water as they want to, but they must keep an accurate record of how much they use.

Student: 200 milliliters of water.

Student: There. I know there's seeds there.

Student: Right there.

Student: Down here.

Student: There we go. I think that's good enough.

Student: 200 milliliters.

Narrator: The students finish by placing the lid on the terrarium and making sure the sticky label identifies the front and includes their group name and number.

Teacher: I have a question. Why do we put a lid on the terrarium lined with plastic? Jorge?

Student: You know the stuff that we were talking about, the gas that comes when the water evaporates.

Teacher: The water vapor we were talking about yesterday.

Student: The water vapor. If you put it on top, the water vapor won't get out. So that means it will keep the water in it longer because the water vapor won't go out.

Teacher: You're closing the system with the water vapor. You're right. The water is going to evaporate and then, over the course of the next couple of days, we can watch it create its own rain and rain back onto it.

Narrator: Ask the students to name the part of the terrarium system and then explain that all of these parts together make up the terrarium environment. An environment is everything, both living and non-living, that surrounds and influences an organism, including other organisms. Each separate part of an environment is called an “environmental factor.” Go back over the list of environmental factors and have the students identify which are living and which are non-living.

Teacher: Now, the last thing we're going to do is...

Narrator: The teacher introduces the terrarium journal. Today's entry should include a list of the environmental factors and a description of the terrarium. The students should be encouraged to write and draw in their journals.

Teacher: So everybody is going to get a terrarium journal.

Narrator: Before ending the session, the teacher begins the Word Bank and Content/Inquiry charts. In this part, it's important that the students learn that an environment is everything that surrounds and influences an organism. And an environmental factor is one part of an environment; it can be living or non-living.

There are several readings about environments in the FOSS Science Stories folio. Be sure to read through the Science Stories folio, so you'll know the best time to have the students read these selections.

<Investigation 1, Part 2>

Narrator: In this part, students will observe changes in their terrariums and keep a record of their data in their journals. Here is what you'll need for this part: The terrariums and the terrarium maps and the terrestrial environments journals.

From the measurement kit, you will need the meter tapes. You will need to duplicate Student Sheet No. 4 called “Response Sheet—Terrestrial Environments.” And have Assessment Chart for Investigation 1 available.

The students will make their observations every two to three days. The terrariums you see here have been growing for a while. The students will

need help getting started with their journal entries. So when they begin, ask questions like: How do the sides and the top of the terrarium look? How does the soil look? Have any seeds sprouted? What kind of seeds sprouted first?

What kind of seeds sprouted last? What kind of plant is growing best in your terrarium? How have the living factors of the environment changed?

How would you recommend planting seeds in a terrarium? How much soil should be placed on top of the seeds? What factors affect the growth in your terrarium? What would you do differently next time?

Student: Here.

Student: Well, this is the tallest one. No, actually this is the tallest. So that's six.

Student: Six centimeters.

Narrator: In this part, the students should have learned that a relationship exists between a number of environmental factors and environments change over time. This is a good time to introduce the Project Folder to the students explaining that, at the end of the module, they will get a chance to choose their own investigation. Add any questions or ideas that students have to the folder at this time.

This is the end of Investigation 1. Be sure to choose several of the interdisciplinary extensions and do the math problem of the week before moving onto the next investigation.

<Investigation 2, Part 1>

Narrator: In this investigation, the students will be looking at the environmental preferences of two different animals, isopods and beetles. They will conduct their experiments in aluminum foil runways. In this part, the students make initial observations on the isopods and beetles and then they construct their runways.

Here is what you'll need for this part: From the kit you'll need plastic cups, aluminum foil, transparent tape, and plastic spoons. From the measurement kit, you'll need hand lenses and the meter tapes. You will need to supply soil, strips of stiff paper, and beetles and isopods.

Make copies of the student sheet "Runway Construction" and one copy of

the Assessment Chart for Investigation 2.

Plan to have about 50 isopods and 50 darkling beetles for this part. You'll need to place the organisms in plastic cups before you begin. Plan to have Assessment Chart for Investigation 2 with you, so you can make notes about your observations on how students are working. To begin this part, have each collaborative group form into two teams.

Teacher: Isopods; You may know these as roley-poleys.

Narrator: Tell the students they will be introducing some animals into their terrariums but, first, they'll need to find out what kind of environment those animals prefer, so they can adjust the terrarium environment accordingly.

Teacher: Feel free to do so.

Student: That guy is having a hard time.

Narrator: If students are reluctant to pick these critters up, they can pour them into their cups or use a spoon. Or, to save time, you may want to put them in the cups before the session begins. At their seats, students observe the new organisms.

Student: Whoa!

Narrator: The students record their observations in their journals. After students finish recording their observations in the journals, you may wish to have them return the organisms to their individual cultures before you demonstrate how to make the runways.

Teacher: These are the runways as they are completed. And so each group is going to have to make two of these.

Narrator: The getters get the precut aluminum foil and stick paper strips and the transparent tape.

Student: Turn the foil—oh, okay. Fold the foil up to make walls right along the four edges of the tape.

Student: Look how I did mine. I folded them. Other way, other way around. The paper has to be folded. The paper has to be on the bottom.

Student: Okay. Now turn the foil—oh okay.

Student: I know how to make these. I made one before.

Student: Fold the foil up to make the walls right along the four edges of the tape.

