Natural science in our school environment: being five and being a scientist

Danielle L'Heureaux

Bank Street College of Education

Follow this and additional works at: http://educate.bankstreet.edu/independent-studies

Part of the Curriculum and Instruction Commons, Elementary Education Commons, and the Science and Mathematics Education Commons

Recommended Citation


This Thesis is brought to you for free and open access by Educate. It has been accepted for inclusion in Graduate Student Independent Studies by an authorized administrator of Educate. For more information, please contact kfreda@bankstreet.edu.
Natural Science in our School Environment

Being Five and Being a Scientist

By

Danielle L’Heureux

Mentor:

Jenny Ingber

Submitted in partial fulfillment of the requirements of the degree of Master of Education Bank Street College of Education 2013
Abstract

This independent master’s project is a proposal of an integrated science curriculum for five and six year olds. I taught this curriculum to my Kindergarten class as I worked on my IMP, and the seed idea to explore our school’s natural environment evolved into the activities included in this curriculum. I cultivated the progressive theories of John Dewey and Lucy Sprague Mitchell, by allowing the students’ interests help guide the direction of our natural sciences study, and delving into our explorations within our very own school environment. As you read the curriculum in its four-units (Natural/Manmade, Living/Non-living: Animals, Living/Non-living: Plants, and Change), an important piece is labeled “In My Classroom,” which describes the learning that both my students and I had this year.

Danielle L’Heureux
Table of Contents

Introduction ........................................................................................................... 5
What is a Science Curriculum for Five and Six Year Olds? ...................... 6
Science as Core Curriculum and Interdisciplinary Work ......................... 8
Inspiration for “Being Five and Being a Scientist” ................................. 8
Teaching Style ................................................................................................... 10
How to Read ....................................................................................................... 11
Science as Foundation Curriculum .............................................................. 12

Being Five and Being a Scientist: Goals ...................................................... 15

Unit 1: Natural / Manmade ........................................................................... 17
Lesson Plan #1: What is Science? .............................................................. 20
Lesson Plan #2: “Found Objects”: Natural and Manmade ...................... 23
Lesson Plan #3A: Name it! Sorting Game ............................................... 28
Lesson Plan #3B: Nature Walk One: .......................................................... 32

Unit 2: Living / Non-living: Animals ............................................................ 38
Lesson Plan #1A: Living / Non-living .......................................................... 42
Lesson Plan #1B: Gummy and Wiggly Worms .......................................... 50
Lesson Plan #2: What Animals Need! ....................................................... 53

Unit 3: Living / Nonliving: Plants ................................................................. 74
Lesson Plan #1: Sorting Seeds .................................................................. 79
Lesson Plan #2: What Plants Need! ........................................................... 83
Lesson Plan #3A: Five Senses: “Using Your Ears” ..................................... 86
Lesson Plan #3B: Five Senses: “Mystery Boxes” ....................................... 90
Lesson Plan #4: Nature Walk Three: Learning Garden ............................ 95

Unit 3: Change ............................................................................................... 107
Lesson Plan #1: We all Change! ................................................................. 110
Lesson Plan #2: Nature Walk Four: Our Classroom Tree ..................... 116
Lesson Plan #3: Trees are Living! ............................................................... 129
Lesson Plan #4: LeafSnap application ...................................................... 133

Being Five and Being a Scientist: Findings .............................................. 138
Student work: Classroom Science books .............................................. 139
Science vocabulary for word wall ............................................................. 144

Works Cited ................................................................................................... 145
Appendices .................................................................................................................. 146
Appendix A – Letter to Families............................................................................... 147
Appendix B – Constructing word walls ................................................................. 148
Introduction

Progressive Curriculum

In studying Lucy Sprague Mitchell, founder of Bank Street College, and John Dewey, my understanding is that a progressive curriculum is a child-centered curriculum, where a teachers’ awareness of children’s interests motivate the learning experiences. A defined theme – such as “trees in our playground” or “holiday traditions in our classroom” – can be used to create a science or social studies curriculum that integrates many other academic areas. In the curriculum “Natural Science in our School Environment: Being Five and Being a Scientist” the themes of nature, living and nonliving, trees, and water within a school’s property are the framework to arouse student interest, and can lead to many different learning experiences. If you use this curriculum, please read it with the spirit of flexibility and tailor what works best in your school setting, with your students, and for you as a teacher!

Both Lucy Sprague Mitchell, founder of Bank Street College, and John Dewey, founder of the Laboratory School at the University of Chicago, set forth progressive ideas integrating the whole child, stage development, cognitive and social learning experiences, and individual learning styles. John Dewey believed that children’s own interests motivates their learning and are the starting point for all education and curriculum (Mooney, 2000). Lucy Sprague Mitchell (1934) describes how young children explore their environment at different stages, and how class trips that explore the environment lead to growth in relationship-thinking. Mitchell (1934) explains that when children take trips exploring the immediate environment and return to classrooms equipped with
materials, that a type of play develops which reveals relationship thinking about the world around them. In developing this curriculum, I drew upon these progressive notions to create hands-on learning experiences; meaningful connections between activities (Dewey), as seen in the study of natural science within a school’s environment; learning about world around them to explore and acquire knowledge (Mitchell), and play – discovery and exploration in nature and through classroom learning activities such as art and writing. I strove to observe my students and learn from them the next natural step in our study of natural science.

**What is a Science Curriculum for Five and Six Year Olds?**

The topic of the following curriculum, which I taught in my kindergarten classroom from September through December, is “Natural Sciences in our School Environment.” It is a hands-on learning experience. Much of the learning happens in an outdoor setting, which is then brought back into the classroom for further exploration. By engaging in the four units (Natural/Manmade, Living/Nonliving: Animals, Living/Nonliving: Plants, and Change), students construct their own knowledge about nature, about living and non-living things, and about how living things change over time.

The teacher’s role in this curriculum is to guide students in their knowledge construction while acknowledging that they may not find answers to all of the students’ questions. For example, with an unpredictable outdoor learning environment, some of the questions that students ask about the natural environment may not be easy to answer. The teacher can respond with “That’s a great question. I want to learn more about it and let you know.”
OK?” This kind of response models teachers as learners, and actually encourages students to take risks themselves in the learning community (Harlen, 1989).

In Wynne Harlen’s (1989) inquiry-based approach to teaching elementary science, she defines science as “…[involving] children finding out something through their own actions and making some sense of the result through their own thinking (Harlen, 1989, p. 5).” Her book Primary Science: Taking the Plunge lays out how to develop science work in elementary classrooms and describes teaching methods to support inquiry-learning (Harlen, 1989). The teacher is encouraged to stretch him/herself to move beyond the idea of “right” and “wrong” in science teaching. All of the classroom discussions encourage all students to share their ideas in a supportive and trusting classroom environment. Questions like, “What did you see? Hear? Touch? Smell? and Taste?” are open-ended and provide an entry point for all learners. I have included suggestions for guiding questions for teachers to use throughout the curriculum. Many of the activities are repeated over different seasons, like visiting a tree or body of water, and then spiraling and building upon the science themes such as “living and nonliving.” The repetition and review of these ideas over time deepened student understanding, based upon classroom observations and written work as assessment.

The concepts for science learning goals have been taken from the Next Generation Science Standards (NGSS) (Achieve, 2013); however, this curriculum was being developed while the NGSS were in draft form, so the learning goals are not exactly the same as those defined in the standards. Overall science learning goals, and more topical learning goals for this curriculum are listed on pages 13 and 14.
Science as Core Curriculum and Interdisciplinary Work

My professors and colleagues at Bank Street have taught me how to make science a significant piece of the core curriculum, in which learning in other areas -- reading and writing, math, arts, and social skills -- can organically extend. I can almost hear your question, because the same question enters my mind too. Where is there time in the curriculum to do these nature walks and science learning? The nature walks are at the heart of the following curriculum -- each unit has at least one nature walk that informs all of the classroom learning and activities. Nature walks can be a great way to inspire kids to write about their experiences and practice math skills like sorting, patterns, and measurement. Throughout the curriculum I weave in examples of how to include writing, math, and social studies skills into the science learning experiences. I have also included questions and ideas for scaffolding learning in your classroom, by extending various activities and by creating a collective share after all learning experiences. Additionally, I have included a section “In My Classroom” after each lesson, so you can see my students’ work and the wonderful results!

Inspiration for “Being Five and Being a Scientist”

Part of my inspiration for creating this curriculum is a personal one – halfway through my graduate studies at Bank Street, my family moved out of the city to northern NJ and I became more aware of the natural environment as a resource for kids learning about science. Another influence was Last Child in the Woods: Saving our Children from Nature-Deficit Disorder (Louv, 2006), which I read when my son was two years old. Author Richard Louv (2006) coined the term “nature deficit disorder,” linking it to the
rise of childhood obesity, attention-disorders, and depression. He advocates that children need more direct contact with the outdoors, for their physical and emotional health (Louv, 2006). It made me think about the importance of interacting with the natural environment, whether an urban, suburban environment.

Next, a course I took at Bank Street - “Science for Teachers” - lifted a veil around a concept I had that nature could only be enjoyed outside of the city. In fact, for one exercise in the course, our professor asked a group of graduate students to begin listing animals that live in New York City. Our list included: pigeons, rats, squirrels, chipmunks, cockroaches, seagulls, mice, raccoons, dogs, ducks, turtles, geese, cats, skunks, horses, peacocks, chickens, fish, and swans. What an acknowledgement and validation of the diversity of living things in the heart of one of the world’s largest cities! I sincerely think that this curriculum is accessible to teachers working both in urban and suburban areas. I was teaching in northern NJ when I created this curriculum, at an independent school with a large campus for exploring the natural environment, but I designed it to be used in both a suburban and urban settings. My colleagues in New York City have taught me about the vast natural resources available to teach this curriculum in city schools – Riverside Park, Central Park, and in a most general sense, the nature walks and activities in this curriculum can be done finding one tree or puddle of water, and exploring the life in these.

As a teacher, I love to learn with the students and believe that our relationships in the classroom are an important foundation for learning to happen. I strive to teach at the edge
of my comfort zone, allowing for student questions and uncertainty to exist, without always knowing as the teacher. Over the course of teaching the following curriculum, the students, my mentor teacher, and I learned together as we observed nature – and we enjoyed being scientists together in our school’s natural environment! Our class spent much time together sharing our observations in order to build not only individual, but also a collective development of our ideas. This sharing between students happened both during formal and informal learning times in the classroom, and often students gathered at the science table with magnifying glasses, enthusiastically chatting about the materials.

**Teaching Style**

An important part of my persona as a teacher is to maintain a sense of calm, as a model for the children to bring to their day, and create an atmosphere of calmness and awareness in the classroom. In addition to encouraging “big belly breathing” and taking a pause (“pausing for a quiet thinking moment”), one concrete way that I try to create a calm classroom is to speak about the world around us in a detailed manner, raising moment-to-moment awareness. For example, during morning meeting I might mention that I hear some birds outside the window, or hear the heating vent blowing air into our classroom. For this reason, I found it to be quite natural to begin teaching and using the vocabulary of the five senses from the start of the school year. I’ve noticed that young children are especially conscious about any changes in our classroom environment (as well as with their teacher), and so drawing their attention to these kinds of details was effortless. As we delved into our science observations and recordings, I encouraged
students to use their five senses, a set of skills that they had already practiced and built a vocabulary for observing within our classroom.

**How to Read**

My process with this curriculum has been multifold, and will explain why I decided to organize it the way that I did. Most importantly, I wanted to prepare my original curriculum into a format that will help you, the reader, learn from and hopefully use in your own classroom. I began with the development of my ideas about science curriculum as described above, then communicated with my ever-supportive cooperating teacher about the curriculum. As I planned for and executed each learning experience for my students, I wrote about and photo-documented their experiences – my findings were awesome. Like all educators I know, my favorite part of this process quickly became the students’ work and documenting the wonderful learning that they were doing. As planned from the start, I wrote the science curriculum in a format that can be reused by others – naming the four guiding units (Natural/Manmade, Living and Nonliving: Animals, Living and Nonliving: Plants, and Change) and outlining the goals, lessons, preparation and materials for each. Some of the lessons and activities run in parallel so you may want to read through all units beforehand in planning how to organize your teaching/learning experiences.

Each Unit is introduced with **seed questions**, which are intended to help you think about what you want your students to learn from the lessons and activities. Reflecting upon these questions repeatedly throughout the unit may help both you and your students deepen the learning experience. After that I offer the **theme** for each unit and then the
**concepts for activities**, to serve as foundational frames for planning. Many of the **goals** are from the *Next Generation Science Standards* (Achieve, 2013) and name scientific skills for young learners of science. These may be useful for curricular planning with your colleagues, and to explain your curriculum to parents and administrators. Lastly, in the **considerations for learning experiences** section I explain my activity choices based on developmental theory.

