The Pumpkin Patch Project
Exploring The Life-Cycle Process

SHED CHILDREN'S CAMPUS
• ESTABLISHED 1984 •

BRAIN BUILDING IN PROGRESS
Department of Early Education and Care
BrainBuildingInProgress.org

This Innovative STEM Preschool Curriculum was made possible through a competitive grant awarded by the Massachusetts Department of Early Education and Care.

SHED, Inc.
65 Phillips Street
Andover, MA 01810
978-623-8460
www.shedinc.org

Contents

Introductory

Remarks From The Director

Inquiry and exploration remain the premise behind the philosophical approach of STEM curriculum in early childhood education. Children are inherently inquisitive, and curiosity is deepened through educational opportunities that exist beyond classroom walls. Multidisciplinary research projects suggest that the benefits of outdoor pedagogy are boundless, yet we are witnessing a decline in children's engagement with the natural world.

SHED Children's Campus believes that involvement with nature is essential to the development of our children. Our organizational philosophy holds deep roots and connections to nature, which can be witnessed through our evolving outdoor learning environments. These outdoor spaces serve as the primary foundation in which we educate our children on the fundamental skills of STEM programming as well as promote learning and development in all physical, cognitive, and social domains.

The original concept behind the Pumpkin Patch Project organically emerged. The rationale for the proposed curriculum was comprehensive yet simple. We hoped to bring a complex topic back to the basics by taking children on an experiential journey where they familiarize themselves with sequential properties through scientific cause and effect relationships.

On behalf of our entire organization, **SHED Children's Campus,** we are extremely excited to share our story, and hope to inspire other organizations and educators to challenge norms and explore unfamiliar ideas.

Linda-Shottes Bouchard, executive director

Acknowledgements

SHED Children's Campus expresses the utmost gratitude to the **Massachusetts Department of Early Education and Care** for providing our organization with this experimental opportunity. We especially would like to thank, **Eric Lieberman,** creator of the Preschool Innovative STEM Curriculum Grant and his committee for believing in our vision and supporting our organization along this journey. Additionally, recognition is due to the developers of the **Brain Building in Progress** initiative for their contributions and efforts.

The success of this project is largely attributed to the continuous support of our children, families, friends, volunteers, and educators. Thank you to **Wildwood Nursery** in Andover, Massachusetts, for designing and constructing the pumpkin patch in addition to installing an irrigation system. Much appreciation goes to volunteer and alum, **George Eichman,** for building several of our raised beds. In addition, a special thank you is given to the **Andover Gardening Club** for offering consultations and **Konjoian's Greenhouses and Landscape Solutions** in Andover for donating an abundance of plants and seeds.

Explore With Us

SHED Children's Campus is self-supporting non-profit organization located in Andover, Massachusetts, on the beautiful campus of Phillips Academy. Since establishment in 1984, SHED has evolved from an extended day kindergarten program to a prosperous organization offering programs for children 2.9-15 years of age throughout the twelve months of the year. Currently, SHED Children's Campus serves 400 families on an annual basis residing throughout the Merrimack Valley.

SHED Children's Campus operates five differentiated early childhood education programs: Monarch Preschool, Springboard to Kindergarten, Minds in Motion ½ day Kindergarten, Kid's Club Before and After School Kindergarten, and Little Explorers at Play (LEAP.) In addition, Monarch Summer Camp and Junior Adventures are offered throughout the summer months.