Narrator: When the students have finished construction, store the runways until you're ready for the next part. The important thing for students to learn in this part is that designing an investigation involves controlling the variables, so that one factor can be observed at a time. Be sure to review the Science Stories folio, so that you can plan the appropriate reading activities for this investigation.

<Investigation 2, Part 2>

Narrator: In this part, students use the runways they have constructed in order to investigate what type of environments isopods and beetles prefer. Here is what you'll need for this part: From the kit, you'll need plastic cups, the five-milliliter spoons, plastic spoons, stirring sticks, and sticky notes. From the measurement kit, you'll need: Two basins, 100-milliliter beakers, pitcher, hand lenses, and the meter tapes.

You will need to supply dry soil, moist soil, the isopods and beetles, plastic wrap, newspaper, and the runways assembled in Part 1. Make copies of the student sheet called “Animal Investigations” and the response sheet called “Bugs and Beetles.” Have the Assessment Chart for Investigation 2 handy.

To prepare the soil, spread one liter of moist soil out on newspaper and let it dry for two to three days. Place it in the basin for student use. Have two liters of moist soil from the bag in another basin for this session. Place five to six isopods in one cup and five to six beetles in a second cup for each group.

To begin Part 2, bring out the cup of isopods and a cup of beetles. Remind the students that they are living organisms and are not to be harmed in any way.

Teacher: One of the experiments that we're interested in doing is we're trying to find out what kind of an environment different organisms prefer if you give them the choice. Human beings don't mind living in the desert. They don't mind living at the top of mountains. But we're going to see what these organisms like, what their preferred environment is.

Is there any way you can think that—a way that we could use these runways to design an experiment to see, for example, how much water these different organisms like? Anybody figure out a way we can set these runways up that would be an experiment that would give the organisms a choice about water. Rocky, do you have an idea?

Student: You can put a tiny bit—put a little—something to hold it up and pour a little water in, so there will be some water, and see if they like the water in there.

Teacher: That's exactly what we're looking for here, to give them a choice for what they like.

Narrator: The teacher suggests an experimental design to test their animals' environmental preference for moisture. The getters measure one 50-milliliter mound of dry soil and two 50-milliliter mounds of moist soil leaving a space between each. The students add two five-milliliter spoons of water to the moist soil to make wet soil. The students can label the soil with sticky notes.

Teacher: What we're going to do—and probably while you're writing down your setup—is we're going to take the isopods and put them in one runway. We're going to take the darkling beetles and put them in another runway. And we're just going to watch them without interfering with them. That's very important when you do this kind of an experiment.

You're going to put them in there and in 15 minutes we're going to see where they go. And we want to know a couple of different things: Do they prefer the dry, the moist or the wet? Do they stay on top? Do they try to burrow under the soil. And I want you to describe that as best you can.

Narrator: The students add the beetles to one runway and the isopods to the other. The isopods quickly begin to explore their environment and so do the beetles.

Student: Most of the dirt in the beetles are going to the dry. Because there's—well most of them are like in these two groups because there's—there are two over here and four over here. Two of them came over to here and then one of them went over to there.

Student: He likes wet. Either that or he's trying to get out.

Narrator: Students record their observations after 15 minutes. They record observations again after a couple of hours and look for changes. If the students want to leave the animals in the runways overnight, cover them with plastic wrap, so they can't escape.

Teacher: Erica, what did you find out at this table?

Student: We found out that roley-poleys like the wet soil better.

Teacher: How could you tell roley-poleys like the wet soil better?

Student: Because they went to the dry soil for a couple of seconds and they came back to the wet soil.

Teacher: So they've been there consistently then. They like the surface or down underneath?

Student: They mainly like the surface but, in the dry, they keep burying down.

Student: The darkling beetles, they like the dry stuff. And they—they are kind of mixed. One of them is burying himself but the other four are on top of the soil.

Narrator: The teacher introduces the term “preferred environment” as the place where animals are most comfortable.

Teacher: What would you say the preferred environment of the isopods is? Carrie?

Student: Well, an isopod seems to prefer the wet soil.

Teacher: Okay. How about what would the preferred environment of the darkling beetles be?

Student: Well, dry.

Teacher: Okay. So if you were out in nature and you saw these two organisms, would you expect to find them living in the same place?

Student: No.

Teacher: And you're absolutely right. In nature, they don't live in the same place. And later we'll talk a little bit more about the natural habitat of both darkling beetles and isopods.

Narrator: Before ending the session, students complete the response sheet "Bugs and Beetles," which is used as an assessment. The most important thing for students to learn in this part is that each organism has a set of preferred environmental conditions. Isopods generally prefer moist environments. Beetles usually prefer dry environments.

Be sure to ask for students' questions and ideas to add to the Project Folder.

<Investigation 2, Part 3>

Narrator: In this part, students investigate how isopods and beetles respond to the environmental factor of light. Here is what you'll need for this part: From the kit, you'll need the plastic cups, the five-milliliter spoons, plastic spoons, and the black paper. From the measurement kit, you'll need the hand lenses.

You will need to provide soil, isopods and beetles, the runways from Part 2, and newspaper. Make more copies of the student sheet called "Animal Investigations" and have your Assessment Chart for Investigation 2 handy.

To prepare for this session, cut the black paper into four pieces and then fold the edges in, in order to make a canopy. Place the canopy on the runway. Propose to the students that the runways might be used to investigate another environmental factor: Light.

