

EXPLORING CREATION WITH BOTANY

**MANUAL
FOR
CO-OP AND CLASSROOM
INSTRUCTORS**

**BY
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Table of Contents

Teacher's Notes	7
Arrival Activity	7
Show and Tell.....	8
Devotion.....	8
Previous Lesson Review	8
This Week's Lesson	8
Projects and Activities.....	9
Game Acclaim.....	10
Notebooks.....	10
Alert the Parents	10
Field Trip.....	10
Cold Regions	10
Read Alouds	11
Tests.....	11
 Lesson 1	 13
Arrival Activity	13
Class Connection.....	13
Devotion.....	13
Previous Lesson Review	14
Teaching Time.....	14
<i>Botanists</i>	14
<i>Plant Cures</i>	14
<i>Taxonomy</i>	15
<i>Vascular and Nonvascular Plants</i>	15
<i>Seed Homes</i>	15
Game Acclaim.....	15
Notebooks.....	16
Longer Classes	16
Cold Regions	16
Read Alouds	16
Alert the Parents	16
 Lesson 2	 17
Arrival Activity	17
Class Connection.....	17
Devotion.....	17
Previous Lesson Review	17
Teaching Time.....	18
<i>Seed Anatomy</i>	18
<i>Starch</i>	18
<i>Germination</i>	18
<i>Monocots and Dicots</i>	19
<i>Seed Growth Experiment</i>	19
Notebooks.....	19

Read Alouds	20
Alert the Parents	20
Lesson 3	21
Arrival Activity	21
Class Connection	21
Devotion	21
Previous Lesson Review	22
Zing Ding	22
Teaching Time	22
<i>Dissecting a Flower</i>	22
<i>Composite Flowers</i>	23
<i>Carnivorous Plants</i>	23
<i>Make a Model of a Flower</i>	23
<i>Preserve a Flower</i>	23
Notebooks	23
Read Alouds	24
Alert the Parents	24
Flower Diagram	25
Lesson 4	27
Arrival Activity	27
Class Connection	27
Devotion	27
Previous Lesson Review	28
Teaching Time	28
<i>Pollination</i>	28
Zing Ding	29
Game Acclaim	29
Notebooks	29
Read Alouds	30
Alert the Parents	30
Lesson 5	31
Arrival Activity	31
Devotion	31
Class Connection	31
Previous Lesson Review	31
Teaching Time	32
Game Acclaim	32
Zing Ding	33
Notebooks	33
Alert the Parents	33
Lesson 6	35
Arrival Activity	35
Class Connection	35
Devotion	35
Previous Lesson Review	36

Game Acclaim	36
Teaching Time.....	36
<i>Leaf Rubbings</i>	36
Zing Ding	37
Mid-term Project: Field Guides.....	37
Leaf Skeleton.....	37
Notebooks.....	37
Read Alouds	37
Alert the Parents	37
Lesson 7	39
Arrival Activity	39
Class Connection.....	39
Devotion.....	40
Previous Lesson Review	40
Teaching Time.....	40
Zing Ding	42
Notebooks.....	42
Read Alouds	42
Alert the Parents	42
Lesson 8	43
Arrival Activity	43
Class Connection.....	43
Devotion.....	43
Previous Lesson Review	44
Teaching Time.....	44
<i>Woody and Herbaceous Stems</i>	45
<i>Phototropism</i>	45
Zing Ding	45
Notebooks.....	45
Read Alouds	45
Reminders for Parents	46
Lesson 9	47
Arrival Activity	47
Class Connection.....	47
Devotion.....	47
Previous Lesson Review	48
Teaching Time.....	48
<i>What Trees are Good For</i>	48
<i>Oxygen</i>	48
<i>Flowers and Seeds</i>	48
<i>Twigs</i>	48
<i>Trunk Growth</i>	49
Notebooks.....	49
Read Alouds	50
Alert the Parents	50