Each Lesson is organized using the following outline:

<table>
<thead>
<tr>
<th>I. Intro/setting the environment</th>
<th>Similar to the <strong>seed question</strong>, a specific set of questions that you want students to think about throughout the lesson.</th>
</tr>
</thead>
<tbody>
<tr>
<td>II. Goals and objectives</td>
<td>Similar to the unit <strong>goals</strong>, specific scientific skills for young learners in the lesson,</td>
</tr>
<tr>
<td>III. Prep and Materials</td>
<td>List of materials you will need to teach the lesson, including books, as well as pre-teaching activities and cross-curriculum concepts.</td>
</tr>
<tr>
<td>IV. Procedure</td>
<td>Step by step teaching instructions for the lesson.</td>
</tr>
<tr>
<td>V. In my classroom</td>
<td>In this section, I share the work that my students did. Their enthusiasm, creativity, and both written and artwork tell an important parallel story about the learner next to my story as a teacher, and validates my belief that students love to learn science through their own natural environment.</td>
</tr>
</tbody>
</table>

**Science as Foundation Curriculum**

The heart of this curriculum is a hands-on study of the natural world, and the students’ learning experiences in their nearby environment. In Unit 1, the themes of Natural and Manmade are designed and built around a Nature Walk I: Around the School – simply an intentional walk, taking a different route around the school property and surroundings,
searching for “natural” and “manmade” artifacts. In Unit 2, the themes Living and Nonliving: Animals, the learning is designed around a study of water in Nature Walk II: Water, Water Everywhere. In Unit 3, the themes of Living and Nonliving: Plants are explored around multiple visits to a garden during the different months and seasons. In Unit 4, the theme of Change is explored around multiple visits to a designated “classroom tree during the different months and seasons.

Below is an outline of the curriculum. You may notice that each lesson is numbered and may be lettered, as well. The lessons in the curriculum follow an intentional sequence bringing the learners though an authentic series of activities and are shown with the lesson titles as follows.

**Unit 1: Natural / Manmade**

- Overview
- Lesson Plan #1: What is Science?
- Lesson Plan #2: “Found Objects”: Natural and Manmade
- Lesson Plan #3A: Name it! Sorting Game
- Lesson Plan #3B: Nature Walk One: Around the School

**Unit 2: Living / Non-living: Animals**

- Overview
- Lesson Plan #1A: Living / Non-living
- Lesson Plan #1B: Gummy and Wiggly Worms
- Lesson Plan #2 What Animals Need!
Unit 3: Living / Non-living: Plants

- Overview
- Lesson Plan #1: Sorting Seeds
- Lesson Plan #2: What Plants Need!
- Lesson Plan #3A: Five Senses: “Using Your Ears”
- Lesson Plan #3B: Five Senses: “Mystery Boxes”
- Lesson Plan #4: Nature Walk Three: Learning Garden

Unit 4: Change

- Overview
- Lesson Plan #1: We All Change!
- Lesson Plan #2: Nature Walk Four: Our Classroom Tree
- Lesson Plan #3: Trees are Living!
- Lesson Plan #4: LeafSnap Application
Being Five and Being a Scientist: Goals

Overall Science Goals

During the Kindergarten year, Next Generation Science Standards (Achieve, 2013) expectations are for students to begin to build their scientific skill set, by learning science practices including:

- Asking questions and defining problems that can be tested and/or observed.¹
- Make direct or indirect observations and/or measurements to collect data and to make comparisons.²
- Using and sharing pictures, drawings, or writings about observations.³
- Communicating obtained information to share and collaborate with peers.⁴

Topical Science goals

In addition to the above goals, Kindergarten students can begin to explore patterns in the natural and manmade world in order to provide a structure for organizing scientific information.

- Cause and effect and what might cause the patterns that they observe in the weather and natural environment.⁵
- The needs of plants and animals and different places where plants and animals live.⁶

¹,²,³,⁴,⁵,⁶ These science skills and practices are connected to those standards described in the Next Generation Science Standards (Achieve, 2013).
• Living things need water, air, and resources from the land, and they try to live in places that have the things that they need.\textsuperscript{7}

• Events have causes that generate observable patterns.\textsuperscript{8}

\textsuperscript{7,8}These science “story lines” are derived from the \textit{Next Generation Science Standards} (Achieve, 2013).
Unit 1: Natural / Manmade
Unit 1: Natural / Manmade

Seed question

The seed question that students will explore in this unit is: *What in our environment is natural and what is manmade?* The context will be the classroom, school playground, and any other nearby outdoor environment so that students can link these concepts to their own world.

Themes

- Being Five and Being a Scientist
- Natural and Manmade

Concepts for activities

- “What is a scientist?” and “How will we be scientists in Kindergarten?”
- Science Table representing natural and manmade objects
- Natural / Manmade slideshow
- Nature Walk I: Around the School
- Sorting (pre-classification)

Goals

Students will:

- Demonstrate an understanding that science is about asking questions and defining problems that can be tested and/or observed.
- Ask questions based on observations of the natural and/or designed world.¹⁰

---

¹⁰ These science skills and practices are connected to those standards described in the *Next Generation Science Standards* (Achieve, 2013).
• Observe patterns in the natural and human designed world to describe phenomena, and to use as evidence.¹⁰

Considerations for Natural / Manmade Learning Experiences

Piagetian theory asserts that we learn by building from simple to complex ideas, and that is how the child is able to construct meaning (Mooney, 2000). I purposefully began this science curriculum with a relatively simple concept – to identify different objects as either “natural” or “manmade.” Early on in our class discussion, I introduce the vocabulary “manmade” as another way to describe something that is not part of nature (Lesson #3: Found Objects). In subsequent weeks the terms “living” and “non living” are introduced as a more complex way to talk about “natural” and “manmade.”

All of my students were able to grasp the difference between natural and manmade when we looked at familiar objects in the slideshow (Lesson #2: Found Objects), and when we took a nature walk in small groups (Lesson #3B: Nature Walk I). I feel confident that this is a solid building block for further science exploration together, because the children’s learning experiences grew from the school environment where they work and play. The task of recognizing natural and manmade objects was achievable for all, led to deeper thinking and questions for some, and overall began our creation of a positive learning community.
Lesson Plan #1: What is Science?

I. Introductory lesson / Setting the Environment

In this lesson, students will think about the question, *What is a scientist?*

II. Goals and Objectives

Students will demonstrate an understanding that science is about asking questions and defining problems that can be tested and/or observed.

III. Preparation and Materials

**Before the lesson**

- A week before the activity, ask students to bring in a plant (or seeds and a pot) to care for throughout the school year. Allow each student to choose where to place the plant in the classroom, and ask him or her what he or she will need to do to care for the plant.

**Teacher preparation/Materials for the lesson**

- The teacher should read materials about doing science with young children, such as *The Young Child As Scientist: A Constructivist Approach to Early Childhood Education* by Christine Chaille (2002) and *Developing Science in the Primary Classroom* by Wynne Harlen (1990). These authors approach science for young children as experiential learning, where children are invited to ask questions, build theories about what they observe, and solve problems.
- Chart paper and markers.
IV. Procedures

1. The teacher will ask students to think about What is a Scientist? and probe student thinking by asking if they know anyone who is a scientist, or if they have ever done science themselves.

2. The teacher will ask students to remember bringing their plants into the classroom and deciding where to place it and how to care for it. Some questions could be: What made you think to place your plant near a window? and Why do you touch the soil before watering your plant?

3. The teacher will read the book From Seed to Plant by Gail Gibbons, highlighting that plants need water and sun to grow.

4. The teacher will revisit the question “What is a Scientist?” and write down students’ questions and comments on chart paper.

5. Next the teacher will explain his/her teaching goals for Kindergarten Scientists on the chart paper. In Kindergarten, all students will practice being scientists often. Teacher will state: a) all scientists ask lots of questions (and don’t always know the answers), and that they have to look for the answers; b) that scientists think about questions and answers by practicing observations and by using their senses to get information (i.e. using our eyes to see things, our ears to hear things).

V. In My Classroom

When I asked the students What is a Scientist? some of their responses were, “they mix potions,” “they mix things in bottles and create things,” and “they dig up things and find bones.” I then asked the children if they knew anyone who was a scientist. One girl
answered that her mom was a “kids’ doctor and does science.” I said, “Hmm, it is interesting to think about people we know who are scientists for their jobs.” One student was certain that all scientists wore white lab coats. I explained that some scientists do wear lab coats, especially if they work in a lab and need to protect their clothing, kind of like a smock when we paint. I intentionally asked questions to provoke the children’s curiosity beyond our time together in the classroom, which allows for them to construct their own knowledge.

The students were delighted when I told them that we would all be scientist in Kindergarten – and that we had begun already by thinking about how to care for our class plants. I also emphasized, as I will continue to throughout the curriculum, that scientists **ask questions** and try to find the answers.
Lesson Plan #2: “Found Objects”: Natural and Manmade

I. Introductory lesson / Setting the Environment

In this lesson, students will think about the questions, *What is natural?* and *What is manmade?*

II. Goals and Objectives

Students will:

- Make direct observations to collect data and make comparisons.
- Ask questions based on observations of the natural and/or designed world.\(^\text{11}\)
- Use and share pictures, drawings, or writings about observations.

III. Preparation and Materials

Before the lesson

- Ongoing throughout the unit, set up a science area (with a small table if possible) in the classroom where students can explore objects during free activity time. Equip the table with a basket of relevant science books, magnifying glasses, clipboards with white paper, and a small container of colored pencils.
- Bring in natural objects from outdoors like leaves, pinecones, acorns, and any other seasonal nature and place them in a basket. Invite students to bring objects that they find on the playground back into the classroom to explore.

\(^{11}\) These science skills and practices are connected to those standards described in the *Next Generation Science Standards* (Achieve, 2013).
• Bring in manmade objects like a toothbrush or a tennis ball, and place them on the science table. Perhaps students will ask, “Why is this here?” Use their questions to probe them to think about why they think the manmade objects belong or don’t belong as an introduction to describing and classifying objects. Invite students to bring a manmade object from home to add to the science table.

Teacher preparation/Materials for the lesson

• The teacher should prepare to show the brief YouTube video “Natural Vs. Man Made” on a computer or SMART Board® (http://www.youtube.com/watch?v=h12GOr-YdRg). This one and a half minute video is a medley of different sounds, accompanied with images of where the sounds come from.

• The teacher should distribute one piece of white paper with two lines at the bottom and the sentence prompt, “This is a ____________.” It is natural.” and another piece of white paper with two lines at the bottom and the sentence prompt, “This is a ____________.” It is manmade.”

• The teacher or a selected student can add “natural” and “manmade” vocabulary to the word wall, which is a common feature of most Kindergarten classrooms (see Appendix B).

IV. Procedures
1. The teacher will ask students to think about *What is nature?* and *What is manmade?*

2. The teacher will remind students to think about what they’ve observed at the science table over the past week, bringing both the “nature basket” and the “manmade basket” for students to reference. Teacher will inquire: *How can you describe this ________ object?* and *What did you observe about these different objects to help you know which basket they belonged to?* Different objects may be removed from the baskets to discuss.

3. The teacher will show the YouTube clip (see materials above) about natural and manmade sounds and ask students to think about using different senses to think about what is natural and what is manmade.

4. Then the teacher will ask students to choose one natural and one manmade object from the baskets, and instruct them to write about it. Student instruction can be scaffolded based on their writing experience – either sketching the object and / or writing beginning and ending letter sounds to complete the sentence prompts.

5. After students complete individual work, the teacher will guide a group share, asking students to sit in a circle with their work in front of them and read aloud their sentences to each other.

6. Possible extension: Compile all the pages into a classroom book, titled “Natural and Manmade in Our World.”

V. **In My Classroom**
Throughout this curriculum, I will reference this “science table” as a place where I placed different objects for children to free explore during the first 30 minutes of each day, and where some of the science activities and experiments take place (see an example of a science table in Image 1). The objects on the table are selected to peak children’s natural curiosity, to invite questions, and to allow them to have tactile experiences as science learners – using their five senses to learn.

Students would spend time there alone or with peers, and if a teacher were nearby there were casual conversations about the objects. As more students noticed the natural objects on the table, they began to add things that they had found during recess or at home over the weekend. By collecting nature objects in our classroom for students to touch, look at, and observe, I was intentionally setting an environment in which the children could freely explore natural objects independently or with a friend, and planting seed ideas for our natural / manmade slideshow and discussion (Lesson #3A: Name it! Sorting Game).
Image 1: Science table with bin of science books, magnifying glasses, natural / manmade sorting cards, nature samples, and algae in the windowsill.
Lesson Plan #3A: Name it! Sorting Game

I. Introductory lesson / Setting the Environment

In this lesson, students will think about what is natural and what is manmade in our school environment, and they will practice sorting skills.

II. Goals and Objectives

Students will:

- Make direct observations to collect data and make comparisons.
- Communicate and share ideas about observations.

III. Preparation and Materials

Before the lesson

- At a morning meeting, or some other time prior to the lesson, teacher poses seed questions to prepare for learning activities later that same day:

  - What is natural? What is manmade?
  - What kind of nature have we found outside and collected at the science table?

- The teacher prompts students to close their eyes and visualize being outside at recess. What do they see around them that may be a part of nature and what is not part of nature. Invite students to think about senses that they might use in addition to their eyes to make these observations:

  - Can you think about something in nature that we hear and cannot see (i.e. birds)?
  - Can you think about something in nature that we can smell before we can see it (i.e. flowers)?
Teacher preparation/Materials for the lesson

- Several days prior to this lesson, teacher takes at least twenty photographs at recess. The collection will include both natural and manmade objects from the students’ familiar playground surrounding. Take photos and create a slideshow presentation using PowerPoint presentation software to show on a computer or SMART Board®. Pictures may include students at play, their shows, a teacher’s coffee mug, and playground equipment.

- Chart paper and markers.