Student: There.

Student: Thank you.

Student: Oh, God, is it too short?

Student: Hey, they are going over to the light side.

Teacher: It's been about 15 minutes now since we covered these runways. Anybody like to tell me what kind of results you came up with? How about here at this table? Jeff?

Student: Five—all five of the beetles went in the dark side.

Teacher: Huh. And did you get any action with the isopods.

Student: Well, three we can find—we can find three went into the dark side and one is starting to bury under the soil.

Teacher: Ah, so not only they went under the dark piece but they went under the soil, too. So what do you think the preferred environment would be for both the beetles and the isopods as far as light would go?

Tammy, do you think they would prefer light or dark?

Student: They would prefer dark.

Teacher: Okay. So even though they like different kinds of moisture, they both like dark.

Narrator: A 15-minute test isn't conclusive. When the students check the runways after a couple of hours, though, they find that their initial observations are on the right track. Most of the isopods and beetles have gone under the dark covers. In this part, students find that both isopods and beetles usually prefer a dark environment.

<Investigation 2, Part 4>

Narrator: In this part, students design an animal investigation focusing on an environmental factor they haven't tested yet. For this part, you'll need the terrariums and the isopods and beetles.

Begin this part by discussing what the students already know about isopods and beetles. When the students have determined the preferred environments of the animals, let them place the animals in the terrariums. This group has added the isopods because they know isopods prefer a moist environment.

Some students may want to create a different kind of terrarium more suited to beetles. When they have developed their plan, let them set it up. Encourage students to observe their terrariums regularly and to keep journal records.

This brings us to the end of Investigation 2. Be sure to choose several of the interdisciplinary extensions and complete the math problem of the week before moving onto Investigation 3.

<Investigation 3, Part 1>

Narrator: In this investigation, students isolate one factor in the

environment, water, and set up an experiment to determine the range of tolerance for the early growth of four different types of plants. Here is what you'll need for this part: From the kit, you'll need the half-liter containers, the FOSS trays, the seeds, the four-liter zip bags, and either the prepared labels or the sticky notes.

From the measurement kit, you'll need the basins, pitcher, the 100-milliliter beakers and the meter tapes. You'll need to provide moist soil, dry soil, newspapers and paper towels.

If you decided to use the prepared labels, duplicate Student Sheet No. 8 called "Container Labels." You'll also need to duplicate Student Sheet No. 9 called "Plant Experiment Setup." Have Assessment Chart for Investigation 3 ready.

To get ready for this part, spread three liters of the moist soil out on the newspaper and allow it to dry for two to three days. Once the soil is dry, you can store it in a plastic bag. Just before this part begins, place the moist soil in a basin labeled moist and put the dry soil in a basin labeled dry. Place each type of seed in two labeled cups, so that two students can count out the seeds at the same time.

We suggest that you have the students cover their desk with newspaper to make cleanup easier. Plan a place to store the miniplanters. They will do well in regular room light or sunlight. They will grow for 12 to 14 days. Begin this part by reviewing the terrarium experience.

Teacher: I want you to think of a couple of questions or ideas that could have happened to them. First of all, what would have happened if we didn't put any water in them at all? No water. Charlie?

Student: They might die.

Teacher: Okay. They might die. Okay. What if we did the opposite? What if we gave the terrarium too much water? What do you think would have happened then with our plants?

Nick?

Student: One time, my family, we were growing watermelons and they needed a lot of water. But they died because my little brother put too much water in it. So they need a certain amount of water to grow. And if they get too much, they'll die. If they get too little, they'll die, too.

Teacher: Okay. Thank you.

Narrator: The challenge is presented. How much water do corn, barley, peas, and radishes need to grow? The students will set up four planters exactly the same. The only difference will be how much water is put in each planter.

The students fill out their plant experiment setup sheet. Each group decides on the symbols they will use to represent the seeds. It is really important that they follow the map as they plant. The only variable will be water.

The getters get a tray and four containers. They place moist soil in three of the containers and dry soil in one container. They take the 100-milliliter beaker and a cup of water with them, too.

Teacher: And pour into the container.

Narrator: The teacher tells the students how to set up the four different environments. They will add 40 milliliters of water to moist soil to make wet soil. They will add 80 milliliters of water to moist soil to make the very wet soil.

They label their containers. The getters form two lines and get 12 of each seed. They need three of each for each cup.

Using their maps, students sort the seeds and plant them in the four environments. They add a quarter-cup of soil on top of the seeds and gently tap the soil. They can use the bottom of the cup or their hands. Remind the students that to get an accurate reading of the water level, they should bend down to read the scale on the beakers at eye level.

Next, the getters get four zip bags. Each student bags and seals one of the containers and places it on the tray. Each student will choose one type of plant to study, either the pea, the corn, the radish, or the barley. They will concentrate on observing that plant in each of the four environments. The students store the trays.

Teacher: Okay. I'm going to set up a last container that all of us can observe and look in the next couple of days. And this is a container that has the moist soil in it. However, I am going to add 120 milliliters of water, which means I'm going to really saturate and soak this soil. And then I'll put it back here, as well.

Narrator: The class will also observe what happens to these seeds over time. Based on their experience with seeds in the terrarium, students predict which plants will grow tallest and why. They record their predictions. It's important that the students understand that they have set up a controlled experiment where the only variable is water.

