

An Overview of a Kindergarten Tulip Test Garden

A Citizen Science Project

Mary Hatton

2015-2016

mhatton@comcast.net

<http://maryhattonscience.weebly.com/citizen-science-kindergarten-test-garden.html>

Kindergarten Tulip Test Garden

Goals:

1. To engage children in the process of doing science
2. Reinforce district curriculum goals for K-science
 - a. Learning and using senses to make observations
 - b. Living things
 - c. Seasons changes
3. Extend learning of living things to include how plants grow and the tulip lifecycle
4. Integrate math and ELA skills

Project Website:

Journey North, Tulip Test Gardens <http://www.learner.org/jnorth/tulip/index.html>

Results of the LD Batchelder Tulip Project <http://maryhattonscience.weebly.com/>

Overview of the Project

Part1: Prep for Introduction and Fall Planting (40 minutes whole class experience)

1. Teacher report planting to Journey North
 - a. Register with Journey North
 - b. Email/upload date of planting and pictures
2. Request for paraprofessional/teacher help manage small groups/prepare garden
3. Plant date set up
 - a. Introduction about project
 - b. How to plant tulip bulbs

Part 2: Winter Practicing the Skills of a Scientist:

1. Weekly Indoor Observations
 - A. Measuring height of plants
 - B. Counting numbers of leaves
 - C. Drawing what we see
 - D. Describing what we see
 - E. Predicting what will happen next time.
 - F. Photographing plants
 - a. Put together as part of whole class slide show of the entire experience
2. *Math*: Collecting Winter Weather Data
 - a. Collect daily/weekly temperature on monthly calendar
3. Writing observations
 - i. Descriptions
 - ii. Sketches
 - iii. Drawing conclusions
 - iv. Making predictions

Part 3 Spring

1. Going outside to check on plants after snow melts
2. Observing stages of lifecycle and documenting
 - a. Observe for 5-10 minutes outside and 15 minute descriptions of what children see (Each month. Each week beginning in March)
 - i. Take photo for slide show and inside discussion
 - ii. Children could draw what they see from the photo later
3. Teacher reporting results to Journey North
 - a. When they emerge
 - b. When they bloom

Part 4 What happened?

- A. Lifecycle of our Tulip
 - a. Review the slide show of all the work the class accomplished
 - b. Reinforce vocabulary terms:
 - i. Bud, young plant, adult plant, old plant, leaves, stem, flower, bulb
 - c. Introduce what is a lifecycle?
 - B. Seasons are important to lifecycle
 - a. Take a look at Journey North's pictorial maps
 - b. Identify changing colors on map in January, February, March, May
 - i. Draw conclusions about what this tells us about when tulips grow.
 - ii. Identify that they grow earlier in some parts of the world than others.
 - c. Review calendars of temperature. Which months have temperatures in the 30s?
 - i. What happens between January- May? Do the number of days increase/decrease/stay the same as we move from winter to spring?
- Reading and learning about "Being a scientist"
 - What does it mean to be a scientist?

- What do scientists do?
- This could be done as part of the introduction or it could be done after the children start making observations in the classroom: read it and have them tell the teacher- how they are being scientists.

Introduction and Fall Planting

Objectives:

- Become familiar with a bulb and its parts.
- Observe the inside and outside of a tulip bulb.
- Learn that this is a citizen science project
- Learn what it means to be a scientist
- Plant bulbs for a science project

Dates for Planting Should do it no later than late October or early Nov.

Prep:

Weed and dig 7 inch holes (Parents have been asked to volunteer and help)

Access to Water : we could fill gallon milk containers (We used 4 for)

Bring chicken wire and pine needs and hangers to brace down chicken wire

2 containers of cayenne pepper

2 containers of large red pepper flakes

Pre-assessment Page

Materials

Outdoor Materials

- 6-12 trowels (2-3 per group of children)
- 1 bulb per pair
- One adult in charge of water as plant and holes are covered

Other Materials

- Picture of bulb
- Picture of tulip
- Picture of narcissus (have photos to show how bulb grows)
- onion bulb, one for each class, in 2-L bottle to observe
- Brought in 7 bulbs in window box for observations
- onion bulb- one per class

- Cut 2-L clear plastic bottle so top off and flipped over (like funnel) with a cut out of wider space for roots. Place bulb in the container so roots are hitting water. (Fowle's flower market on 114 sold single bulbs)

Prep

Cut open tulip bulb

Create 7 inch deep holes

Bring in narcissus set ups for each class

Procedure

Introduction:

1. First introduction of self I am a scientist and we will help scientists this year by creating a tulip garden.
 - a. Now or earlier- read the story "What is a Scientist" (by Barbara Lehn) so children are thinking about what it really means to do science.
2. Model scientific process as talk with children.
3. Learn (like scientists) as much as we can about the bulb
 - a. Pass around whole bulb and ask the children to describe using our senses of touch and sight
 - i. How does it feel smooth/rough, etc...?
 - ii. What color is it?
 - iii. What shape is it?
 - iv. Is it heavy/light?
 - b. Pass around a halved bulb on plate to observe
 - c. Introduce terms as the children make observations and discoveries
 - i. Outer leaves, stem, bud, roots, and inner leaves
 - d. Review with a picture and placing parts on picture (on SMARTboard or poster)
4. Review of seasons and what we see or how we know seasons change.
 - a. I used art lesson on tree as it changes from one to the next
 - b. Another good book is *A busy year* by Leo Lionni, 1993. Scholastic, Inc.
5. Explain what we will do outside.- plant tulip bulbs and then report when they come up to scientists.

6. Show how we place the bulb in the hole (pointed side up).
7. Explain how we have to plant them
 1. plant a bulb in 7 inch deep hole (pointed side up)
 2. Add water
 3. cover with soil
 4. Water
 5. Shake some pepper flakes (to keep small animals from digging up)
8. Pre Test Question

Planting:

1. Teacher organizes groups
2. They each had a hole to place their bulb in.
3. Mary added water to each
4. Each child covered holes
5. They predicted when they thought they would come up

Fall Post Planting:

1. Mary Hatton put down chicken wire after AM & PM are finished (not done in 2013 or 14)
2. Gave onion bulb to each teacher for informal observations: identify what happens when it grows and think about bulbs outside:
 - a. Children to look and see what parts of plant grow:
 - i. Roots
 - ii. Stem
 - iii. Leaves
 - iv. Flowers

Winter Practicing the Skills of a Scientist

Objectives:

- Making observations about parts of the plant and reinforcing names for parts of the plant (bulb, outer leaves of bulb, stem, leaves, & flower)
- Make observations about height of plant
- Counting the number of plants and number of leaves
- Drawing observations
- Writing numbers and descriptions
- Taking photos of the plants

Materials

Magnifying lenses

Tulip bulb* / onion in water (tulip bulbs were inconsistent in 2014).

Ipad (for photos)

Data Pages

Pencil / colored pencils

Ruler

Practicing Making Observations (15 minutes per visit, 4 visits. Each small group had practice once)

Procedure:

1. First Visit (30 minutes)
 - a. Whole class visit looking at tulips and discussing how to measure and
 - b. Review what we are trying to do
 - c. Take a look at what the roots of the narcissus

Additional visits 2-5

2. Students participated during stations. They rotated one group per week
3. Mary arrived to do 15 minute visits
4. Clipboards
5. Ruler
6. 5 magnifying lenses
7. We described what we observed with our eyes and magnifiers (Guiding questions to help the children focus on the whole plant: What do you notice about the plant? What colors do you see?, shapes of parts of plant?, numbers of parts for sketching?, what happened since last time? Are there any changes?)

- a. Rotated the job(s):
 - i. Sketching our tulips
 - ii. Taking pictures
 - iii. Measuring height of stem with ruler in inches
 - iv. Counting number of plants and number of leaves
8. Asked: What do you think will happen next time? Scientists make predictions. Let's make some of our own.
 - a. Wrote on question page that remained next to the window box
9. Extension: As the children count more, create a table to record number of leaves and height of plant
 - a. Ask them to notice patterns of numbers:
 - i. Does the height increase? Decrease? Stay the same?
 - ii. Do the number of leaves increase, decrease, stay the same?
 - b. Draw conclusions/infer using evidence: What does this tell us about how tulip plants grow?

10. *Math*: Collecting Winter Weather Data

- a. Collect daily/weekly temperature on monthly calendar

In spring

Objectives:

1. Observe what happens, the different stages of the lifecycle of a tulip
2. Describe and gather data as the tulips grow
3. Make predictions about what will happen each week

Materials:

Rulers, camera, journal pages, pencils

Paraprofessional &/ teacher to come outside to help manage children

Prep:

At some point after snow has melted, the chicken wire and pine needles will need to be removed

Procedure:

1. Going outside to check on plants after snow melts
2. Observing stages of lifecycle and documenting
 - a. Observe for 5-10 minutes outside- descriptions of what children see
 - b. (Each month. Each week, once a week beginning in March)
 - c. Repeat the same process as in-class observations
 - i. Sketching our tulips accurately and reminding about how many parts we see, what colors, shapes, etc...
 - ii. Taking pictures
 - iii. Measuring height of stem with ruler in inches in journal and then in class chart
 - iv. Counting number of plants and number of leaves in journal and then in class chart
 - v. Keeping a calendar including when they emerge, when they bloom, and when they die
 - d. Take photo for slide show and inside discussion
 - e. Make predictions about what might happen next?
 - i. Ask children what happened in the window box or review their previous observations later
 - f. Children could draw what they see from the photo later (*if you don't have enough time or weather is an issue*)