- iPads or digital cameras, and give a mini-lesson on how to use these electronics.

IV. Procedures

1. The teacher will revisit the questions from earlier discussion (see Before the Lesson above): What is natural? and What is manmade? and record students’ ideas on chart paper. The teacher will remind students to use their own “nature” and “manmade” collections from the science table as important reference to help answer these questions.

2. The teacher will project the slideshow presentation on a computer or SMART Board® and ask students to respond “nature” or “manmade” for each picture. An American Sign Language sign can be taught for
classroom management of noise, so that all students can participate without loud noise levels.¹²

V. In My Classroom

When I posed the question, *What is nature?* almost all the students contributed ideas, with answers like, “rocks,” “trees,” “squirrels,” “bear,” “raccoons,” “chipmunks,” and “grass.” Students’ responses to the question *What is manmade?* included “tennis ball,” “computer,” “books,” “windows,” “pencils,” and various other objects from our science table and around the classroom. Because of their pre-thinking about these ideas from Lesson #2, students were able to define these terms in a concrete way from their own explorations in our classroom and our playground environments.

As we watched the slideshow together, the students’ responded “nature” or “manmade” with enthusiasm – the pictures were meaningful because they were of themselves at play. Students responded in agreement and with certainty about many of the objects (i.e. a key is manmade, grass is nature). Some of the photos were less clear, for example, a shed that at first glance is manmade, but then one student noticed that it was a wooden shed and that wood is nature. When this deeper thinking happened, I allowed for the uncertainty of not having one correct answer linger in the classroom. I repeated what the student said so that everyone could hear it and think about it, and then said, “Hmm, some things seem to be both natural and manmade.” In an inquiry-based learning environment, the moments when questions are not clearly answered can be ripe learning moments because they

¹² Reference [www.aslpro.com](http://www.aslpro.com) for a dictionary of over 7200 ASL signs, and videos that teach the movements.
require children to think about their own answers and why they believe their answers to be true.

The photographs in Image 2 were taken at recess, and shared in a presentation created with PowerPoint software the following day. Students were asked to identify images as "nature" or "manmade" as a practice in thinking about what nature is, and in sorting into two categories. The simplicity of the task invited all students to participate. As the show progressed, students began to think more deeply about the concept of nature. For example, one on the third image of top row, one student commented, “…the slide is manmade, but our friend is nature because he is alive.”

Image 2: Slideshow presentation of images that are “manmade” or “nature.”
Lesson Plan #3B: Nature Walk One: Around the School

I. Introductory lesson / Setting the Environment

In this lesson, students will explore the natural environment around the school. They will have the opportunity to think about what is natural and what is manmade in their school environment, and to practice sorting skills back in the classroom.

II. Goals and Objectives

Students will:

• Make direct observations to collect data and make comparisons.
• Make direct or indirect observations and/or measurements to collect data, which can be used to make comparisons.\(^\text{13}\)
• Observe patterns in the natural and human designed world to describe phenomena, and to use as evidence.\(^\text{14}\)
• Communicate and share ideas about observations.
• Use technology to document and record their observations.

III. Preparation and Materials

Before the lesson

• The teacher will present his/her own photographs of nature and manmade to the class, and students will have experience sorting objects by these two concepts (this was done in Lesson plan #3A).

\(^{13}\)\(^{14}\) These science skills and practices are connected to those standards described in the Next Generation Science Standards (Achieve, 2013).
• The teacher will choose a route around the school property to explore natural and manmade in their surroundings.

**Teacher preparation/Materials for the lesson:**

• iPads or digital cameras Parent(s) volunteer(s)

• Chart paper and markers

• Students: mud boots, jackets

**IV. Procedures:**

1. The teacher will divide the students into three (or more) smaller groups depending on class size, so that students can work in groups of 5-7 and share an iPad or digital camera. Parent volunteer(s) can be assigned to work with one or two small groups, depending on the class size.

2. The teacher will remind students of school safety rules when working outside of the classroom, like “stay with your group at all times,” and “keep your body within the sidewalk and the row of trees.”

3. The teacher will give students the task to look for things that are natural and manmade on the nature walk, and to use an iPad or digital camera to take a picture of it. Each student will be asked to find at least one of each kind of object.

---

15 Taking a group of five and six-year olds on a nature walk *with* technology requires several adults to run smoothly. If parent volunteers are not available at your school, the teacher could modify the lesson by rotating students who use the technology on different nature walks.
4. Once outside, the teacher will encourage students to be mindful of the nature around them by pointing at examples, such as “Notice the weeds growing out of the cracks in this sidewalk,” and “Look at the tracks in the mud – what kind of animal do you think made those?” The teacher will also point out examples of manmade objects and sounds, such as “Listen. What makes that kind of sound? Where is it coming from?”

5. As a group back in the classroom, the teacher will encourage students to share at least one of their findings with the class and will write all ideas onto chart paper. The teacher will also write down any questions that students have from the nature walk.

6. The teacher can now add the word “observations” to the word wall (see Appendix B).

7. Possible extension: The teacher will print and laminate student photographs from the nature walk. Students can use these cards to practice sorting their own pictures into “natural” and “manmade” piles, developing classification skills (see Image 7).

V. In My Classroom

On the following pages are some samples of the students’ photographs (see Images 3-6), which are evidence of good observation skills during our nature walk. There are photos of objects zoomed in -- the wire of a fence, a hose, a pinecone, animal scat, and blades of grass – and there are photos zoomed out – the field lined with trees, the playground, and our school’s learning garden. When I looked through the photos the children took, I realized that they used these different observation skills of zoomed-in (close-up) and
zoomed out (wider lens). Back in the classroom, we looked at the images together, and I pointed out to them how some of the scientists in our class used “zooming in” to look at things and some of the scientists used “zooming out” to look at things, and that they are both important ways to make observations.

Our first nature walk took place after the “natural / manmade” slideshow. We walked along the tree-lined side of the playground, and students were asked to think about what they saw that we “nature” or “manmade.” Students were placed in small groups with a teacher, and each student had the opportunity to use an iPad to photograph what they saw. Below are four sample photographs from a collection of 54 total! These student photographs were printed and laminated and placed in our science area for further sorting.

**Image 3:** *Student comment:* “Look at the color of this leaf!”

**Image 4:** *Student question:* “Is a shadow part of nature?”
VI: Extension

**Sorting game:** For a pre-classification learning game, I printed and laminated the “natural” and “manmade” photographs that students took on our first nature walk. I brought them into the classroom and explained to students that they can use them to practice sorting them into piles of “natural” and “manmade.” During free activity time in the morning, and during transition times throughout the day, this game was available for children to play alone or with peers. The sorting activity could be extended into further activities such as sorting by animals and plants, or by color, size and shape. Sorting is an
important skill and a foundation for when students learn about more formal scientific classifications.

**Image 7:** A basket of laminated student-taken photographs, which can be sorted by natural and manmade.
Unit 2: Living / Non-living: Animals
Unit 2: Living / Non-living: Animals

Seed questions

The underlying questions that students will explore in this unit are: *What in our natural environment is living and what is non-living?*, *What do all living things have in common?* and *What do living things need in order to survive?* Looking specifically at animals as living things, students will think about *How do animals move?* *What do animals eat? Where do animals live?* and *What is their habitat?* The context will be in the classroom, school playground, and at a body of water (e.g. puddle, pond, stream).

Themes

- Living and Non-living: similarities and differences
- Needs of Animals as Living things
- Water study

Concepts for activities

- Living/ Non-living slideshow
- Gummy and Wiggly worms
- What Living Things Need!
- Nature walk II: Water, Water Everywhere (visit 2-3 times if possible)
- Nature walk II: Art documentation
- Nature walk II: Writing documentation

Goals

Students will:
• Make direct or indirect observations and/or measurements to collect data, which can be used to make comparisons.  

• Use and share pictures, drawings, and/or writings of observations.

Students will demonstrate understanding of the following:

• Animals depend on the resources in the place they live and can change their local environment.

• Animals use their senses and body parts to get what they need; Organisms depend on their surroundings to obtain the materials they need to grow and survive.

• Animals obtain food they need from plants or other animals.

• Water is found in many places and forms on Earth.

Considerations for Living / Non-living: Animals Learning Experiences

Building off the foundation that was built in Unit 1: Natural / Manmade, I wanted to delve into more pattern recognition and classification by exploring the concept of living and non-living. To begin this unit, I used a similar format to the natural / manmade unit by looking at a slideshow of different objects and asking the children to identify them as living or non-living (Lesson #1A: Living / Nonliving). Just several weeks into the school year, I felt that the classroom community was already becoming a “safe” place to learn and share ideas. Several of the activities below include group discussions in which I asked open-ended questions like, “What is the same about all living things?” I continued to write student responses on chart paper or the SMART Board®, and in this unit we began to organize our information using a T graph (Lesson #1B: Gummy and Wiggly

---

16 17 These science skills and practices are connected to those standards described in the Next Generation Science Standards (Achieve, 2013).
Worms!) to name similarities and differences. In this part of the curriculum, I taught about observations and recordings more intentionally, and began to ask students to write and draw some of the different things that they saw on our nature walk. The students continued to use the iPad or digital cameras to document evidence from the nature walk to bring back to the classroom for a second (or third or fourth) look. I printed photographs from our nature walk on display in our classroom, to help guide students to think about their learning experiences outside. I taught about science drawings, and the importance of representing what we see, not necessarily our favorite colors or designs. The setting for the second nature walk was a pond on our school property, but any size body of water could be explored for the study of water, and how it supports living things.
Lesson Plan #1A: Living / Non-living

I. Introductory Lesson / Setting the Environment

In this lesson, students will think about what is living and what is non-living, and what are some of the similarities and differences between them.

II. Goals and Objectives

Students will:

• Make direct observations to collect data and make comparisons.
• Communicate and share ideas about observations.
• Practice sorting similarities and differences using a T-graph.

III. Preparation and Materials

Before the lesson

• The teacher will ask students to look at natural objects on the science table, and think about whether they are living or non-living.

Teacher preparation/Materials for lesson

• Before this lesson, the teacher will create a slideshow using PowerPoint software with about thirty pictures of living and non-living things from the Internet. Pictures may include a puppy, a child, a flower, a lake, a rainbow, a cupcake, and a toy. The selections at the beginning should be easier to recognize as living or non-living, with some more sophisticated thinking required towards the end (i.e. apple seeds, eggs).
• Add “living” and “non-living” vocabulary to the word wall (see Appendix B)
• SMART Board® or computer to project slideshow.
• Chart paper and markers

IV. Procedures:

1. The teacher will write the questions “What is living? and “What is non-living on chart paper and read them aloud to students.

2. The teacher will use the slideshow created with PowerPoint software on a computer or SMART Board® and ask students to respond “living” or “non-living” for each picture. An American Sign Language sign can be taught for classroom management of noise, so that all students can participate without loud noise levels.

3. Halfway through the slideshow, the teacher will stop and ask students to think about how they know whether something is living or non-living. The teacher will ask students to share their ideas about “What is the same about all living things?” and record their answers on chart paper. Emphasize to students to think about these characteristics of living things as the slideshow continues. If there is disagreement about whether something is living or non-living (i.e. egg), invite students to debate with each other.

4. After the slideshow, the teacher will read aloud the student-generated “Characteristics of all living things,” and ask students to identify and circle the ones that were true for all living things viewed in slideshow.
5. The teacher will read the book *What's Alive? (Let's-Read-and-Find-Out Science 1)* by Kathleen Weidner Zoehfeld (1995) to complete the first part this lesson, and keep both picture books available for students to look at during DEAR (Drop Everything and Read) time.

V. In My Classroom:

When I introduced the categories of “living” and “non-living,” we began our class discussion by looking at our collection of nature at the science table, including various non-living objects such as acorns, leaves, and flowers. One student asked, “Are leaves alive? They are part of trees.” I responded, “Hmm, they are alive when they are connected to the tree by a branch, but what about when they fall off?” Another student responded, “They are dead! But in the spring new leaves grow!” I responded with another question, “So will those new leaves be alive?” Several students nodded their heads, “yes!”

One student shared that his family had a dog that died, and now they had a new dog. To explore the definition of living and non-living as scientists, I explained that we would look at pictures of different objects, and I wanted them to think about whether they were “living” or “not living.

As I predicted, it seemed that, intuitively, the students were able to distinguish a doll and rainbow as non-living, and a frog and flower as living. Mid-way through the presentation when I asked the students to think about the question *What are some things that all living things have in common?*, some of their responses were: “they have feet,” “their legs
move,” “their hands move,” “they have faces,” “they eat,” “they grow,” and “they breathe.”

Before we began looking at the second part of the slideshow, I read the student-generated list “what all living things have in common” out loud, and I asked them to think about these ideas as we looked at the photographs. For example, when a photograph of a dog came up, the students said “it’s living!” I asked, “OK, well, does the dog have feet? Do the dog’s legs move? Do their hands move? Do they have faces? Do they eat? Do they grow? Do they breathe?” Asking these questions, based upon the students’ own ideas, generated lively discussion. When we got to the photograph of a sunflower, the students realized that not all living things have feet, legs, hands, or faces. To prompt thinking about the characteristics of all living things, I asked the children to think about whether puppies grow into bigger dogs and if seeds grow into plants. These types of leading questions lead students to identify on their own that all living things move, and all living things grow. I prompted the children to think about why things grow, using kids themselves as an example. What helps all of you to grow? Students responded with answers like, “vegetables!” “fruit,” and “sleep.” I helped to generalize the characteristic and said that all living things need food and water to survive. I referenced our classroom plants (see Unit 1 PAGE #), and asked students what we do to help plants stay alive. They immediately answered, “water,” “sun” and “soil,” and I explained that these are sources of food and water for plants and trees too. I did not get into more details about the different types of nutrients that plants and animals need, but perhaps a first grade class might explore that topic. Our final list to describe living things was: 1. It moves, 2.
It grows, 3. It needs air, and 4. It needs food and water, which I wrote on chart paper. I also added to the chart a fifth distinguishing characteristic that living things need shelter or habitat to survive.