There are several readings in the FOSS Science Stories folio about seeds and plants. Be sure to check the Science Stories folio, so you'll know the best time to read these selections.

<Investigation 3, Part 2>

Narrator: In this part of the investigation, students record their observations at five and eight days. Here is what you'll need for this part: You'll need the class planter and all the miniplanters. They should look something like this.

Make copies of Student Sheet No. 10 called "Plant Observations" and Student Sheet No. 11 called "Response Sheet—Water Tolerance," which you can use for assessment. Have Assessment Chart for Investigation 3 ready.

To begin this part, ask the students to observe the similarities and differences in their plants in each one of the planters. Ask the students which parts they should watch closely, the leaves, the stems, the roots.

Teacher: What's going to happen is each plant expert is going to observe the different plants, depending on the water. So remember, we had a dry environment. We had a moist environment, a wet and a very wet. And as the plant expert, you want to see how your plant has grown in each one of those environments.

Student: Take the tallest plant...

Student: Where is the measuring tape?

Student: We're supposed to count how many plants came up.

Student: We're making sure just the...

Student: 13.

Student: I have about 14.

Narrator: Ask reporters which environment had the most plants come up, which environment had the tallest plant, what is the height, which environment has the plant with the most leaves on it?

Not all planters with the same environment will have the exact same growth, so answers will vary. This is a good topic for discussion or a good way to generate ideas and questions for the Project Folder.

At this point, the students will fill out their response sheet on water tolerance. You can have the students complete this in class or take it home for homework.

<Investigation 3, Part 3>

Narrator: In Part 3, the students disassemble their planters and compare the growth of their plant in each of the four different environments. For this part, you'll need the meter tapes from the measurement kit.

You will need to supply the planters from Part 1, the students' journals from Part 1, Student Sheet No. 10 called "Plant Observations" from Part 2, and newspaper to cover the desks.

You will need to make copies of Student Sheet No. 12 called "Plant Profile." The Assessment Chart for Investigation 3 should be available.

Begin this part by explaining to the students that they are going to make their final observations of their plants in Part 3 of their plant observation sheet and then they are going to disassemble their planters in order to observe the roots.

Each group member will take apart one planter. To do this, each student will gently turn the planter on its side. Gently pull on the plants to make sure they are completely removed from the container. Then they will separate them by gently teasing apart the roots, being careful not to hurt the plants, if they can.

After the plants are separated, the appropriate plant goes to the plant expert in each group. Each plant expert will take all of his or her type of plant from each of the environments under the appropriate heading. This one came from the moist environment, so it will go under the moist heading.

This is the time to introduce the concept of range of tolerance. The

students have discovered the range of tolerance for water for their plants in each one of the environments. They now can determine the optimum conditions for growing their type of plant.

This is the end of Investigation 3. Be sure to choose several of the interdisciplinary extensions and complete the math problem of the week before moving on.

<Investigation 4, Part 1>

Narrator: In this investigation, students assemble fresh water aquariums and observe them over a period of time. They monitor the environmental factors of temperature and water and observe goldfish behavior. Here is what you'll need for Part 1: The six-liter containers; the lids, if you decide to use them; fish food; and the fish net.

From the measurement kit, you'll need the Celsius thermometers and pitchers for water. You will need to supply aged or treated water. If your water contains chloramine, you'll need to use the water treatment drops. About 12 sprigs of elodea and 12 goldfish.

Duplicate Student Sheet No. 13 called “Aquatic Environments Journal,” Student Sheet No. 14 called “Aquarium Log” and the Assessment Chart for Investigation 4.

Chlorine used in water treatment is toxic to fish and will kill them. Chlorine will dissipate out of the water when exposed to air for a day. Chloramine, on the other hand, another additive used in some water supplies, will not dissipate out of the water when exposed to air. You need to use the water treatment drops in order to make the water safe for the goldfish if it contains chloramine.

If you are unsure, check with your local aquarium store to find out. Or, to be on the safe side, use the water treatment drops to treat your water.

Obtain two-dozen goldfish. Place two of the goldfish in each one of the students' aquariums. Be sure that the aquariums contain aged or treated water.

Have small pond snails, elodea, or lemna—which is otherwise known as duckweed—available for the aquariums. Store them separately for now.

To make a journal for each student in your class, use the aquatic environments journal cover sheet and staple it to about 10 sheets of white-

lined paper.

Begin this part by asking the students to describe some aquatic environments and how these aquatic environments are similar to and different from terrestrial environments.

Teacher: Okay. So what living things are in both environments? Andrea?

Student: Living plants. There's trees in terrestrial environments and there's like just plant life and coral in aquatic environments.

Teacher: Good. So plant life is something that is common in both of them. Great.

Narrator: The teacher explains that each group will get an aquatic environment called an “aquarium.”

Teacher: The getters are going to get all of the necessary materials that we need to put our aquariums together. If you look in the back of the room, we already have our aquariums that are filled with water. What's going to be very important is that when you handle the goldfish, you handle them carefully and that you also are aware of the temperature of the water.

Narrator: After the getters have brought the aquariums to their groups, allow students 10 to 12 minutes to just observe the fish in the aquariums. Ask the students to focus on the fish structures, movements, and behaviors. Distribute the aquarium journals and ask the students to record the date and time of the observations as well as the goldfish structures and behavior data. Distribute the aquarium log and have the getters get a thermometer. Members of each group will share the responsibility of daily feeding, checking the temperature, and monitoring water conditions.