Lesson 10	51
Arrival Activity	51
Class Connection.....	51
Devotion.....	51
Previous Lesson Review	52
Teaching Time.....	52
<i>Transpiration</i>	52
<i>Compare transpiration</i>	52
<i>Cones</i>	52
<i>Plant a Tree</i>	53
<i>Arbor Day Poster Contest</i>	53
Zing Ding	53
Alert the Parents	54
 Lessons 11 and 12	 55
Arrival Activity	55
Class Connection.....	55
Devotion.....	56
Previous Lesson Review	57
Teaching Time.....	57
<i>Seedless Vascular Plants</i>	57
<i>Fern Spore Study</i>	57
<i>Drawing the Life Cycle of a Fern</i>	57
<i>Make a Fern Terrarium</i>	57
<i>Moss, Liverworts, and Lichen</i>	58
<i>Make a Lichenometer</i>	58
Zing Ding	58
Notebooks.....	58
Read Alouds	58
Alert the Parents	58
 Lesson 13	 59

Teacher's Notes

This teacher's manual supports the *Exploring Creation with Botany* elementary science book authored by Jeannie Fulbright. Please visit <http://www.jeanniefulbright.com> or <http://www.apologia.com> for more information. This manual incorporates teaching, projects, and activities that correspond with the book. The teacher must first read the lesson in the book before implementing the ideas and teaching demonstrations in this manual, as the manual assumes the teacher has an understanding of the content in the lesson. The manual serves as a road map for the teacher to teach, but does not often repeat the material from the book.

There are thirteen lessons in the book, but only twelve lessons in this co-op manual; Lessons 10 and 11 are combined as one lesson. Lesson 12 is a field trip that can be scheduled at any time during the course.

Each student's parent is responsible for making sure the student has covered the material in the lesson before coming to class, *except for Lesson 3, which will be taught in class. The parent will not need to do any of the projects with the student except the seed dissection that occurs during the middle of Lesson 2. The flower dissection in Lesson 3 is so vital to the lesson that Lesson 3 will be taught completely in the Week 3 co-op class without the need for the parent to cover it beforehand.* The co-op class serves as a time to review the lesson with the students and reinforce the lessons with hands-on experiments and projects, both those listed in the book and projects exclusive to this manual. This manual includes many ideas, resources and activities that can be incorporated into your class time. However, if your class time is short, you will need to choose which segments you have time to complete. Do not try to cram a great many activities into a short time period. Children will enjoy and retain their learning more if they are not rushed through activities, projects and lessons. Give them time to ask questions, contemplate the material, and engage their minds in the learning process.

Because this manual is simply a guide from which you will choose the activities, projects, and demonstrations that you wish to do in your class, a list of materials is not given for each lesson. You will need to read through the material related to each lesson, choose what you will and will not do, and make your own list of materials and items needed for your class.

Arrival Activity

Each lesson is sequenced for an easy classroom experience, beginning with the **Arrival Activity**, which allows time for everyone to arrive and get settled. This is helpful when you have children who arrive early because their parents are working in the co-op or school. It's always important to have a fun, but not crucial, activity ready for them. The last child that arrives can be given the materials to do it at home or skip it all together.

Show and Tell

After the Arrival Activity, you will gather the students for **Class Connection**. Children will enjoy the class more if they have plenty of opportunities to share a bit of who they are with their classmates, as well as get to know their classmates personally. This is best accomplished using the age-old “show and tell” philosophy. The children will look forward to Class Connection each week as this is their moment to be in the spotlight. Each week, the children will share either an assignment or something science-related: a story, artifact, or experience. Every child should have a chance to share if he wishes, but no child should be required to share by pressure or coercion.

Devotion

After Class Connection, the lead teacher will begin with a **devotion**. The devotion will illustrate a spiritual concept and allow the children time to contemplate, ask questions, and pray. Occasionally there will be a Bible reference and a suggestion for the devotion. Other times, the devotional is scripted for you to memorize, read aloud, or restate in your own words. This devotion is simply a suggestion. If you prefer (or feel led) to share something else, please feel free to do so. End with a prayer dedicating your time together to the Lord.