Some of the photographs were more complicated to think about, like flowers and trees (which we see growing, but we cannot see them “breathe” carbon dioxide, or absorb water and nutrients), seeds and eggs (which are sometimes living and become flowers or chicks and are sometimes not living, when we eat sunflower seeds and eggs), and apples (which are living when they are on the tree and non-living when we eat them). These things that are sometimes living and sometimes not-living generated interesting discussion amongst two students. Most children sat quietly and listened to their peers’ comments, like “flowers get water from the dirt” and “eggs are not alive, but then baby chickens are born!” I wanted to allow the two students to share their ideas and I tried to include all students in the learning experience by referencing back to the listed characteristics of all living things on chart paper. I intentionally tried to allow some uncertainty to exist in the classroom, and allowed a tone for our science curriculum where both teachers and students could have a discussion outside of the comfort zone of two definite categories of “living” and “non-living.”

**Living / Non-living: In My Classroom**

Using stock photography images from the Internet, I compiled a second PowerPoint slide show with different images, as you see in Image 8. As a group, we looked at the pictures, and students were asked to identify which were living and which were non-living. Their
answers were intuitive and correct for all of the images. Halfway through the slideshow, I placed a stop sign, at which point we stopped the slide show and brainstormed ideas about what makes something living (see following page).

**Image 8:** Living / Non-living slideshow
Students had lots of ideas about what was the same about all living things and during our brainstorm, we wrote down all of their ideas. As referenced in the section “What is a Science Curriculum for Five and Six Year Olds?” (page 2), creating a safe environment for learning and socializing is a key component in teaching hands-on science. After generating these ideas, the class looked at the rest of the slides, with the instructions to keep these ideas in their mind. We did not cross out any ideas (again, to reinforce that all ideas are valued), but we did circle the ones that were the same for all the living things that we saw – animals, plants, trees – and I added the last point, that all living things need food and water (see Image 9). For some of the ideas, it was easy to see that they did not apply to all living things (e.g. clothes). For others (e.g. all living things need air and water) the teachers explained that we would learn more about those things that cannot easily be seen for plants and trees in particular.
Image 9: Classroom brainstorm of commonalities among living things.
Lesson Plan #1B: Gummy and Wiggly Worms

I. Introductory Lesson / Setting the Environment

In this lesson, students will think about what is living and what is non-living, and what are some of the similarities and differences between them. It is adapted from a lesson in Louisiana’s 2008 Department of Education Science Curriculum.\(^\text{18}\)

II. Goals and Objectives

Students will:

- Make direct observations to collect data and make comparisons.
- Communicate and share ideas about observations.
- Practice sorting similarities and differences using a T-graph.

III. Preparation and Materials

Teacher preparation / Materials for the lesson

- Gummy worms and real worms\(^\text{19}\)
- 4-8 small plastic containers with holes for worms to stay
- Paper and writing pen or pencil
- Chart paper and markers.

IV. Procedures


\(^{19}\) If rain is predicted in the days prior to lesson, students could participate in collecting real worms at recess with shovels and a plastic container. Otherwise, worms are available for purchase at fish and tackle shops.
1. The teacher will break students into small groups of four. Each group will have a plastic container with at least one earthworm in it, and one gummy worm.

2. The teacher will ask students to use their senses to look at, smell, and touch both worms, and draw or write descriptions about each. A prompting question might be: *What color is each worm?* The teacher will observe students at work and sit with one or two groups to guide discussion. After 10 minutes the whole class will gather in a circle, and students will bring their work with them to share.

3. The teacher will make a T graph on chart paper, with the headings “Living” and “Nonliving” for each column. As students share their observations of earthworms and gummy worms, teacher will list their responses (see Figure 1). The teacher will read the final list aloud and hang it in the classroom.

4. The teacher will show pictures and highlight pages from *Earthworms* and *Twist, Wiggle, and Squirm: A Book about Earthworms* and share pages that illustrate how worms burrow and eat bits of dead plants, leaves, and insects. Teacher will also emphasize that worms need moisture, or water, to live.

5. To complete the lesson, the teacher will emphasize that non-living things (in this case, gummy worms) do not need the same things that living things need.
V. Example of Gummy/Wiggly T-Graph

**Figure 1: T-Graph**

**WORMS**

<table>
<thead>
<tr>
<th>Living</th>
<th>Nonliving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can move</td>
<td>Cannot move alone</td>
</tr>
<tr>
<td>Has ridges</td>
<td>Has ridges</td>
</tr>
<tr>
<td>Slimy</td>
<td>Sticky</td>
</tr>
<tr>
<td>Cold</td>
<td>Doesn’t eat or drink</td>
</tr>
<tr>
<td>Needs water</td>
<td>Smells good</td>
</tr>
<tr>
<td>Stinky</td>
<td></td>
</tr>
</tbody>
</table>

---

Lesson Plan #2: What Animals Need!

I. Introductory lesson / Setting the Environment

In this lesson, students will review the characteristics of living things, and they will learn more specifically about an animal of interest.

II. Goals and Objectives

Students will:

- Learn to name animals’ needs for food, shelter, and habitat.
- Practice non-fiction research using online and text resources.
- Communicate and share ideas about observations.

III. Preparation and Materials

Before the lesson:

- The teacher will read non-fiction books about animals to students and create a list of what they’ve learned about each animal afterwards. Since reading non-fiction is part of a Language Arts curriculum, this activity could be done during times designated for Science or Language Arts.
- The teacher will introduce students to online resources about animals, model using them to the students, especially how to find specific information about an animal. Again, this activity could be done during science or times designated for Language Arts or Technology curriculum.
- The teacher will introduce a graphic organizer for collecting animal facts (see Figure 2), and model to students how to use pictures and / or text to complete the graphic organizer.

Teacher preparation / Materials for the lesson:
For one to two weeks before students work independently on researching an animals’ needs, the teacher will read aloud non-fiction books to students about different animals, add non-fiction animal books to the classroom library, and set-up classroom computers and/or iPad for non-fiction online resources about animals.

The teacher will create a larger version of the graphic organizer (see Figure 2) about animal facts to model how to gather and organize information.

Book resources: Each of the following series have many titles about various animals, and are arranged for early readers, including only a small amount of text and many colorful photographs:

- **DK Readers** leveled readers for “beginning readers” about animals
- **Amazing Photos and Fun Facts about Animals in Nature** by Kay de Silva (this is an electronic “Amazing World” series through Amazon)
- **National Geographic** readers for kids about animals

Online resources: These non-fiction websites are suitable for non-readers, including photographs, videos, and text for students working with a teacher.

- **National Geographic for Kids**
-Smithsonian National Zoological Park


Includes text organized by food, habitat, and animal habits, and would be most useful with teacher guidance.

IV. Procedures

1. The teacher will show the class-generated chart paper about living and non-living things, and review the characteristics of living things aloud. S/he may add visual cues to the chart for pre-readers, like some berries next to food, and a stream next to water. The websites listed above have graphics that can be printed and used as visual cues.

2. The teacher will name the lesson, and tell students that they will be learning about animals as living things. The teacher will ask the students to share some animals that they know, and make a list of those animals. Next, the teacher will ask the students to vote about which animal they want to know more about. The top two animals will be explored in animal studies during the next two Language Arts or Science sessions, depending on where the time is available in your classroom schedule. One animal study should be a water animal, as a connection to Lesson #3A: Water, Water Everywhere.

3. For the first animal study, the teacher will read aloud a book and/or share an online resource on a computer or a SMART Board®. The teacher will work with the class to list information on chart paper about the animal and
to organize it using a graphic organizer (see Figure 2). The teacher will ask students to think about these questions:

-We know that living things move and grow. How does this animal move?

-We know that living things need food and water. What does this animal eat, and how does it get the food?

-We know that living things need shelter and a special habitat. Where does this animal live? and Does this animal live with others or alone? and What kind of habitat does this animal need to live?

4. For the second animal study, the teacher will read aloud a book and/or share an online resource on a computer or a SMART Board®. The teacher will work with the class to list information about the animal. This time, the teacher will instruct students to complete the graphic organizer independently or in pairs. The list of information about the animal can have both words and images to help students to use the chart independently. This lesson can be scaffolded for independent readers, who may want to use the books and/or online resources on their own.

5. Add the word habitat to word wall (see Appendix B).
Figure 2: What Animals *Need!* Graphic Organizer

- How does this animal move?
- What does this animal eat, and how does it get the food?
- Animal name and picture here
- Where does this animal live?
Lesson Plan #3: Nature Walk Two: Water, Water, Everywhere

I. Introductory lesson / Setting the Environment

In this lesson, students will collect samples from a pond or another body of water, looking for living organisms, and observations of the findings. They will have the opportunity to draw and write about their learning experiences using the “scientific drawings” and thinking about accurate recordings of what they saw, heard, smelled, and touched.

II. Goals and Objectives

Students will:

- Make direct observations to collect data and make comparisons. Students will visit a pond or another body of water twice, ideally during two different seasons, to compare the measurements and life forms collected.
- Communicate and share ideas about observations.

Students will demonstrate understanding of the following:

- Water is found in many places and in many forms on earth, and provides homes for plants and animals.
- Measurements allow objects to be compared and described (i.e. hotter and colder, bigger and smaller).

---

21 Includes Art Documentation and Writing Documentation extension activities
22 If possible, plan to visit the same body of water so that students can observe how weather and seasons affect one habitat.
23 These science skills and practices are connected to those standards described in the Next Generation Science Standards (Achieve, 2013).
III. Preparation and Materials

Before the lesson:

- The teacher will select a body of water nearby the school property where students can walk to, or arrange a bus ride to transport students to a property with a pond. If there is no nearby pond access, a stream or even a puddle of muddy water has a story to tell about living things.

- The teacher will get books about pond life to add to the classroom library. These can be used to help answer some of the students’ questions about their experiences at the pond. Some suggested titles:
  - *Life in a Pond* (2001) by Janet Halfmann (include experiment to put algae in two containers – one in window, one in dark closet)
  - *Lily Pad Pond* (1989) by Bianca Lavies

Teacher preparation / Materials for the lesson:

- iPads or digital cameras, and give a mini-lesson on how to use these electronics.

- Thermometer

- 1 small kids’ fishing net/small group

- 1 small plastic collection container/small group

- Parent(s) volunteer(s)²⁴

---

²⁴ A nature walk with fishing nets for sampling requires several adults to run smoothly. If parent volunteers are not available at your school, the teacher could modify the lesson by collecting the water samples him/herself.
- Chart paper and markers
- Students: mud boots, jackets

IV. Procedures

1. The teacher will divide the students into three (or more) smaller groups, depending on class size, so that students can work in groups of 5-7 and share a fishing net and collection container. Parent volunteer(s) can be assigned to work with one or two small groups, depending on the class size.

2. The teacher will remind the students that they are scientists on a nature walk, and that all students need to make careful observations and think about any questions that they have.

3. The teacher will remind students of school safety rules when working outside of the classroom, like “stay with your group at all times,” and “keep your body on the grass outside of the pond.”

4. Once at the pond of other body of water, the teacher will intentionally quiet the group for a “two minute” science observation – listening to the sounds around the pond, what they see in and around the pond, and the smells around them.

5. While students remain seated a safe distance from the pond, the teacher and parent volunteer(s) will fill each small plastic container with an inch or two of pond water to hold collections. The teacher will also use a thermometer to measure the temperature of the pond water, and show the
students the evidence on the thermometer. The teacher should tell the class that the word “thermometer” will be added to their word wall.

6. In a safe and organized manner, each student will have the opportunity to use a small fishing net to collect water from the pond. The teacher will model the technique of gently pressing the net against the side or bottom of pond, to stir up living organisms for collection. Once each student has collected some pond life in the net, they will add it to the collection container. Students can look at the collections while waiting for their turn.

7. The teacher will use an iPad or digital camera to record students at work and take some zoomed-in photographs of the collection containers.

8. As a group back in the classroom, the teacher will encourage students to share at least one of their findings with the class and will write all ideas onto chart paper. The teacher will read the list aloud, and ask students to name whether each item is living or non-living. The teacher will also write down any questions that students have from the nature walk.

9. Add the word “thermometer” to the word wall (see Appendix B) since they have experienced how temperature can be measured using a thermometer and it may be a new word to students’ vocabulary.

10. Possible Extensions – Art documentation (these could be done as centers):
    a. The teacher will print “zoomed-in” photographs from the nature walk and ask students to make scientific drawings of what they saw. Students will practice drawing accurate details using accurate colors.
b. The teacher will place small containers of pond water on table with magnifying glasses, and ask students to make scientific drawings of what they see.

c. The teacher will ask students to think about one thing that they saw at the pond, and use felt to depict that thing. Each student piece will be placed into a large box with blue cloth on the bottom, to create a classroom diorama.