Each student records the data in the log. The students write their names or group number on a sticky note before placing it on the aquarium at the water level. They feed the goldfish just one or two pieces of food.

Student: Are they eating it?

Student: Eat up.

Student: Eat up.

Student: Eat.

Student: Eat up little fishies.

Student: Fishies, eat. Eat up.

Student: You need your vitamins.

Student: The big one I don't think wants to eat anything. He's already full.

Student: I don't think they like that thermometer in there.

Student: We'll—well, we can't take it out.

Teacher: What I would like to do right now is to consider the factors that we've listed for the aquariums. And I want you to take out your aquatic journals that you've all made. And what you're going to do is you're going to make your first journal entry. And what you want to discuss are your observations of your aquarium.

Now, it's really important when you—whenever you do make an entry in a journal is you need to always include the date and the time. Because we are making real, live observations. And we need to know when these observations occurred.

You can write about anything that you have observed. How the fish behaved. What you've seen them do. How they react to different environmental factors. Okay? And if you need more ideas for your writing, you can take a couple of minutes just to look at your aquarium to get some ideas generated.

Narrator: Data entries will vary from student to student. The students need to decide where they would like to store their aquariums. They need to be stored away from direct sunlight. They also need to decide whether or not they want to use the lids. Point out to the students that they can observe the class aquarium containing the water plants during their free time.

There are two important factors to learn from this part: Water quality and temperature are two important non-living environmental factors to be considered when setting up a goldfish aquarium. Be sure to check the Science Stories folio to plan time for student reading.

<Investigation 4, Part 2>

Narrator: In Part 2, the students use bromothymol blue indicator to compare the acidity of the water in their goldfish aquariums to the water in the class aquarium containing only plants. They relate the acid level in the water to the carbon dioxide given off by the fish.

Here is what you'll need for Part 2: The six-liter containers, plastic cups and lids, the fish net, the five-milliliter spoons and straws, the half-liter containers, the 12 dram vials, the BTB, the fish food, and sticky notes.

From the measurement kit, you'll need the 100-milliliter beakers and the pitcher. You will need to provide goldfish, elodea, and aged or treated water.

Duplicate Student Sheet No. 15 called "Investigations" with BTB, Student Sheet No. 16 called "Response Sheet—Aquatic Environments" to use for assessment. Also have the Assessment Chart for Investigation 4 available.

Prepare the vials for demonstration. Label three clean, dry vials "Plant Aquarium Water," "Goldfish Aquarium Water," and "Aged Tap Water."

Try the BTB experiment with the plants and fish before doing it with your class. If the water in the goldfish cup does not change from blue to green to yellow, you'll need to purchase bottled drinking water and try it again.

Begin this part by introducing the BTB to your students.

Teacher: You want to lid it up and then you just want to swirl it around. And then you'll want to notice the color. And I'll compare it up to some white paper. What kind of color does it look like the water has turned?

Student: Blue.

Teacher: Good. A light blue. Okay. Now, I have a key up here. And if the water turns to blue, that lets you know there's no acid inside the water. If our water turns green, there's some acid. And if it turns yellow, it's very high in acid. Okay?

Narrator: The teacher explains that it is important to know the amount of acid in the water because too much will hurt living organisms like fish.

Teacher: What we're going to do is we're going to set up an environment that...

Narrator: The teacher proposes an experiment to test the acid content in three different water setups: Water with the fish in it, water with the plant in it, and plain water. The students put six drops of BTB in each cup.

Student: Four, five.

Student: One more.

Student: Six.

Student: I'll stir it up.

Student: Three, four, five . . .

Student: It's green.

Student: It's clear.

Narrator: The students record their observations, but they don't see much change in the water. They leave the cups for 30 to 40 minutes.

The students should see results similar to what we have here. They should notice that there's a difference in the fish cup, the plain water cup and the plant cup. The difference in the coloration is due to the acid content in the water.

Give each group a straw and ask the starter to blow gently into the cup containing just water and BTB.

Student: What color—is that more of green or more of yellow?

Student: More of a yellow.

Student: Yellow. That's what I thought.

Student: It's a green-yellow.

Narrator: Explain that both humans and fish exhale a gas called “carbon dioxide.” This is what caused the change in color in the water. The students return the goldfish to their aquariums and complete Response Sheet—Aquatic Environments. This assessment can be completed in class or at home.

Store the cups with the plants away from the windows overnight. The next morning, the students should notice that the water has turned to green. Move the cups with the plants back into the light. After 30 or 40 minutes, the students should notice that the water has turned to blue.

In the absence of light, the plants produce carbon dioxide. And in the light, they absorb it.

The most important thing for students to understand is that carbon dioxide produced by aquatic organisms changes the acidity of the water. This is a good time for students to add ideas and questions to the Project Folder.

<Investigation 4, Part 3>

Narrator: In Part 3, the students create a more diverse aquarium by adding a variety of aquatic organisms and plants to their goldfish aquarium. Here is what you'll need for Part 3: From the kit, you'll need the fish food, half-liter containers, the fish net, transparent tape, sticky notes, and the turkey baster.

From the measurement kit, you'll need the pitchers, the thermometers, and the 100-milliliter beakers. You will need to supply the class plant aquarium; small pond snails; crustaceans such as amphipods, especially gammarus; two liters of aged or treated water; the aquatic environments journals from Part 1; and the aquarium log from Part 1. Have the Assessment Chart for Investigation 4 available.