Previous Lesson Review

After the devotion, a **Review** of the previous lesson will highlight what the children have learned up to this point. Asking key questions and allowing the students to answer them will help jog their memories and further establish their learning. Many times, the students will have taken home an experiment or activity the week before. This is the time to ask questions about their experiences with that activity or experiment. Be certain that you know what the students did the week before so that you can discuss it with them. *If a new teacher is teaching each week, as is sometimes the case with co-ops, please have the teacher look at the previous week’s lesson.*

This Week’s Lesson

Zing Ding

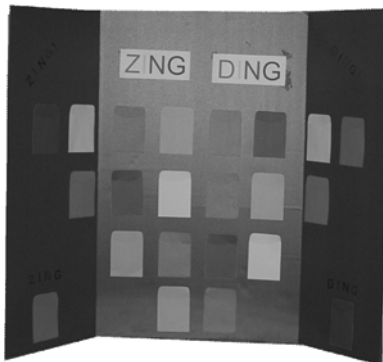


Photo by Jeannie K.
Fulbright

The students will be reading the lessons at home with their parents; you will review what they learned when they come to class. To make this a fun and exciting time, a game of **Zing Ding** will be used each week to review the materials. This game uses a tri-fold board covered with colorful envelope cards or index cards that create pockets all over the board. The colors should correspond to M&M colors. Place review questions from the lesson in each pocket. You can use the questions in the “What Do You Remember” section to help

you come up with review questions. You can also use the bold-faced words in the lesson to help you come up with your own questions.

A bowl of M&M's are used to heighten the interest in the game. The students are asked to come up and choose an M&M. The color the student chooses indicates the color pocket from which you will pull a question. The student will then eat his M&M while you pull out the question. After you read the question aloud, the student will then answer the question if he can. If he gets it right, you say "Zing!" and give him another M&M. If the student cannot answer the question, ask the other students to raise their hands to answer. Try to give each student an opportunity to pull a question. Note the students that do not know any of the answers. They probably did not read the assignment. If most of the class did not read the assignment, you may have to spend more time teaching the concepts than playing games or doing notebook pages. You may need to further encourage the parents to complete the reading with their students.

Sometimes Zing Ding is listed at the beginning of class, and other times it is listed near the end. You can choose if and when you will play the game with your students. You can alter the game to suite your preferences. You can use True/False questions or even photos that the children should identify. You can add bonus questions or surprise "freebie" questions.

You can also do a separate Zing Ding game for each teaching segment. For example, in Lesson Five, the students learn about the different methods for seed dispersal, as well as the different animals that disperse seeds. You can have a game of Zing Ding for seed dispersal questions and later have a game of Zing Ding asking questions about the different animals that disperse seeds. You will need to determine how much class time you have to do this.

Projects and Activities **"Digging In" and "Demonstrate"**

In the manual, the hands-on activities are labeled **Digging In**. Occasionally there will be a teacher demonstration labeled **Demonstrate**. As the teacher, you will have to decide how many of the activities your class should do. This will depend on class size, the amount of time you have to teach, and the age of your students. This manual is geared towards the mid-elementary students – third and fourth graders. If your students are older or younger, you will need to adjust the activities accordingly. If you are teaching younger students, keep in mind that they have short attention spans; they will need you to reinforce every concept with games, questions, activities and – if possible – a trek outdoors.

After reading through the lesson and deciding which activities you will want to do with your students, write down the supplies you will need. At the beginning of each lesson is a section where you can write down what you will need for each lesson.

Game Acclaim

Sometimes there will be a game found under the heading **Game Acclaim**. You are encouraged to add other games as well. You can make up your own games by creating a Botany version of Bingo, Concentration, Old Maid, or any other common game. For example, to help the children remember the different names of seeds, you can create concentration cards on index cards with the different seeds put into pairs. You could create a game of Bingo with different flowers, seeds, and animals that disperse seeds all over each game card.

Notebooks

Each student is expected to complete a notebook for this course. To that end, each student will need a binder and page protectors in which to place his completed notebook pages. Students are encouraged to be creative with their notebooks, using their own ideas to design each page. If a student needs a bit more structure, however, he can download notebook page templates from the Apologia website, <http://www.apologia.com>. He can use these notebook templates to complete the notebook assignment either during class time or at home.