11. Possible Extensions – Writing documentation

a. The teacher will give students a writing prompt like, “We went to a pond. We saw ________.” and students will use their writing strategies to complete the sentence. Student work can be compiled into a classroom book, “Our Trip to the Pond: Fall 2013.”

V. In My Classroom

On the next pages are some samples of students at work on our nature walk to the pond (Images 11, 12, 14, and 15). Additionally, there are samples of students’ work back in the classroom, using art and writing documentation to record their experiences from the field (Images 10, 13, and 16-19). Students displayed a high level of enthusiasm with the extensions, and feeling of ownership about their learning.
Living / Non-Living: Animals: Student work

After our first trip to the pond in October, we regrouped in the classroom and shared our experiences. Students were asked to share either an observation of something that they saw, or a question that they had about the pond. Like in all previous group discussions, the teachers validated all the ideas that students shared by writing them down. If something was unclear about a students’ statement, I used gentle, probing questions to help me to understand. Oftentimes other students would speak out and help to clarify another students’ contributions. Given the choice, our students had many more questions about the pond at this point. Below is a list generated by our class in October (Image 10).

Image 10: Classroom brainstorm and questions about what we observed at the pond.
Living / Non-living: In My Classroom

In Image 11, a student is observing pond water during October. He has collected the water himself by using a small net. Each student had the opportunity to collect water. Photographs are taken by the teacher to bring back to the classroom for discussion. Samples of pond water are brought back to classroom for small groups to observe.

Image 11: Student collecting sample of pond water.
At our second visit to the pond in December, here is a student collecting pond water using a small net, with teacher guidance (Image 12).

Image 12: Student using net to collect sample of pond water.
Below is a classroom poster (Image 13), to keep record of the water temperature at each pond visit. Sometimes a student will reference this poster when s/he gives her/his weather report during morning meeting. The teachers have also used the idea of temperature to talk about how to measure information that we observe.

Image 13: Classroom poster

Extensions

These are two photographs taken from our first pond visit in October (Images 14 and 15). Each student collected pond water using a net, and samples were brought back to the classroom for further observation. The teacher used a thermometer to test the water temperature, which we recorded in our classroom. Before the visit, the concept temperature and measuring it were discussed in class. Below pictures were printed in color and hanged in the classroom for a subsequent science drawing activity.
Image 14: Pond water and algae

Image 15: Pond water and algae
In groups of four, students sat at tables with a clear container filled with pond water. There were magnifying glasses available for them to use. Students were instructed to make science drawings of what they saw, specifically to draw in a non-fiction way\textsuperscript{25} and to choose colors that match what they see. They were given a writing prompt, “We went to a pond. We saw ________.,” and they were instructed to use their writing strategies to complete the sentence (See Images 16 and 17). Many students had remembered the green algae from the pond, so the teacher wrote the word “algae” on a sentence strip and included it on the classroom word wall (see Appendix B). Other science words that we have learned continue to be added to the wall to enrich the children’s vocabulary.

\textsuperscript{25} “Non-fiction” is vocabulary that is used in our writing workshop that is familiar to students
Images 16 and 17: Students’ writing work in response to pond visit.
Students were instructed to use watercolors to represent what they observed at the pond. Several photographs from the pond visit were printed as reference material. For all science drawings, or recordings, students were asked to use colors that match what they saw. These two pictures of student work cannot capture the intense and careful manner that each student used in the process (see Images 18 and 19).

**Images 18 and 19**: Students’ art work representing their pond visit.
After our second visit to the pond in December, students used felt to represent something living or non-living that they observed. Each student worked on an individual piece, and placed their object into a large box lined with blue cloth to create a classroom diorama. Students were instructed to be scientists and choose colors that accurately represented what they saw outside (see Images 20-23). They practiced using fine motor skills to cut the felt. Each student used an iPad to photograph their work, and printed pictures were used for their science writing journals (see Images 24-27).

Images 20-23: Students’ felt work for classroom diorama.
"At the pond I see rocks."

"At the pond I see sticks."

"At the pond I see [a] little bug."

"At the pond I see [a] leaf."

Images 24-27: Students’ science journals.
Finished classroom diorama, which is left out in our science area for students to look at and manipulate (Image 28).

Image 28: Classroom diorama of the pond.
Unit 3: Living / Nonliving: Plants
Unit 3: Living / Nonliving: Plants

Seed questions

The underlying questions that students will explore in this unit are: *What are the changes over the lifetime of a plant, What do plants as living things need in order to survive?* and *How are a plants’ needs similar and different from an animals’ needs?*

Students will have the opportunity to observe plant life caring for and watching the potted plants growing in the classroom and possibly to explore other gardens, and to refine the use of their five senses to gather information about plant life.

Themes

- Needs of plants as living things
- Plants and Animals as Living: similarities and differences
- Seed Exploration
- Garden Study

Concepts for activities

- Study of classroom plants (comparing animals and plants as living things)
- Where do these seeds come from, and where are they *growing*?
- Using Our Senses
- Nature Walk III: Garden
- Nature Walk III: Art Documentation
- Nature Walk III: Writing Documentation
Goals

Students will:

- Make direct or indirect observations and/or measurements to collect data, which can be used to make comparisons.\textsuperscript{26}
- Use and share pictures, drawings, and/or writings of observations.\textsuperscript{27}

Students will demonstrate understanding of the following:

- Plants need water and light, and different plants survive better in different settings due to their varied needs.

**Considerations for Living / Nonliving: Plants unit**

After our unit focusing on Animals as Living things, we move into a study of Plants as Living things. The first task stated in Unit 1 is for students to bring a plant into the classroom to care for throughout the school year. Up to now in the curriculum, students have been touching the soil daily to determine if it is wet or dry, and deciding whether to give the plant more water. Discussing these plants became the starting point for thinking about the needs of plants as living things, and allowed us to compare animals and plants as living things (Lesson #2: What Plants Need!). As we looked at different kinds of seeds, students had the opportunity to describe how the seeds looked, and make predictions about how the seeds would grow (Lesson #1: Sorting Seeds).

\textsuperscript{26} \textsuperscript{24} These science skills and practices are connected to those standards described in the *Next Generation Science Standards* (Achieve, 2013).
One of the skills goals for this curriculum is for students to practice making oral, written, and pictorial observations about the world around them. As I thought about how to build five and six-year olds’ observation skills, I decided to include a variety of fun, hands-on activities using their senses (Lessons #3A: Five Senses: Using Your Ears and #3B: Five Senses: Mystery Boxes). To begin these activities, I asked students to think about some ways that they notice things, and reminded them that during our nature walks we made observations using our eyes – to notice things that were natural or manmade. Students talked about things that they saw in the classroom, like the rug that they were sitting on, the color of their sweaters, and the SMART Board® directly in front of them. I explained that there are many ways to make observations by: 1.) using our five senses – seeing, hearing, smelling, touching, and tasting; and 2.) “stopping to smell the roses,” or pausing for a moment so that we can notice details. To practice using our five senses as a group, I held up a tennis ball and asked the students what they saw. Their first responses were based upon their sense of sight: “it’s a ball,” “it’s circle,” and “it’s yellow.” I wanted the children to think about the tennis ball by using other senses, so next I asked them to close their eyes so that they could use a different sense, and I bounced the ball on the floor. When I asked them what they heard, they replied that they had heard the tennis ball bounce. I said “Yes, you used your ears and sense of hearing! You heard the sound of the ball bouncing.” I passed the tennis ball around and asked children to feel the ball with their hands and to describe it using their sense of touch. They discovered that it was “scratchy” and “fuzzy.” Finally, I asked, “Are there any other details that you notice about the tennis ball? and, “What senses are you using to get that information?” Students
noticed that the ball had letters and numbers written on it in black, and that the ball has
dirt marks on one side.

The setting for our third nature walk was our school’s garden, which was already in place
when I began teaching this unit, but any small plot of plants outside or potted plants
inside the classroom could be explored for the study of seeds and plants. To set the
environment for this unit, I asked students to start noticing the different kinds of fruit and
vegetable that they had in their lunches, and if there were seeds I’d ask questions like:
How big are those? How many seeds in that apple? and Are those bigger or smaller than
the seeds we collected from yesterday’s apple? Students may begin to collect some of the
seeds from their lunches, place them in small plastic cups, and label them, as a way to
begin to build curiosity about plants as living things.
Lesson Plan #1: Sorting Seeds

I. Introductory Lesson / Setting the Environment

In this lesson students study seeds as a foundation of plants as living things, and allows students to think about where seeds come from, what they look like, and compare different kinds of seeds.

II. Goals and Objectives

Students will:

• Make direct observations to collect data and make comparisons.
• Communicate and share ideas about observations.
• Use mathematical skills to count and graph different seeds.

III. Preparation and Materials

Before the lesson:

• The teacher encourages students to notice seeds in different fruits (i.e. apples) and vegetables (i.e. cucumbers) that they eat at snack and lunch. To build student interest, give students the option to collect their seeds in small, clear plastic cups and label them with masking tape. The seed collection can be placed at the science table with a magnifying glass for students to make observations.

Teacher preparation/Materials for lesson:
• Apples and pears (1 fruit for every 2 students plus one extra of each for demonstration)
• One large kitchen knife, carefully placed in classroom out of student’s reach
• Cutting board
• Popsicle sticks for students
• Magnifying glasses (1 for groups of 4 students to share)
• Small collection cups
• Newspaper to cover tables
• Chart paper and markers
• Copy of bar graph for each student (see Figure 3)

IV. Procedures

1. The teacher will introduce the lesson to the whole class by holding up an apple and a pear and asking students for their predictions about what is inside. Some of the may respond, “fruit,” “core,” and “seeds.”

2. The teacher will carefully cut the apple and pear in half on a cutting board and hold up two open sides of the fruits for students to see. S/he will pass the pieces of fruit around for students to touch, and ask them to share observations in the group.

3. Next, the teacher will explain that each student will have the opportunity to investigate an apple or pear in more detail, and to collect all of the seeds. The teacher will demonstrate how to use the Popsicle sticks to dig into the apple and pry out the seeds. The teacher will demonstrate how using the
magnifying glass may show details in the fruit that we don’t usually notice (i.e. a star shape in the center of an apple).

4. Students will be instructed to work in pairs to make observations about their fruit and to collect all the seeds.

5. After approximately 20 minutes of group work, the teacher will ask students to come back together as a group to share their findings. On one piece of chart paper, the teacher will write students’ observations and questions about apples and on another piece the teacher will write observations and questions about pears.

6. The teacher will model how to make a graph of their findings about the seeds. S/he may ask some questions to help students understand the graph like, *If you only have seven seeds, do you have to fill in all the boxes with seeds?* and *If you have five seeds, where will you place the seeds on the bar graph?* Using the template on the following page, students will glue on seed per box on the bar graph, and label it “Seeds from an apple” or “Seeds from a pear.”

7. When all students have completed their graphs, the students will gather in a group to share their findings. Some questions may be, *Why do you think [student 1]’s apple had more seeds than [student 2]’s apple?*

8. Add the word “seed” to the word wall (see Appendix B).
Figure 3: GRAPH OF SEEDS FROM A___________
V. **In My Classroom**

Our class did a variation of this sorting seed lesson, by investigating, organizing, and counting the seeds for six fruits: grapefruit, apple, red pepper, tomato, kiwi and cantaloupe (see Image 29). The different types of fruits enabled us to scaffold the lesson for learners with differing organizational and counting skills. Each group of children was engaged and diligent in their work. The students investigating the tomato and kiwi were extremely patient, allowing their seeds to dry overnight, and picking each one up with care and gluing it to their graph! Our class made a collective graph of our work (see Images 30 and 31).

**Image 29:** Organization of seeds in ten strips.  
**Image 30:** Scale of graph with grapefruit seeds.
Image 31: Finished seed graph of class data
Lesson Plan #2: What Plants Need!

I. Introductory Lesson / Setting the Environment

In this lesson, students will review the characteristics of living things, and learn about what plants need to survive. Students will compare their findings to what they learned in Unit 2, Lesson 2 “What Animals Need!” and create a T-chart.

II. Goals and Objectives

Students will

- Make direct observations to collect data and make comparisons.
- Communicate and share ideas about observations.
- Practice sorting similarities and differences using a T-chart.

III. Preparation and Materials

Before the lesson:

- The teacher will manage classroom plants to ensure that they all get watered regularly, creating “gardener” as a rotating classroom job.
- The teacher will take a weekly photo of at least one of the plants to document the plants’ growth.
- Every month, the students will measure their plants using unifix cubes and write down its height in the number of cubes to document its growth.
- The teacher will have student-generated chart from Unit 2, Lesson 2 “What Animals Need!” posted on the wall for comparison.

Teacher preparation/Materials for lesson
• The teacher will reread non-fiction book *From Seed to Plant* (2012) by Gail Gibbons, and highlight pages that introduce plants’ needs of water, sun, and air.

• Chart paper and markers

IV. Procedures

1. The teacher will bring several classroom plants down from the shelf and ask students to make observations about it.

2. The teacher will show weekly photographs that s/he has taken of the plants and ask students to name some of the changes that they have seen. A guiding question may be: *How do you know that the plant has grown?* The students may mention the monthly measurements they take as evidence of the plants’ growth.