Begin this part by asking the students what they could do to their goldfish aquariums to make them more diverse and interesting. When the students suggest adding things to the aquariums, bring out the plants and animals. Each group can add two or three snails, one or more sprigs of elodea, and some lemna.

Over the next few weeks, plan time for students to make observations and record them in their journals. Keep the gammarus in the plant aquarium. The students may add the gammarus to their goldfish aquariums but be aware that the goldfish love to eat them.

Discuss with students the similarities and differences between their aquariums and natural fresh water environments. Over time, you may get to see elodea grow and form roots, snails lay eggs on plants or on the sides of the aquarium, lemna multiply and begin to cover the surface of the water, and goldfish die. The water may become green from the growth of

algae.

Your students should know that an aquatic environment can contain many different organisms. Be sure to choose several of the interdisciplinary extensions and complete the math problem of the week before moving on.

<Investigation 5, Part 1>

Narrator: In this part, students investigate the environmental factor of salinity. They conduct a controlled experiment in order to determine which of four salt solutions is the best concentration for hatching brine shrimp.

Here is what you'll need from this part: From the kit, you'll need the FOSS trays, plastic cups and lids, transparent tape, kosher salt, the five-milliliter spoons, stirring sticks, the brine shrimp eggs and minispoons, and sticky notes.

From the measurement kit, you will need: The liter containers, the 100-milliliter beakers, hand lenses, and the pitchers. You will need to provide the water.

Duplicate a copy of the Assessment Chart for Investigation 5. Have this available so you can take notes as you work with the students.

The three parts of this investigation take a minimum of one week. Timing is critical. Be sure to start on a Monday.

Each group will need a half a cup of kosher salt. The reason we use the kosher salt is that it does not cloud the water and it will be easier to see the brine shrimp once they hatch.

Measure four minispoons of the brine shrimp eggs into a vial for each group. The eggs should just cover the bottom of the vial. Then cap the vial.

Test your eggs and water ahead of time. Put 150 milliliters tap water into two cups. Using the five-milliliter spoon, add 10 milliliters of salt to one cup and label it "Two Spoons" and add 20 milliliters of salt to the other cup and label it "Four Spoons."

Transfer one level minispoon of eggs to each cup. Put the lids on and gently swirl. In 24 to 48 hours, you should see tiny brine shrimp swimming around. Eggs float but larva swim. Any movement of water

will interfere with your observation. If no eggs have hatched in 72 hours, you may need to use treated water or the eggs may be too old.

If you've decided to use the prepared labels, make eight copies of the Student Sheet No. 8 so that students can tape the labels to their cups. Begin this investigation by reviewing the environments that the students have studied so far. Another type of environment is a salt pond or a salt lake.

Teacher: Dr. Brine has found that thousands of migrating birds depend on a small aquatic animal called the brine shrimp for food. She is concerned. If the lake continues to get smaller and therefore saltier, either because the lake is drying up or the fresh water flowing into the lake is reduced, the salty environment may have an effect on the population of brine shrimp. Now, what's going to happen if the brine shrimp die? Carrie?

Student: The birds will die?

Teacher: Ah, very good. So you do see a cause and effect link there. Now, here is what we're going to do today: Just like Albert Einstein is my friend, of course Dr. Selena Brine is my friend. And she's given me a small vial of brine shrimp eggs. And what Dr. Brine would like us to experiment with is to find out if salinity is an environmental factor that affects the hatching of Mono Lake brine shrimp eggs. So what she needs you to do is design an investigation to test her idea.

So what we're going to do is test the idea of does salinity affect the growth of brine shrimp eggs. You remember at our last experiment we worked with range of tolerance. Do you remember range of tolerance?

Class: Yes.

Teacher: Very good. Yes. So what we're going to look at is we're going to try to find out what the range of tolerance is for brine shrimp eggs and salinity. And then we're going to find out if we can figure out what the optimum or best environment for the brine shrimp eggs is. Got that?

So how would you set up an experiment controlling the variables to find out what the range of tolerance is and what the optimum environment might be? Any ideas on how you would set up that experiment? Erica?

Student: Well, maybe you could like put salt water, fresh water, and maybe some sort of mild salt water and see which grows better.

Teacher: Okay. Is she getting a range of salt in that so we can figure out a range of tolerance? And might it be a good idea to start with totally fresh water to see if they can live with no salt?

Student: Uh-huh.

Teacher: Then you're saying a mild salt solution and then quite a bit of salt in the next one? Does that make sense to everybody?

Class: Yes.

Teacher: I think Dr. Brine would be very pleased with what you come up with. And so here I think is what we're going to do: You're going to get to make four actually different solutions, salt solutions. And we're going to range—I love your idea. We're going to start with fresh water. Can brine shrimp live in fresh water?

Then you're going to put three more cups with different salt solutions. I'm going to write it up on the board in a minute just what you need.

Narrator: The teacher has listed the procedure on the board for reference. The getters carefully measure the salt into three cups. The group members label the cups.

Student: Stir it up a little more.

Narrator: The students bring their cups to the water table and add 150 milliliters of water to each cup and stir. Notice how the students are reading the beaker scale at eye level to get an accurate measurement.

Student: Okay. Just a little more. Like about that much. That's perfect. Okay. So we need more in this one.