Alert the Parents

If the parents need to know anything in particular before they return the following week, or before they begin reading the next lesson, this will be noted in the **Alert the Parents** segment at the end of each lesson. For example, the students will need to collect different kinds of leaves in a bag and bring them to class for Lesson 6. You can either tell the parents as they pick up the students, send out a reminder email, or send a note home with the students.

Field Trip

The last lesson in the book, Lesson 13, teaches the students how to keep a nature notebook (also called a nature journal). This lesson will be best taught as a field trip where the students can actually experience nature journaling. You will want to plan a field trip to a place that has abundant plants and nature. A botanical garden, state garden, or nature preserve would be a great choice. You can plan this field trip any time during the course, simply alert the parents to cover the last lesson before the field trip. If you live in a cold region, plan your field trip while plants are in bloom.

Cold Regions

If you live in a cold climate and are beginning this book in the late summer/early fall, you will want to change the lessons around to insure maximum usage of decent outdoor weather. Lesson 6, the lesson on leaves, is an important lesson to do early in the season. Additionally, if your plan to complete the course in one semester, you will be finishing the book in the dead of winter, thus, you

will want to place Lessons 11 and 12 (which are combined as Lesson Eleven in this manual) at the beginning. A nice schedule for cold climate is as follows:

For cold region co-ops using the book over an entire year: Do Lesson 1, 6, then 2 – 13

For cold region co-ops using the book over one semester: Do Lesson 1, 11-12, 6, 13, then 2 – 10

Read Alouds

Occasionally books that you can read in class will be mentioned under **Read Alouds**. These books are usually short and highlight some aspect of that week's lesson.

Tests

There are no tests available for this course, as we consider the student's notebook to be the best evaluation tool. However, if you wish to create tests for your class, you can do so by creating True/False and multiple-choice questions from the "What Do You Remember" section of each lesson.

(This Page Is Intentionally Left Blank)

Lesson 1

What is Botany?

What I will need for this lesson: _____

Arrival Activity

The children should decorate the first page of their botany notebooks during this time. Remember that they can use blank paper if they want to be creative, or they can use a template downloaded from <http://www.apologia.com>. Provide plenty of colored pencils for this activity. This is also a good time to explain notebooks and page protectors and demonstrate how to insert pages into the notebook. Tell the students that if they learn anything about botany during the week, they should include a picture and description of it in their notebooks.

Class Connection

Gather the children into a circle, if possible. Begin Class Connection by asking the students to go around the room and introduce themselves. Explain the Class Connection concept to the students. Encourage them to bring items to class to share with one another in “show and tell” style. They can bring anything scientific: snake skins, bug collections, strange items they have found outdoors, etc. They can also share experiences they have had with experiments or science videos they have seen.

Devotion

*Where do you find the roots of most plants? (Answer should be: **In the dirt**). Although plants live in dirt, most of us prefer not to have dirt on us. Why do you think that is? Have any of you ever been dirty? Who in here has ever been completely covered with mud? Well, even if you’ve never been that dirty, each day you get a little dust and dirt on you by walking around outside. What do we do when we get dirty?*

Where Jesus lived, the ground was covered with dry dirt that really kicked up a lot of dust as a

person walked. Everyone wore sandals everywhere they went because the weather was always very hot. There were no cars, and not many people rode horses, so everyone walked everywhere they went. Can you imagine what their feet looked like? Well, let me read you a story. Read John 13 concerning Jesus' washing the disciples' feet. Discuss how this is a picture of how we should treat others. Ask for examples of what we can do today to "wash one another's feet."

Previous Lesson Review

Because this is the first lesson, you will not do a review today.

Teaching Time

Play Zing Ding with your students, then teach the segments below using activities and demonstrations.

Botanists

Review the job of a botanist.

Discuss the logic behind: *Not all biologists are botanists, but all botanists are biologists.* Explore this logic presentation with other fields of science.