3. Next, the teacher will ask students to name what they have learned about “what plants need to survive” from their own gardening experiences and from the books they have read, and record it on chart paper. Student responses will be recorded on the chart paper. In addition to water, sunlight, and air, students may notice other details about the plants growing in the classroom. The teacher may use a guiding question about temperature like, *Do you notice any differences in the plants that are growing on the classroom windowsill and the mudroom windowsill? Do you think both rooms get the same amount of sunlight? and Is one room warmer than the other?*
4. Lastly, the teacher will hang both the “Animals’ Needs” and “Plants’ Needs” chart papers on the wall and ask students to think about the ways that they are the same and the ways that they are different. The teacher on a T-graph will record all students’ ideas.
Lesson Plan #3A: Five Senses: “Using Your Ears”

I. Introductory Lesson / Setting the Environment

In this lesson students explore how our sense of hearing can be used to collect information.

II. Goals and Objectives

Students will:

• Make direct observations to collect data and make comparisons.
• Practice making careful observations using their sense of hearing.
• Communicate and share ideas about observations.

III. Preparation and Materials

Before the lesson:

• The teacher will find four different animal pictures online or in a book and make multiple copies of each animal on small pieces of paper. Samples are included on following pages for farm animals – cows, horses, sheep, and chickens (see Figure 4).

IV. Procedures

1. The teacher will review the idea that scientists use their senses to make observations, and explain that students will do an activity to practice using their sense of hearing. Each student will pretend to be an animal, and make that animal’s sound, listening for other children making the same animal sound. Students will gather in animal groups by using only their animal noise (i.e. no talking!).
2. Before beginning this activity, the teacher will show the class pictures of the animals one at a time and ask students to make the animal sounds. Make sure that the students agree on the animal sound.

3. Each student receives a small piece of paper with a picture of one of the animals on it. The teacher will model how to quickly look at the paper and then put it in a pocket, so that no one sees each other’s animal.

4. Students look at their picture, make animal noises, and sort themselves into animal groups.

5. Talk about the experience as a group, and about how important our sense of hearing is to us.

6. Add the word “senses” to the word wall (see Appendix B).

V. In My Classroom

I anticipated that the activity might get very silly with five and six year olds, but while it was fun, class management was not a problem. I found that the students kept the volume controlled on their own because they needed to be able to hear their peers in order to find their animal group.

Afterwards, we talked about how the object of the game was to look at their animal pictures, and then to find the other children making the same animal sounds by listening carefully. One child raised his hand and said, “I could hear the other people making moo sounds, and I could tell where they were in the room because I heard that it wasn’t so loud.” His observation of volume and location of sound was a great detail, and an
example of careful observation. I pointed out to them that as they practiced using their sense of hearing, they were also practicing being scientists!
Figure 4: Animal cards from “Using Our Ears!” activity
Lesson Plan #3B: Five Senses: “Mystery Boxes”

I. Introductory Lesson / Setting the Environment

In this lesson students explore how their senses can be used to collect information. Students are asked to use these questions to think about objects: What does it smell like? What does it feel like? What does it sound like (when I shake it)?, and What does it look like?

II. Goals and Objectives

Students will:

- Make direct observations to collect data and make comparisons.
- Practice making careful observations using their senses of smelling, feeling, seeing, and hearing.
- Communicate and share ideas about observations.

III. Preparation and Materials

Before the lesson:

- The morning before this lesson, the teacher will read Five Senses (2000) by Aliki.
- The teacher will make a poster on chart paper with these guiding questions for students to think about: What does it smell like? What does it feel like? What does it sound like (when I shake it)?, and What does it look like?

Teacher preparation/Materials for lesson:

- The teacher will use small plastic containers (i.e. re-used food packaging such as small yogurt containers) to set up “mystery boxes.” Items will be concealed in containers so that students have to use their senses to determine what is
inside, with the exception of the sense of sight station. Various different objects can be used for this activity, and there is the possibility for a home-school connection by asking children to bring an object from home for “science observations.” Some suggestions that focus on each sense (although each sense can be used for all) are:

- **Sight**: carrot, apple, banana, and kiwi (observe the outside, then cut open and observe the inside)
- **Sound**: uncooked pasta, uncooked beans
- **Touch**: flour, sandpaper
- **Smell**: garlic, coffee grinds
- **Taste**: samples of any of the food items, depending on food allergies in classroom

- Magnifying glasses (at least one/station)
- Popsicle sticks (for students to probe at objects at the “sight station”)
- Chart paper and markers

**IV. Procedures**

1. The teacher will review the idea that scientists use their senses to make observations, and explain that students will work at different stations to think about what is in each mystery box. The teacher will remind students to use their senses to describe what they notice, and guess what is in each container.

2. The teacher will explain that small groups of students will work at each station, and that students will switch to each station during the class.
Containers will not be opened until all students have been to each station. While students work in the stations, the teacher will encourage them to pay attention to details with probing questions.

3. After students work at each station, the class will meet as a group to review each mystery box, and the “sight station,” and share words that they used to describe each. The teacher will scribe students’ observations on chart paper.

4. For each mystery box, the teacher will choose a student to open and reveal the findings.

5. Afterwards, the teacher will lead a group share with guiding questions like, *How are dried beans and dried pasta the same?* and *What helped you think know that they were different objects in the containers?* In the group share, students will have the opportunity to talk about their senses helped them to think about “mystery” objects.

V. In My Classroom

In small, teacher-guided groups, children were instructed to use their senses to notice things about different objects. In addition to naming the sense that they used for each observation, I was surprised by the descriptive language that they used. Below are some responses and observations from two of the objects observed:

**Flour:** white; fluffy; squishy; soft; powdery; smells doughy; feels sort of like sand, “a fat pillow,” feathers; (note: student used a microscope here) tiny pieces; small white dirt; soft type of salt; and it tickles the hand.
Carrot: smells sweet and caroety; orange; shaped like a hot dog; bottom fatter than top; some black on it (when probed, child realized that this was dirt); feels hard; it’s breakable; and (note: once broken into pieces) sort of juicy and wet inside

As I guided a small group through this activity, I recorded every student response to validate everyone’s thinking. There were two children in my group who seemed rigid in their observations, as if there were only one or two “correct answers,” and it seemed to block their confidence to state what they saw, heard, smelled, or touched. To encourage them to think beyond the basic characteristics of a carrot for example, as “orange,” I used probing questions and focused on their peer’s responses to deepen their thinking. When another child saw the carrot as “hot dog shaped,” I asked, Does this shape remind you of anything else? and Is one end of the carrot different than the other? I intentionally used language to draw their attention to different kinds of details and questions about the objects, to help the children develop their own questions to ask, and the confidence to voice what they observe. By building the habit of mind to look carefully and differently at things, the students develop their science skills in observations. Just moments later in the activity, I cut the carrot in half. Several students immediately made observations, “it’s juicy in there,” “it’s orange,” and “it smells different.” Then I posed the question, Is the outside orange and the inside orange the same color? The outside was unpeeled and was a darker shade of orange, with brown lines in the veins of the carrot. One student responded, “Yes, they are different!” I wanted more information, so I probed, “Oh,
interesting. How are they different?” Eventually he came to explain that they were different, and observed the brown dirt on the outside of the carrot.
Lesson Plan #4: Nature Walk Three: Learning Garden

I. Introductory Lesson / Setting the Environment

In this lesson students focus on observing plants as living things in indoor potted plants, or an outdoor garden. Students will have the opportunity to draw and write about their learning experiences using “scientific drawings” and thinking about accurate recordings of what they saw, heard, smelled, touched, and possibly tasted (depending on plants observed and food allergies in the classroom).

II. Goals and Objectives

Students will:

• Make direct observations to collect data and make comparisons, and will practice using a documentation sheet in the field.

• Use their five senses to make observations.

• Communicate and share ideas about observations.

III. Preparation and Materials

Before the lesson:

• The teacher will review lessons about seeds and plant growth (Lesson #1: Sorting Seeds), and the idea that many objects can be observed using multiple senses (Lessons #3A and #3B).

• The teacher will select an indoor garden within the classroom, or an outdoor garden nearby the school property where students can learn about plants as living things.

Teacher preparation/Materials for lesson:

• Documentation sheet (see Figure 5)
• Clipboards and pencils
• Students: mud boots, jackets

IV. Procedures

1. The teacher will review the five senses and show students a classroom poster with a word and a descriptive picture for each sense (i.e. ear for “hearing”). S/he will ask students to think about how they might observe a pumpkin in a garden, like: Can you see it? Can you feel it? Can you smell it? Can you taste it? and, Can you hear it?

2. The teacher will introduce documentation sheet (see Figure 5), and ask students to think about how they could record things they observe in the garden so that others can learn from it. The teacher will model how to use the sheet in the garden. The sheet mirrors the classroom poster with a picture and a word for each sense at the top, and six rectangular boxes for students to draw and/or write their observations. The teacher will instruct students to use this sheet when observing the garden to show what they observe, and to draw a line(s) to the sense(s) that they used to observe it.

3. After approximately 30 minutes, or when students seemed finished with their explorations, the teacher will gather students back into the classroom. The teacher will revisit the “five senses” classroom poster and show students five large pieces of paper to make posters. Each paper will have one of the following on top: See (with a picture of an eye), Hear (with a picture of an ear), Touch (with a picture of a hand), Smell (with a picture of a nose), and Taste (with a picture of a kid eating).
4. The teacher will ask students to share one of their observations from the garden, and ask them to identify the sense they used to make their observation.

5. The teacher will explain that the large pieces of paper will be used to make a classroom poster of each sense. S/he will instruct students to choose two of their observations from the garden, add color to them, cut them out, and then paste the picture to the correct paper. The students will need to consider which observations they most wanted to share, and to use the math skill of sorting to decide which paper to paste it onto.

6. Possible extensions – Writing documentation
   a) Teacher will give students a writing prompt like, “In the garden, I (see/hear/smell/touch/taste) ________.” and students will use their writing strategies to complete the sentence. Student work can be compiled into a classroom book, “The Learning Garden: Our Five Senses.” Students will practice making “science drawings” with their writing, using accurate color choices.

7. Possible extensions – Audio documentation (technology)
   a) Teacher will use computer or iPad to help students to record their voices. Students will read their writing from the above writing prompt, and make an oral recording. Afterwards, the teacher will compile all of the student recordings together to make an audio

V. **In My Classroom**

Once in the garden, each student became busy exploring different areas -- independently, in pairs, and in small groups. Children were calling out, “I feel the wind!” “I see a tomato!” “I smell the basil!” As the students shared their findings, they eventually merged into two or three small groups, so that each could share an observation with many classmates. Interestingly, all the children were able to identify something from at least four of their senses. Although we had talked about things in the garden that could be eaten (e.g. pumpkins, corn), this concept remained abstract to them since they were asked not to eat anything in the garden and most didn’t record anything for the sense of taste. One student repeatedly shared his finding that he could, “taste the wind,” which he would demonstrate by taking a deep breath in and saying, “see! see!” There were some surprises too. For example, the dried out cornhusks made an audible noise when the wind blew, so many students recorded that they could hear corn. With both the sense of seeing and hearing, students observed both inside of and outside of the garden. For example, we could hear airplanes overheard and see the trees outside of the garden.

Back in the classroom, I asked children to look at their recording sheets and share with the group something that they observed in the garden using one of their senses. Children soon discovered that many of them had recorded the same thing but using different senses. For example, one child wrote that he saw basil and one wrote that
she smelled basil. Children recorded touching dirt, water, and leaves. They both saw
and heard the corn stalks, which were dried out and rustled in the wind. Since eating
wasn’t allowed, I didn’t anticipate any responses for the sense of taste but one student
was insistent that he “tasted the air he breathed!” and another student said that he
remembered tasting the tomatoes on a previous visit to the garden. Their recording
work was thoughtful, and each student put detail into their drawings and made careful
lines from their picture to the sense(s) that they used to observe it.
Figure 5: Five Senses Documentation Sheet

(format for this sheet adapted from Dori Cirelli, Kindergarten teacher)
At our school, the learning garden is a school-wide project supported at different levels by grade. We are fortunate that it is located directly outside our classroom, so we are able to casually observe it outside our window daily.

After our classroom-based discussions and experiments about the five senses, we instructed the students to use their scientific thinking during this visit to the garden (see Images 32-34). Using clipboards, a “Five Senses” worksheet (see Figure 5), and pencils, students were instructed to sketch and/or write what they observed and to trace a line to which sense(s) they used to make these observations.

**Image 32:** Student comment: “I can see the corn stalks and when the wind blows I can hear them too!”
Image 33: Student comment: “Are these where the tomatoes grow? I have tomato plants at my garden at home. Look at how they are squished and rotten on the ground now.”
While in the garden, the students worked individually and in small groups to document what they saw. Every student was engaged in his or her work.

When we returned to the classroom, we shared as a group some different findings from the garden experience. Next, I introduced a whole-class project making a poster for each of the five senses, and laid out large pieces of construction paper on the floor labeled for “see,” “hear,” “touch,” “smell,” and “taste.” Students were instructed to choose two of their favorite sketches, add color to them, cut them out, and then decide which poster to
glue it on (see Image 35). The individual work that they had done on the worksheets contributed to collective classroom posters that now hang in our science area.

**Image 35:** Classroom poster of observations using different senses.

**Writing extension: Student Work**

The following examples (see Images 36-39) of student work show their developing skills in “science drawing,” like choosing accurate colors to represent what they see. These were compiled into a classroom book titled “Our Five Senses.”
“In the garden, I touch a plant.”