Student: So we do one spoonful of brine shrimp eggs. Okay. Michael.

Student: Thank you.

Narrator: Once the brine shrimp eggs have been added, the students cover the cups and store them in the FOSS tray for 24 hours. It's important to reinforce to the students that, in a controlled experiment, one variable, in this case salt, is isolated and tested. All other variables are held constant. Be sure to review the Science Stories folio in order to plan time for student

reading.

<Investigation 5, Part 2>

Narrator: In this part, the students monitor the salt water environments and determine which are conducive to brine shrimp hatching. Here is what you'll need for this part: The FOSS trays with the hatchery cups and the aquatic journals from Investigation 4.

From the measurement kit, you'll need the hand lenses. You will need to duplicate Student Sheet No. 17 called "Brine Shrimp Hatching." Have Assessment Chart for Investigation 5 available, so that you can make notes as you work with the students.

The first brine shrimp should hatch on Day 2 or 3. Have the getters get their trays and bring them to their tables in order to check for changes. Be sure to remind the students to wait until there is no water movement in order to make their observations. After the students have recorded their observations, they can return their trays to the hatchery area.

On Day 4, students will check their cups again. They should judge the success of each cup by the density of the larva: none, some, or most. You may want to place cups on an overhead projector so students can see an example of some and most.

Student: There's a lot of them.

Student: A lot of them hatched.

Narrator: When the students have completed their charts, the teacher collects all of the data on the board.

Teacher: Were there some of these cups that had conditions favorable for brine shrimp hatching? Did some of the cups seem to be favorable for brine shrimp hatching? Amon?

Student: Yeah. The two spoons of salt and the four spoons of salt hatched the most brine shrimp.

Teacher: Were there cups that had conditions that were unfavorable for brine shrimp hatching? Erica?

Student: The zero spoons of salt and the six spoons of salt.

Teacher: Were unfavorable for brine shrimp hatching? So judging from that response, would you say that brine shrimp needs salt in order to hatch? Tatiana?

Student: Yes.

Teacher: So you think that brine shrimp do need salt to hatch. Do you think that brine shrimp can have too much salt?

Student: Yes.

Teacher: Yes. The next question would be that from the data on this chart, could you determine the range of tolerance for the amount of salt that brine shrimp could live in? Charlie?

Student: I would say they would need a little bit of salt but not too much.

Teacher: Okay. Now, remember the word optimum. Can you tell me which cup has the optimum salinity for brine shrimp to hatch in? Jorge?

Student: No. 2 and 4. Some of them hatched the first day and some of them hatched the second day.

Teacher: Which one of those—does one of those two cups seem to be better than the other?

Student: Yeah. No. 2 had the most than No. 4 because it has less salt.

Teacher: Two spoons of salt seems to provide the optimum growing conditions for brine shrimp, right?

Narrator: The most important thing for students to learn in this investigation is that brine shrimp eggs can hatch in a range of salt concentrations. But they hatch best in environments with optimum salt concentration.

Remember to ask the students to add their questions and ideas to the Project Idea Folder.

<Investigation 5, Part 3>

Narrator: In this part, the students are challenged to manipulate the environment in order to get the dormant brine shrimp eggs to hatch. Here is what you'll need for this part: From the kit, you'll need the kosher salt,

transparent tape, the five-milliliter spoons and craft sticks.

From the measurement kit, you'll need the pitchers, the 100-milliliter beakers, hand lenses, and the one-liter containers. You will need to provide two pitchers of conditioned water, the FOSS tray containing the hatchery cups, the Brine Shrimp Hatching student sheet, and the students' aquatic journals.

Duplicate Student Sheet No. 18 called “Response Sheet—Brine Shrimp Hatching,” which you can use for assessment. Have the Assessment Chart for Investigation 5 available, so you can make notes as you work with the students.

To begin this part, ask the students if they think the brine shrimp eggs in the 0 and 6 cups are still viable.

Teacher: Could they still be alive and how could you tell?

Jim? The question is: Are the eggs still alive or are they not alive?

Student: They are not alive.

Teacher: They are not alive.

Student: I disagree. I think they are alive. If you put them in the right kind of water, they'll hatch.

Teacher: So how could you alter this experiment or what could you do to your current experiment to test to see if, indeed, they are still alive? Go ahead, Charlie.

Student: You could put them—you could put the ones in 0 in 2 and the ones in 6 in 4 and see if they hatch.

Teacher: I think that sounds like a reasonable experiment that I think we'll even try.

Narrator: At the end of two days, ask the students to check their cups to see if the brine shrimp eggs have hatched. In this part, it is most important that the students understand that when brine shrimp eggs are taken from salt-free water or very salty water and placed in optimum salt concentration, they will hatch. They are still viable.

This brings us to the end of Investigation 5. Be sure to choose several of

the interdisciplinary extensions and complete the math problem of the week before moving on.

<Investigation 6, Part 1>

Narrator: In the first part of this investigation, the students set up a controlled experiment in order to test the effect that salinity has on four different kinds of plants. Here is what you'll need for Part 1: From the kit, you'll need the half-liter containers, kosher salt and a five-milliliter spoon, the seeds, the FOSS trays with the tray columns, and either the prepared labels or the sticky notes.

From the measurement kit, you'll need the basins, a pitcher of the water, the one-liter containers, the one-liter beaker, the 100-milliliter beakers, and the meter tapes.