3. Teacher reporting results to Journey North
 - a. When they emerge (Look at the calendar and record the date)
 - b. When they bloom (Look at the calendar and record the date)
 - c. Optional: pictures
4. *Math*: Collecting Weather Data
 - a. Collect daily/weekly temperature on monthly calendar
5. *Analyzing Data*: Summarizing Tally Charts and Calendars
 - a. Guiding Questions for discussion
 - i. How many plants came up?
 - ii. How long did it take for all the tulips to come up
 - iii. How many leaves grow on a tulip?
 - iv. Did they all come up on the same day?
 - v. How long did it take for the flowers to grow?
 - vi. How tall did they get?
 - vii. How long did it take for the buds to form? To bloom?

What happened to Our Tulips? (June)

Objectives:

1. Recall what we did in our project
2. Review data and conclusions about the tulips
3. Discuss lifecycle and identify how the tulip goes through a lifecycle
4. Observe and discuss data about tulips growing in North America
5. Observe and discuss weather data and identify how temperature changes during months
6. Infer and discuss how temperature affects the lifecycle of the tulip plant
7. Discuss and recommendations or suggestions for the future kindergarten classes in the fall

Materials:

Slide show

Journey North Maps of Data from January-June

Weather data from January - June

Prep:

Slide show of pictures of the students and the project

A. What did we do?

- a. Recapped the project with a whole-class slide show.
 - i. We asked children to recall and reminded them about how we planted the bulbs
 1. Pointed side up
 2. Why we protected them with spines and chicken wire
 3. Why we gave them water in their holes
 4. When we saw them come up
 5. Reinforced names of parts of the plant

B. What happened to the tulip: Lifecycle of our Tulip

1. We all go through a lifecycle: compared to humans. (some done during the intro. Slide show)
 - a. *A piece of literature would have helped about any animal or human lifecycle*

2. Introduced names of different stages of the tulip lifecycle and showed each: a. We call this the bud? What do you see? Repeat name, and repeat for each stage of lifecycle. Bud, young plant, adult plant, old plant, leaves, stem, flower, bulb
- 3.

C. Using Data from Journey North and Weather Observations

- a. Take a look at Journey North's pictorial maps

- i. January, February, March, Mary

1. Maps have different shapes and colors representing

- a. When planted
- b. When emerge
- c. When bloom

2. Volunteers come up and hold up maps with color-coded data from Journey North

3. Everyone look

- a. January:

- i. What colors do you see
- ii. Color and shape tells us when tulip bulbs were planted

- b. Repeat for each month

- i. Notice new colors – green and then red
- ii. Tell them what they mean
- iii. Predict next month
- iv. Repeat questions

- c. What could be happening- these bloom in spring? What do you think the difference may be?

4. We can look at your weather data or information to compare and see if our prediction is correct or to see the differences between each month.

- a. Explain that usually as spring comes around it is warmer than the 30s. So let's look at how many days we counted 30 in each month. Have remaining row groups look and count out the mode.
- b. Have one person from each group stand next to the map of the same month. And have the others tell how many days they counted.
- c. Repeat for each month.

- d. Stop to see if the children notice a pattern (less days in 30s as approach spring)
5. Drawing conclusions and inferring: what does this tell us about winter vs. spring? What does this tell us about the weather that helps the tulips grow?
6. Identify that they grow earlier in some parts of the world than others.

D. Post Assessment Question

Now that you are experts, what do you think will happen if you plant a tulip bulb in the fall?

The New STEM Standards in MA

Reasons for Change (theme or cross cutting concept in K)

In kindergarten, students build on early experiences observing the world around them as they continue to make observations that are more quantitative in nature and help them identify why some changes occur. Students begin to learn to use these observations as evidence to support a claim through growing language skills. They learn that all animals and plants need food, water, and air to grow and thrive and that the fundamental difference between plants and animals is a plants ability to make its own food. Students build their quantitative knowledge of temperature in relationship to the weather and its effect on different kinds of materials. They observe that the amount of sunlight shining on a surface causes a temperature change and they design a structure to reduce the warming effects of sunlight. They investigate motions of objects by changing the strength and direction of pushes and pulls. They provide examples of plants and animals that can change their environment through their interactions with it. In kindergarten science students begin to identify reasons for changes in some common phenomena.

Kindergarten: Earth and Space Sciences K-ESS2 Earth's Systems

K-ESS2-1. Use and share quantitative observations of local weather conditions to describe patterns over time. [Clarification Statement: Examples of quantitative observations could include numbers of sunny, windy and rainy days in a month, and relative temperature.] [Assessment Boundary: Assessment of quantitative observations limited to whole numbers.]