“In the garden, I see water.”

**Images 36 and 37:** Students’ writing and artwork about their garden experience

**Writing extension: Student Work**

By sharing our findings and written sketches and recordings as a group, children discovered that they had used different senses to observe the same thing! This kind of knowledge building is one of the many benefits of group sharing.
“In the garden I hear corn [stalks].”

“In the garden I see corn.”

Images 38 and 39: Students’ writing and artwork about their garden experience.
Unit 4: Change

September 2012

October 2012

November 2012

December 2012
Unit 4: Change

Seed questions

The heart of this unit will be for the class to find a tree nearby the playground or school property that students will visit monthly. As they watch the tree change with the seasons, the underlying questions that students will explore in this unit are: Looking at trees as living things – how are they like plants or animals? and How do trees change as the seasons change? After each visit, students will use their observation and recording skills in writing, artwork, and other classroom reflections to study a living thing change over time, very much like they themselves are.

Themes

- All living things change
- Tree study

Concepts for activities

- We all change! (monthly activity)
- Nature walk III: Our Classroom Tree (monthly visit, if possible)
- Nature walk III: Art documentation
- Nature walk III: Writing documentation
- Trees are Living!
- Leafsnap: Classroom book

Goal

Students will:

- Make direct or indirect observations and/or measurements to collect data that can be used to make comparisons.28

Considerations for Change Learning Experiences

28 These science skills and practices are connected to those standards described in the Next Generation Science Standards (Achieve, 2013).
The topic of change, which is relevant to the previous units Natural/Manmade and Living/Nonliving, is especially relevant to Kindergartners. In our American culture, beginning kindergarten is a significant time of change in children’s lives when they often attend school for a full-day, make new friendships, and begin to learn reading, writing, and mathematics in a more formal way than most PreK settings. I realized that children could easily observe many changes in nature by regularly visiting one tree throughout the school year. In September they’ll see a tree filled with green leaves, vibrant with life (note: this is a tie-in to science topic of living things). Throughout October and November, they’ll see the leaves turn into shades of yellow, orange, red, and finally brown, as the leaves died (note: this is a tie-in to science topic of non-living). During December, January, and February, they’ll see bare branches, perhaps collecting snow or icicles. In March in April, the yellow and lime-green hues of budding leaves will form, and in May and June they will observe new leaves, anew a living part of the tree. Like in each of their own lives, our class will be able to measure physical changes that the tree and leaves go through, and the as each month and season passes they will experience the cyclical nature of all living things.

After each visit to the tree, students will have the opportunity to share their observations and questions as a group. Furthermore, each season, students will be asked to write and/or sketch what they’ve observed about the tree and refine their documentation skills.
Lesson Plan #1: We all Change!

I. Introductory Lesson / Setting the Environment

In this lesson, students will take monthly visits to the classroom tree (Lesson #2), and compare how they grow and change to how trees grow and change.

II. Goals and Objectives

Students will:

- Make direct observations to collect information about themselves.
- Compare their observations (self-portraits) of themselves over time and observe changes.
- Use mathematical skills to measure one another’s height, and graph the data each month.

III. Preparation and Materials

Before the lesson:

- The week before the lesson, the teacher will read *The Season’s of Arnold’s Apple Tree* (1988) by Gail Gibbons.
- The week before the lesson, the teacher will show some photographs on the SMART Board® or computer from “Simply Sage,” a blog which contains nature photography. There is a specific post following several trees and flowers throughout the four seasons. The titles for each season, along with the photographs, tell a story that the students will enjoy: “fall dozes…winter sleeps…spring sings…and summer shouts!” (Website: http://simplysage.org/tag/flower-photography/)
• The day before the lesson, give a mini-lesson introducing the measuring tape as one way to describe and collect information about how long or how tall something is.

Teacher preparation/Materials for lesson:
• White paper for students’ self-portraits (with a place for name, date, and height)
• Color paper for matting the portraits
• Various art materials
• Measuring tapes (several for students to work in small groups)
• Date stamp
• Bar graph (see Figure 6)
• Teacher’s reference book: Yoga for Children (1993) by Mary Stewart

IV. Procedures
1. The teacher will introduce the lesson by asking students to think about the apple tree from Gail Gibbons’ book, and the tree and flower photographs from the blog. S/he will ask the students guiding questions like: how did the tree change from summer to fall? What changes did you notice in the flowers between the spring and summer?

2. The teacher will make the connection that trees are living things and people are living things, and revisit the idea from Unit 2: Living/Nonliving: Animals that all living things grow and change. Next, the teacher will have students stand up and guide them through the yoga
posture, “tree pose,” so that they can feel their own connection to trees:

a. Stand with you two feet on the ground, as if your legs are the trunk of a tree. Imagine that you have roots growing underneath your feet and connecting you to the earth.

b. Feel your arms reaching long alongside your body like branches.

c. Lift your right leg up so that your foot hovers over the ground, then turn your knee out to the side and place your foot against your left leg.

d. Reach your branches up towards the sky. Imagine the wind blowing and moving your arms slightly side to side. Imagine your fingers like leaves and wiggle them gently.

e. Bring your right foot back to the ground. Switch sides.

3. Students will sit back down and the teacher will explain that each month, referencing the classroom calendar as a landmark, they will make a picture
of themselves. Each picture will include their name, the date (use a date stamp), and their height.\textsuperscript{29}

4. The art materials that the teacher supplies can vary each month, including colored pencils, watercolors, crayons, marker, etc. One month the students may want to take photographs of each other for the self-portrait.

5. The students’ work will be hung in a place in the classroom or corridor where it can be viewed regularly.

6. After completing the portrait, each student will document his/her height measurement into a bar graph for that month (see Figure 6).

   Developmentally, the concept of measurement is new to Kindergartners. Rather than using a standard measurement of inches, select a math manipulative from your classroom that students are familiar with. For example, have students connect unifix cubes or plastic links to determine their height. To document their data, students will practice math skills of graphing and skip counting by twos as they complete their work. The teacher will store the students’ graphs monthly until the end of the school year.

\textsuperscript{29} Use a non-standard unit for measurement, like unifix cubes or inchworms, which five and six year olds can understand as a unit.
Figure 6: My Height Growth by Month (part 1)
<table>
<thead>
<tr>
<th>Cubes</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>48</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>46</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>44</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>42</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Lesson Plan #2: Nature Walk Four:
Our Classroom Tree

I. Introductory lesson / Setting the Environment

In this lesson, students will think about the questions *How do things in nature change?* and *How can five and six year olds observe changes in nature over time?*. They will have the opportunity to draw and write about their learning experiences using the “scientific drawings” and thinking about accurate recordings of what they saw, heard, smelled, and touched.

II. Goals and Objectives

Students will:

- Make direct observations to collect data and make comparisons.
- Visit a classroom tree monthly, or at least once each season, to compare the changes over time.
- Communicate and share ideas about observations.

III. Preparation and Materials

Before the lesson:

- A week or so before the first discussion about trees, the teacher will ask students to think about trees in their yards or that they see each day on their walk/drive to school. S/he will ask students to take a picture of a tree that

---

30 Includes Art Documentation and Writing Documentation extension activities
they know and see each day and bring it into school to share with their classmates.

- The teacher will map an alternate way from the playground back to the classroom, where there are one or more trees for students to choose a “classroom tree.”
- The teacher will get books about trees to add to the classroom library. These can be used to help answer some of the students’ questions about their experiences at the pond. Some suggested titles:

  **Non-fiction books**
  - *A Tree is a Plant (Let’s Read and Find Out)* (2001) by Clyde Robert Bulla
  - *Eyewitness Tree* (2000) by David Burnie
  - *Oak Tree* (2005) by Gordon Morrison

  **Other genre books**
  - *A Tree is Nice* (1987) by Janice May Udry

**Teacher preparation / Materials for the lesson:**
- iPads or digital cameras, and give a mini-lesson on how to use these electronics.
- Chart paper and markers
- Students: mud boots, jackets
- Basket to collect leaves
• Clipboards
• Paper
• Colored pencils, crayons, various art supplies
• Writing paper with prompts

IV. Procedures

1. The teacher will open a discussion about trees that we see each day and ask students to share their photographs of a favorite tree.

2. The teacher will talk about how watching trees change as the seasons change is an opportunity to be scientists – to observe, take photographs and draw pictures, write about, and ask questions about what they see. One guiding question about trees could be, Why do some green leaves fall from trees – aren’t they still living? The teacher will lead group to make a KWL chart\(^{31}\) about what students know about trees, what they want to learn about trees, and a blank column for what they’ve learned about trees (to be completed several times throughout the school year).

3. After looking at photographs of trees, the teacher will ask students, How about finding a favorite classroom tree, near our school, that we can visit all year long?

4. The teacher will remind the students that they are scientists on a nature walk, and that all students need to make careful observations and think

---

\(^{31}\) KWL charts are a way to start a unit, for students to share as a group 1. what they KNOW about a subject, 2. what they WANT to know about a subject, and to end a unit by 3. reviewing what they’ve LEARNED about a subject.
about any questions that they have. Students can be invited to pick up leaves to bring back to the classroom for further study.

5. The teacher will lead students on the preplanned route nearby the school, and ask students to point out trees that they like. S/he will take photographs of different trees. Upon return to the classroom, the photographs can be used for a class vote about which tree will be the classroom tree.

6. During each visit to the tree, the teacher can instruct students to sit on the ground and observe. Some possible teacher guidance could be, “…enjoy being outside and looking and the tree…use your senses to observe the tree…share one or two things that you notice with a friend sitting next to you.” Some questions to prompt their thinking about vocabulary and attributes of the tree are: What colors do you see? Do you see the tree trunk? Are there animals near the tree? Are the branches longer at the top of the tree or at the bottom of the tree? and What do you see on the ground next to the tree?

7. Weather depending, the students may bring a clipboard, paper, and some art materials outside to sketch their observations.

8. Before and after each visit to the classroom tree, the teacher can ask students any change that they think they will observe since the previous visit, and what changes they did observe. The KWL chart can be used as a reference to guide these discussions. New student questions that arise can be added to the chart in a different colored marker.
9. The teacher will use an iPad or digital camera to photo-document each visit to the tree.

10. Possible Extensions – Art documentation:
   a. Leaf rubbings: The teacher will demonstrate how leaf rubbings are made, showing students how to press down firmly on the paper to keep the leaf in place and how to unpeel the wrapper in order to use the whole crayon to create a detailed leaf rubbing. Children will like to notice the veins and the intricate details of leaves. In addition to using leaves, there are plastic leaf rubbing plates that can be purchased and used for leaf rubbings and also to press into Playdough. These plastic plates allow students to make art with more details about each type of leaf, and sets of 12 (includes: Ginkgo, Sycamore, River Birch, Tulip Poplar, Linden, Sugar Maple, Sassafras, Sweet Gum, Buckeye, Hickory, Dogwood, Holly, Box Elder, Willow, White Oak and Elm leaves) are available through nature-watch.com.
   b. Student leaf books: Collections of leaves from the nature walks to the classroom tree and from the playground can be used for students to make a five-page book of the biggest, smallest, widest, skinniest, and favorite leaves from their collection.
   c. Students can sketch the classroom tree once a season to document changes, using various art materials such as colored pencils, watercolors, and collage.

11. Possible Extensions – Writing documentation:
   a. The teacher will give students a writing prompt like, “It is
___________ (fall, winter, spring). Our tree is ________.” and students will use their writing strategies to complete the sentences.

Student work can be compiled into a classroom book, “Autumn Visit to Our Classroom Tree.”

12. Possible Extensions – Math concepts:
   a. A study of leaves collected during nature walks or at recess can be used to introduce and practice various math skills, like measurement of leaf length and width, geometry of lines in leaf, and symmetry in leaf patterns.

13. Possible Extensions – Social Studies
   a. Family study: The teacher can make an analogy about how leaves belong to particular trees (i.e. a silver maple leaf comes from a silver maple tree), just like people come from families with particular names. Using brown paper bags filled with sand, and torn and twisted to make branches, students can make leaf rubbings to represent each family member.

14. Possible Extensions – Music
   a. There are many wonderful songs about trees that can be taught to children and sung as a group during morning meeting and transition times. One favorite is: “Family Tree” by Tom Chapin (note to reader: a YouTube search of this song will take you to a live version teaching American Sign Language to the lyrics)

V. In My Classroom

Our classroom visits to the tree became a landmark for each month that the students enjoyed and looked forward to (see Image 40). Since classroom calendar is a daily
routine in most Kindergarten classrooms, physically placing the tree visit into the calendar became a way to bring students’ ownership for their own learning. At the beginning of the month, I added a tree image to the date that we planned to visit the tree, and students would notice and ask *How many more days until we visit the tree?* This led into a natural math problem, to which I responded, “Let’s find out! How many more days, and tell us how you got your answer!” so that students could share their counting strategies with each other.