Discuss how God made plants to help heal and cure us. Research plants that have curative properties, such as aloe vera, and share them with the class. Bring seeds or herbs known for healing properties.

Digging In

Give each child a piece of an aloe vera leaf and a plastic knife. Have each student cut the leaf open and explore the gel within it.

Plant Cures

Discuss how plants have been used to heal, but scientists now isolate the exact molecules or chemical combinations within the plant that causes the cure. Scientists can then make a pill or formula out of just that chemical or combination.

Demonstrate

Present a jar with a bunch of different colored Legos in it. Tell them to imagine these Legos represent all the molecules and chemicals inside a plant. Then, tell them to imagine that scientists determined that the red ones have the ability to stop the growth of tumors. Now, they must find out how to get just the red ones out. Suggest that they might grow up to be the botanist that finds the cure for cancer, and how to extract the cure from the plant.

Taxonomy **Digging In**

Bring a box of buttons to class and have the children work together to sort them into kingdoms, phyla, and classes.

Have the children make up mnemonic phrases to remember the order Kingdom, Phylum, Class, Order, Family, Genus and Species. A common one is: **Kings Play Chess On Fine Glass Sets**

Vascular and Nonvascular Plants

Remind the children that we have veins, which is something we have in common with leaves. Discuss the fact that the same Designer that designed us used many of the same basic principles to create all things. Make sure you point out that we are much more complicated than a leaf, and God created us in His image. He did not create plants or animals in His image.

Digging In

Give the children magnifying glasses to study the vein structure of leaves that you have brought to class.

Bring some living moss into class and have the children take turns looking at it under a powerful magnifying glass. Discuss its properties. It would be ideal if the moss had stalks on it, because then you could discuss that the ball at the end is the storage container for the spores.

Give each child a tiny cup with an inch of water and a paper towel to do the exercise found on page 10.

Seed Homes **Demonstrate**

Show the children an apple and a dandelion tuft (choose other seed laden vessels if you wish). Ask the kids how they are alike. (**Answer:** They are both containers for seeds).

Game Acclaim

Give each child one or more cut-out images of flowers, trees, fruits, pine trees, pine cones, ferns, moss, and lichen. Put up four big poster boards labeled “Angiosperms,” “Gymnosperms,” “Seedless Vascular Plants,” and “Nonvascular Plants.” After discussing the different properties of each kind of plant, ask the children to raise their hand if they believe they have an angiosperm plant.

When you call on each child, have the child tell the class why she thinks it is an angiosperm. If the child is correct, she should come up and tape her image to the board. Offer her a piece of tape as she comes up. Do this with each of the four kinds of plants. *If a child doesn't know what she has – ask that particular child questions about the plant to get the child to recognize it.* You can also do this by asking the children to come up one at a time and telling which kind of plants they have.

Digging In

Have each student build her own light hut to take home. Provide her with peat pellets, seeds, and Dixie cups to grow plants. It might be wise to do this activity at home first so that you can show them a model of each segment. This will also enable you to determine how much time it will take.

Encourage students to water their seeds each day or cover them with a clear plastic bag and a rubber band to keep the moisture inside the container so the seeds will sprout. Remind them to transplant their seedlings into a potted container with soil when the seedlings get too big for a Dixie cup.

Notebooks

If you have time, allow the students to illustrate and record information for their notebooks. If you didn't get a chance to do it in the arrival activity, this is a good time to explain notebooks and page protectors and demonstrate how to insert pages into the notebook. Tell the students that if they learn anything about botany during the week, they should include a picture and description of it in their notebooks.

Longer Classes

Bring dried herbs, a miniature microwave and soap making supplies to make soap at the end of class.

Cold Regions

If you are in a cold region and plan to jump ahead to Lesson 6, please have the student bring a collection of leaves to class for the next class period.

Read Alouds

One Bean by Anne Rockwell – A short and sweet book that explains what will happen to their planted seeds.

Alert the Parents

Tell the parents that they will need to dissect the bean and corn seeds during the reading of Lesson 2. Remind them to soak the bean seeds before they sit down to read the lesson with their children. Tell them you will do the “germination animation” in class.