Kindergarten: Life Science K-LS1 From Molecules to Organisms: Structures and Processes

K-LS1-1. Observe and communicate that animals (including humans) and plants need food, water, and air to survive. Animals get food from plants or other animals. Plants make their own food and need light to live and grow.

K-LS1-2(MA). Recognize that all plants and animals have a life cycle: a. most plants begin as seeds, develop and grow, make more seeds, and die; and b. animals are born, develop and grow, produce young, and die.

Common Core Standards

State Recommendations for integrating Mathematics and STE

K.CC.B.5 Count to answer “how many?” questions about as many as 20 things arranged in a line, a rectangular array, or a circle, or as many as 10 things in a scattered configuration; given a number from 1–20, count out that many objects. (K-ESS2-1)

K.CC.C.6 Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies. (K-ESS2-1)

MA.PK.MD.A.2 Compare the attributes of length and weight for two objects, including longer/shorter, same length; heavier/lighter, same weight; holds more/less, holds the same amount. (K-ESS2-1)

K.MD.B.3 Classify objects into given categories; count the number of objects in each category and sort the categories by count. (K-ESS2-1)

State Recommendations for integrating ELA/Literacy and STE

W.K.2 Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic. (K-ESS2-2)

SL.K.5 Add drawings or other visual displays to descriptions as desired to provide additional detail. (K-ESS2-2)

SL.K.5 Add drawings or other visual displays to descriptions as desired to provide additional detail. (K.LS1-1)

RI.K.2 With prompting and support, identify the main topic and retell key details of a text. (K-ESS3-2)

SL.K.5 Add drawings or other visual displays to descriptions as desired to provide additional detail. (K--ESS3-3)

SL.K.6 Speak audibly and express thoughts, feelings, and ideas clearly. (K--ESS3-3) Appendix

ELA Common Core:

Kindergarten Writing

MA 2 Text Types and Purposes: Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic.

MA 8: Research to Build and Present Knowledge: With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question.

Comprehension and Collaboration

MA 2. Confirm understanding of a text read aloud or information presented orally or through other media by asking and answering questions about key details and requesting clarification if something is not understood.

Presentation of Knowledge and Ideas

MA 4. Describe familiar people, places, things, and events and, with prompting and support, provide additional detail.

MA 5. Add drawings or other visual displays to descriptions as desired to provide additional detail.

MA 6. Speak audibly and express thoughts, feelings, and ideas clearly.

Vocabulary Acquisition and Use

6. Use words and phrases acquired through conversations, reading and being read to, and responding to texts.

Mathematics Common Core Standards

Counting and Cardinality PK.CC

Know number names and the counting sequence.

MA.1. Listen to and say the names of numbers in meaningful contexts.

MA.2. Recognize and name written numerals 0–10.

Count to tell the number of objects.

MA.3. Understand the relationships between numerals and quantities up to ten.

Compare numbers.

MA.4. Count many kinds of concrete objects and actions up to ten, using one-to-one correspondence, and accurately count as many as seven things in a scattered configuration.

MA.5. Use comparative language, such as *more/less than*, *equal to*, to compare and describe collections of objects.

Measurement and Data PK.MD

Describe and compare measurable attributes.

MA.1. Recognize the attributes of length, area, weight, and capacity of everyday objects using appropriate

vocabulary (e.g., *long*, *short*, *tall*, *heavy*, *light*, *big*, *small*, *wide*, *narrow*).

MA.2. Compare the attributes of length and weight for two objects, including longer/shorter, same length; heavier/lighter, same weight; holds more/less, holds the same amount.

Measurement and Data K.MD

Describe and compare measurable attributes.

1. Describe measurable attributes of objects, such as length or weight.

Describe several measurable attributes of a single object.

2. Directly compare two objects with a measurable attribute in common, to see which object has “more of”/“less of” the attribute, and describe the difference. *For example, directly compare the heights of two children and describe one child as taller/shorter.*

Appendices

Letter to Families

Dear Families,

Mrs. Elwell's kindergarten classes are planting a tulip test garden as part of the international science project called Journey North. Each of your children will plant their own bulb. Next spring, we will connect with other schools across the Northern Hemisphere to share when we see our tulips come up and when they bloom to help scientists track spring's progress and learn about seasons, lifecycles and plants.

If you're interested in learning more about the project or developing your own test garden at home, take a look at <http://www.learner.org/jnorth/>

Our Tulip Observations

Scientist names _____

Date _____

Number of plants _____

Our Sketch:

Measuring:

One bud is _____ inches tall

Another bud is _____ inches tall

Another bud is _____

Our Tulip Observations

Date _____

What I wonder today...

I predict next time _____
Because _____