Before each visit to the classroom tree, I reminded students that we were learning to be scientists by observing lots of details about our tree this year. I reminded them to use their five senses to notice the colors, smells, sounds on the tree’s trunk, the branches, the leaves, and on the ground around the tree. After each visit we had a group share about our observations and questions, and referenced our KWL chart (see Image 45). At least once a season, I asked children to show what they see through documented student work. Each task required the student to observe details and sketch, paint, or represent with other art materials what they see. For the fall the students used colored pencils, for the winter they used painted toothpicks and Popsicle sticks, and for the spring they used watercolors. This type of “scientific art” is a documentation that requires them to think about what color choices they will use, and how to draw what they see and not their favorite representation (i.e. hearts and flowers). The written part of the worksheet is partially teacher-written and students were asked to sound out and write only the descriptive words. For each season, the worksheet reads, “It is ________ (fall, winter, spring).” “Our tree is ____________ (descriptive word[s])” (see Images 41-44). There were other
extension activities around our tree study, such as the student’s leaf books and paper bag family trees (see Images 46-51).

Image 40: Photo documentation of our class tree from September 2012-December 2012, which we visit monthly. These photos are on the classroom wall as documentation for students to view the changes over time and seasons.
“It is fall. Our tree is a little bare.”

“It is fall. Our tree is orange.”

“It is winter. Our tree is bald.”

“It is winter. Our tree is light brown.”

Images 41-44: Students’ writing and artwork about visiting our classroom tree.
Image 45: After our December visit, as with each visit to our tree, there was a group share of what students observed. I intentionally wrote all ideas to create a positive learning community. To deepen students’ thinking, I asked questions about where they saw or heard something or why they think the tree looked a certain way.
A five-page leaf book template\textsuperscript{32} with descriptive sentences at the bottom, and clues to help children remember what \textit{biggest}, \textit{smallest}, \textit{widest}, and skinniest meant. The children had questions about widest and skinniest, so I described these words, and modeled both a wide and skinny leaf before they began their work. The last page was for students to display their favorite leaf. By this point of the fall season, our class had collected two large baskets full of leaves during recess, and there were plenty of leaves for all to choose. For management reasons, I asked each student to select five leaves (one leaf/page) and once they got back to their working space, to select which leaf to use on each page. Because there was five leaves total, the children had to sort and determine which leaf was biggest, smallest, skinniest, and widest, which was a challenging sorting problem for many. Children were given the choice to glue leaves, trace and color leaves, or do leaf rubbings, and we encouraged them to try different techniques on each page (see Images 46-50).

\textsuperscript{32} This template was created by Dori Cirelli, Kindergarten teacher.
Image 46-50: Samples of student work in their leaf books
Image 51: One student’s family tree, made with leaf rubbings to represent each family member.
Lesson Plan #3: Trees are Living!

I. Introductory Lesson / Setting the Environment
In this lesson, students will review the characteristics of living things that they constructed in Unit 2, and think about how trees are living things. Since several of the criteria for living things like plants and trees are hard to observe with the eye, students will participate in an easy experiment to see how plants and trees use their stems and trunks to draw up water and nutrients from the soil. The classroom experiment will enable students to make predictions and draw conclusions.

II. Goals and Objectives
Students will:

- Review the characteristics of living things, and think about how trees are living.
- Participate in a classroom experiment and make predictions and draw conclusions.

III. Preparation and Materials
Before the lesson:

- The morning before the experiment, the teacher will revisit the categories of living and non-living, using the knowledge that students constructed in Unit 2. The teacher will review the characteristics, including 1. Living things move, 2. Living things grow and change, 3. Living things need air, and 4. Living things need water and nutrients. S/he will lead a discussion about the needs of living things in relation to trees. When thinking about the question, Do trees grow
students can look at their own photo-documentation from monthly visits to the classroom tree. Afterwards, the teacher will explain how the experiment will help them to see and understand how trees use their roots to draw up water (and nutrients) from the ground.

- Snack time: Bring straws for snack and ask students if they think celery “drinks” water. During snack that day, have students drink their water with straws, which can be a reference point for them later on when the celery absorbs the dye from the water. Adding food coloring to the students’ water is another option.

**Teacher preparation/Materials for lesson:**

- Straws
- Celery stalks
- Water
- Small containers

**IV. Procedures**

1. Place water in small containers and have children add enough drops of food coloring to color the water. Put a celery stalk in each one and let it sit for one to three days to see results. Use three or four containers with different colors to observe how the celery stalk and leaves absorb the color of the water it sits in.
2. Ask students what they think will happen. If they predict that the celery will turn the color of the water, probe them to think about why they think that will happen.

3. Within 24-hours, the colored water will be visible moving up the celery stalk and within 48-72 hours, the color will be visible in the celery leaves.

4. The teacher will revisit the celery stalks a day or two later and have students share their observations. After looking at the outside stem and leaves, the students can open up the celery and observe small lines of color inside the stalk (xylem) where the colored water was soaked up like a straw. The teacher can remind the students how they sucked up water with a straw – just like the celery!

5. The teacher will introduce the “big” science word xylem to the students, and add it to the word wall.

V. In My Classroom

1. Students worked in small groups with a teacher to make predictions about what would happen when celery stalks were placed in colored water. Students also practiced their skills in observing and describing features of celery. Then each group chose a color, put drops of food coloring into water, and placed a celery stalk in the water. These containers were placed on our science table to observe (see Image 52).
2. Two days later, the stalks and leaves had visibly changed the color of the water that they were placed in. Students took the celery out of the water, snapped the celery apart, and used magnifying glasses to observe the results (see Images 53 and 54). The vocabulary word “xylem” was introduced to describe the straw-like tubes that suck water up the celery stalk.
Lesson Plan #4: LeafSnap application

I. Introductory Lesson / Setting the Environment

In this lesson students will use an iPad application, with teacher guidance, to identify leaves to the trees that they grow on.

II. Goals and Objectives

Students will:

• Use technology to identify leaves and to gather information.

• Label and organize information, and collect it in a classroom book.

III. Preparation and Materials

Before the lesson:

• The week before lesson, the teacher will read fiction and non-fiction books about leaves. Some suggested titles are:

  Fiction

  - *Leaves* (2007) by David Ezra Stein
  - *Leaf Man* (2005) by Lois Ehlert

  Non-fiction

  - *Red Leaf, Yellow Leaf* (1991) by Lois Ehlert
  - *Why Do Leaves Change Color (Let’s-Read-and-Find-Out)* (1994) by Betsy Maestro

• Throughout the Change unit, the teacher will encourage students to collect leaves at recess and during the nature walks to the classroom tree. There will
be a large basket of leaves in the classroom, kept at the science table/science area.

**Teacher preparation/Materials for lesson:**

- Basket of students’ collection of leaves
- White paper for background
- iPad or iPhone, with LeafSnap application set-up
- SMART Board ® or computer and LCD projector to project the LeafSnap application (*an adapter is necessary to connect the iPad or iPhone to the computer or SMART Board ®)

**IV. Procedures**

1. The teacher will begin a discussion about leaves, bringing the students’ leaf collection to the meeting area to encourage conversation. To begin, s/he may prompt the students to use descriptive words about the leaves, like: *What color is the leaf? Is it bigger or smaller than this other leaf?*, *What kinds of shapes do you see?* and *How many parts are there on this leaf?*

2. Next, the teacher may guide the conversation by selecting several of the same kinds of leaves, and ask students if they remember seeing that kind outside: *Where did you find these types of leaves? Which tree do you think they may have fallen from?* and *Do you think this leaf fell near the large tree on the playground?*
3. The teacher will reference the book *Tell Me, Tree: All About Trees for Kids* (2002) by Gail Gibbons, and different leaves grow on different kinds of trees. S/he will explain that by looking at a leaf, we can identify which tree it came from.

4. Next, the teacher will explain that the photographs taken with an iPad or iPhone can be used to identify which tree that leaves came from. S/he will connect the iPad or iPhone to the SMART Board ® (or computer), and demonstrate using LeafSnap:

   a. Place the leaf against a white piece of paper as a background for the program to work properly.

   b. “Snap” or take a picture of the leaf. The application will then identify the tree that the leaf comes from and connect the user to an encyclopedic amount of information about each tree. In kindergarten, the five and six year olds would be most interested in the name of the tree.

5. Possible extension – Writing documentation

   a. Each student will choose a leaf and use the iPad or digital camera to take a photograph of it. The teacher will print a color copy of each student's photograph.

   b. Each student will work in pairs, with teacher guidance, and use the LeafSnap application to “snap” a picture of the leaf and identify the tree that it comes from. Students will write the name of the tree underneath the color copy of their photograph.
c. The teacher will assemble all students’ work into a classroom book, titled “Our Leaf Study.”

V. In My Classroom

To introduce children to this app, I connected the iPad to the SMART Board ® and demonstrated how to “snap” a picture of a maple leaf and a dogwood leaf (note: the same process on an iPad or iPhone as taking a photograph) to identify that these leaves come from maple trees and dogwood trees. Several students knew the names of the trees already, but many were interested to learn this new vocabulary and continued talking about “silver maples” and “dogwoods” throughout the day that we did this lesson. At the science table, I set up an iPad for students to use with teacher guidance to Leaf Snap! leaves that they had found and to identify them. This area was open for children to explore during morning activity time. Together with a teacher, the students labeled the leaves that we had identified, as you can see in Image 55.

Using the iPad application “LeafSnap,” we set up a station at our science table where students could photograph leaves to learn the names of the trees that they came from, with teacher guidance.
Image 55: LeafSnap application and labeled leaves at our science table
Being Five and Being a Scientist: Findings

The student work throughout the curriculum is evidence of the students’ developing thinking process and ability to record and communicate these ideas. I intentionally chose a selection of student work that represents different written language and oral language skills in order to illustrate how the curriculum was accessible to all learners in my classroom. Below is a listing of the various activities that students worked on, and page references for you to find samples of their work. On the following pages are also examples of classroom books, science vocabulary, and science folders kept for each student for the school year as a portfolio of their work (see Images 56-62).
Student work: Classroom Science books

Image 56: Collectively created classroom books that students can enjoy reading throughout the school day are an important way to review learning and give students a sense of ownership about their learning.
Images 57 and 58: Pages of student artwork from our classroom book “KC’s Pond Visit.”
Image 59: Page of student writing from our classroom book

Image 60: Page of student writing from our classroom book.
In the garden
I see tomatoes

In the garden
I hear corn
Science folders

This year, I saved all student work and collected it in a 3-ring binder throughout the school year. The contents included:

- All written documentation
  - From “Living/Non-living: Animals” unit: “At the pond, I see ________” writing prompt and student work
  - From “Living/Non-living: Plants” unit: “In the garden, I see / hear / smell / taste / touch ________” writing prompt and student work
  - From “Change” unit: It is fall / winter / spring, our tree is ____________” writing prompt and student work.
  - From “Living/Non-living: Animals” unit: “What Animals Need” research and graphic organizer
  - From “Change” unit: Leaf books

- All art documentation
  - Various sketches and paintings of our nature walks to the pond, the Learning Garden, and the classroom tree.

For future teaching, I will consider creating an electronic portfolio of students’ science work, including the many student-taken iPad photographs. The benefits of an electronic portfolio would be: 1. more interaction with parents throughout the year on their child’s work; and 2. an easily portable portfolio of student work to future teachers.
Science vocabulary for word wall

- scientist
- observations
- magnifying glass
- non-fiction
- natural
- manmade
- living
- non-living
- similarities
- differences
- graph
- thermometer
- algae
- seeds
- senses
- soil
- measurement
- height
- xylem

---

[33 See Appendix B: Constructing word walls]
Works Cited


Appendices

A. Letter to families
B. Constructing word walls
Dear families,

As you may already know, I am completing my graduate studies in early childhood education at Bank Street College. One of my requirements is to write a thesis, or an Integrative Master’s Project (IMP), for which I have designed an original science curriculum. Our class has explored the natural environment surrounding our school – including visiting a classroom tree, the learning garden, and the pond. The three topics we’ve explored are: natural/man-made, living/non-living, and change. We have also practiced observation and recording skills using the five senses, classroom-based experiments, and recording these observations using photography, sketching, and writing. For the formal document that I submit to Bank Street, I want to include samples of student work and photographs of children in the natural environment to add depth to my original curriculum ideas.

I would like to obtain your permission to use some of your child’s written work, and possibly photos of (him or her) engaged in the learning process, in my final thesis presentation. Names and faces will be removed from any and all student work and photos. The study will be shared as a PDF file with the Bank Street community where it will be catalogued as a part of the Bank Street Library collection and entered into an international database for wider circulation.

Please sign and return this form to confirm your consent. Thank you for your time.

Sincerely,

Danielle L’Heureux

I understand that Danielle L’Heureux, Master’s Degree candidate at Bank Street College of Education, is developing a Science in the Natural Environment for her Master’s thesis.

I give permission for my child’s written work, which will remain anonymous, to be used in this study.

Signed _________________________________________
Date______________________

I consent to the use of my child’s photograph, which will remain anonymous, to be included in this study.

Signed _________________________________________ Date ____________________
Appendix B – Constructing word walls

A word wall is a large surface that alphabetically lists sight words (difficult words to sound out that are best learned through memorization and repetitive practice, like “are”) and high frequency words (common words that students encounter in early reader books, like “play” and “friend”). Word walls often include all students’ names with a picture next to it, to help children identify one another when reading or writing. The rationale for including science vocabulary on the word wall is to help students comprehend new vocabulary, and to practice seeing, hearing, reading, and writing the words and integrating them into their learning experience. In order to differentiate the science vocabulary from sight words, high frequency words, and student names, “natural” and “manmade” could be written with a different colored marker or on different colored paper (see Image 63).
Image 63: A section of word wall from our classroom, with words and images in alphabetical order.