You will need to supply potting soil, newspaper, and paper towels. You will need to make copies of Student Sheet No. 9 called "Plant Experiment Setup." Also have Assessment Chart for Investigation 6 ready.

As before, place each type of seed in two labeled cups and place the cups in two distribution centers. Put the soil in two basins. Make four salt water solutions: One liter of water with zero salt, one liter of water with one 5-milliliter spoon of salt. One liter of water with two 5-milliliter spoons of salt and one liter of water with four 5-milliliter spoons of salt, and stir each.

Prepare sticky labels or use the prepared labels. Begin this investigation by telling the students a story.

Teacher: So what he wants to know is if you can take that saline or salty water and just really what kind of an effect it might have on the crops he wants to grow.

Now, we want to do a controlled experiment here. And again, how would you set up an experiment to see if plants could survive in salt water at all? And if they can survive in salt water, just how much salt they could tolerate before they wouldn't grow anymore? Who has got an idea for how we could set up that experiment? Carrie?

Student: Well, we could have two of the same plant with the same amount of dirt. And we could have four cups, one with no salt and then one with a little—with a little salt and one with more and then a lot of salt. And then we could water them at the same time and see which one of the plants will

grow.

Teacher: The only thing we're going to change this time is what, Carrie?

Student: The amount of salt.

Teacher: Okay.

Narrator: The getters get their materials. Each group gets four half-liter containers and the students put one level cup of soil in each container. They label their cups with a sticky that says 0, 1, 2, or 4.

Student: Put peas at the bottom?

Student: Peas at the bottom sound good?

Narrator: The students work together to make maps of where they will plant their seeds.

Student: Peas at the bottom?

Student: Yeah.

Student: And barley on the left?

Student: Barley on the left, does that sound good?

Student: Mmmm. Tastes like peas.

Student: You have yours, Anthony. You have yours...

Narrator: The students add one quarter-cup of soil and tap it down with the cup. The water is in labeled containers. The students use the 100-milliliter beaker to add the amount of water the group has agreed upon. These students are adding 60 milliliters of water. Each student carefully checks the label to be sure they are getting the correct solution.

Student: We should be watering by now.

Narrator: Each group puts their labeled containers on a FOSS tray and stores them on a side of the room. The most important thing for students to take away from this investigation is that organisms have ranges of tolerance for environmental factors. The range of tolerance can be

determined with a controlled experiment.

There are several readings in the FOSS Science Stories about environments. Be sure to check the science story folios, so you'll know the best time to have your students read these selections.

<Investigation 6, Part 2>

Narrator: In this part, the students monitor the growth of their plants. Here is what you'll need for this part: From the kit, you'll need the transparent tape. From the measurement kit, you'll need the 100-milliliter beakers, the meter tapes, and the one-liter beaker.

You will need to provide the FOSS trays with the plants, newspaper, and paper towel. Duplicate Student Sheet No. 10 called "Plant Observations," Student Sheet No. 12 called "Plant Profile" and Student Sheet No. 19 called "Response Sheet—Salt of the Earth." Have Assessment Chart for Investigation 6 available.

Begin this part by handing out the Plant Observations sheet to each student. Have them complete the first part. Remind the students that each one of them will become a plant expert for one type of plant in each of the environments.

Distribute the planters and ask the students to observe and record the changes. They should look something like this.

Repeat this after 9 days and 13 days of planting. At this point, the students should be able to come to some conclusions about the salt tolerance of the plants and the optimum environment for each.

Have the students take apart the planters like this. Turn it on its side and gently dump out the plants. Spread it out on the newspaper and gently tease apart the roots, so that the students can examine them. Each plant expert examines the roots of his or her plant. They make a permanent record by taping the plants to the Plant Profile sheet.

Discuss how the plants from the different environments are similar and how they are different. Conclude this part by having the students write a letter to Farmer Johnson with their recommendations. Then, have the students complete their response sheet Salt of the Earth. They can complete this in class or take it home for homework.

The most important thing for students to learn is that organisms have

ranges of tolerance for environmental factors, including salt. Barley has the highest tolerance for salt. Remember to invite the students to add their project ideas and questions to the Project Folder.

<Investigation 6, Part 3>

Narrator: The last part of the module gives students an opportunity to choose their own investigation. This gives students a chance to follow their own interests and also gives you some insight into how well they have understood the unit on environments. This is the time to bring out the Project Ideas Folder. As much as possible, you want students to use their own ideas and investigate the questions that they have come up with during the module. If you don't have enough ideas in the Project Folder for everyone to investigate, you can use the project ideas sheet to help students think about more investigations.

The project plan sheet should be completed by each student or team of students doing a project. This sheet helps you control materials and keep tabs on what the students are working on. You will also want to make sure that the projects the students propose are realistic and will be of some benefit to the class.

FOSS suggests students give three-minute presentations following the guidelines on the presentation guideline sheets. They can also make a poster to help them explain their investigation to the class. You should plan about two weeks for the students to complete their projects. You can give them time in class and they can also work on their projects at home.

The assessment folio has suggestions for scoring the students' work on the projects. Also in that folio, you will find information and masters for two kinds of summative assessment and end-of-module tests given in a variety of formats and suggestions for assembling portfolios.

This is the end of the Environments module. Keep in mind that there are a lot of details contained in the Teacher's Guide that we weren't able to show you on this video. But most of all, I hope you enjoy bringing life into the classroom as much as I always do.