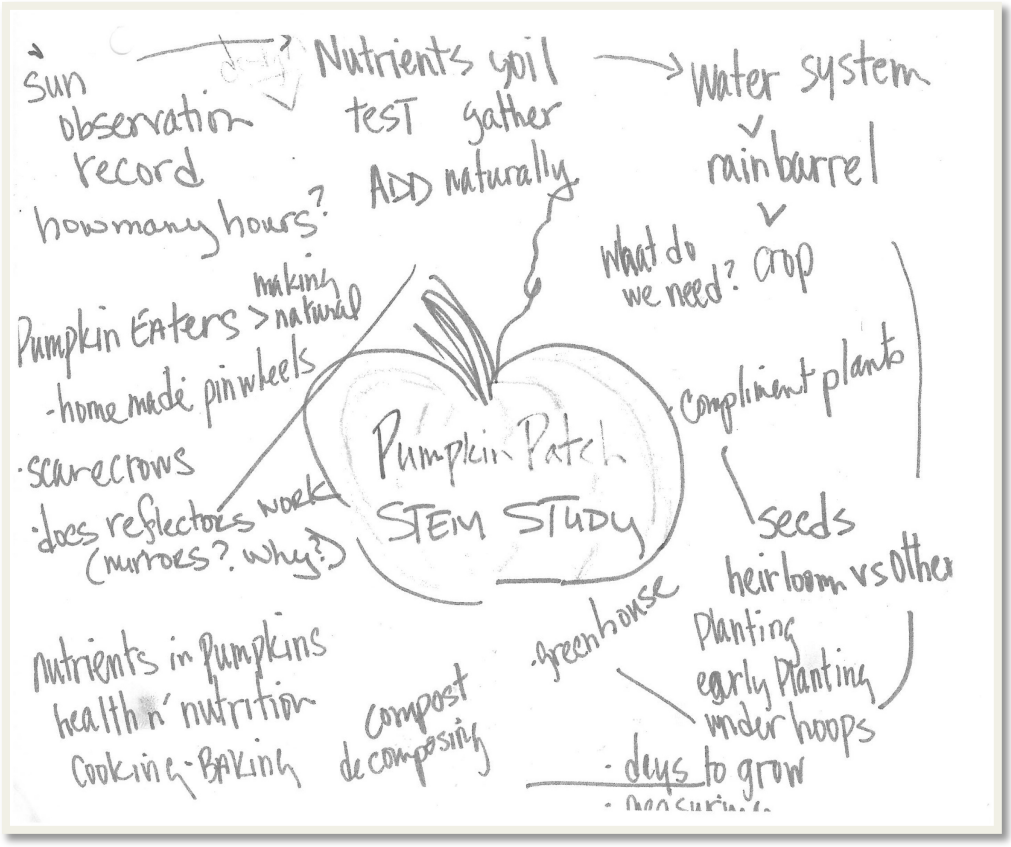
Our early childhood programs have adopted an emergent style of curriculum, inspired and influenced by the Italian Reggio Emilia Approach as well as Howard Gardner's Multiple Theories of Intelligence. Our approach is child-centered where intentional program planning occurs based upon what children find interesting, stimulating, and challenging. Parents are recognized as children's primary educators, and the entire family is invited to explore with us where we attach curriculum to developmental milestones.

Theme presentations remain at the core of curricular design for the purpose of providing age appropriate activities that encourage thought and foster inquisitiveness. SHED Children's Campus advocates for the development of school readiness skills through play; we believe children learn best by doing, and play provides the foundation for future learning and growth. Additionally, great emphasis is placed upon multidisciplinary learning opportunities that require the presence of all senses and levels of intelligences.

Curricular Design

The Pumpkin Patch Project entails a comprehensive science, technology, engineering, and mathematics curriculum centered upon hands-on experimentation and collaborative inquiry. The STEM curriculum involves an array of activities that allow children to enhance existing knowledge while heightening conceptual understanding of the world in which they reside.

The goal-oriented project follows a sequential process with defined objectives where interrelated discipline skills are fostered though age-appropriate activities that encapsulate all senses. The described curriculum allows children to comprehend complex life-cycle processes through active involvement in each of the stages with the ultimate intent of fostering the whole individual.



The original concept behind the Pumpkin Patch Project sketched in the fall of 2013.

From the start of the 2013-2014 academic calendar, children were involved in the organization's composting efforts. A composting bin was placed in each classroom, and children were educated on the fundamental properties associated with composting.

In attempt to provide an additional layer, a decomposing pumpkin was placed in the classrooms. Children predicted potential outcomes, and documented changes through words and pictures. Eventually, the children were able to witness the sprouting phenomena. The pumpkin was then placed in one of our gardens with the intent to encourage children to monitor growth throughout the winter months.

Since 2012, SCC has seen a 40% decrease in amount of collected trash due to the installation of a 3-bin composting system and heightened emphasis on recycling.

COMPOSTING LITERARY RESOURCES:

- *Composting Stew: An A to Z Recipe for the Earth*
  By: Mary McKenna SIddals (2010)
- *Garbage Helps Our Garden Grow: A Compost Story*
  By: Linda Glaser (2010)
- *Kids Can Compost*
  By: Wen-Chia Tsai Parker (2010)

Inside the classroom, children and educators were busy familiarizing themselves with the different characteristics of pumpkin seeds. By introducing related literature, educators were able to ask open-ended questions to gauge the children's level of knowledge while encouraging them to draw hypothesizes. Moreover, children examined several different types of pumpkin seeds, and were prompted to draw inferences related to similarities and differences in size, shape, and texture.

Additionally, children explored the properties of annual and perennial plants. Educators prompted children to collect and label seeds while explaining the differences between the life-cycle processes. An additional yearlong science project involved our butterfly garden where native species of plants attractive to butterflies and hummingbirds were planted with the goal of increasing the local population of pollinators.

In October of 2013, our early childhood educational programs visited Andover Historical Society in Andover, MA. During the outing, children were educated on the importance of plant origin and cultural connection. SHED Children's Campus has previously committed to the revitalization of heirloom plant varieties in our local region, and believed the proposed pumpkin patch would provide another layer to strengthen that commitment. Furthermore, programs have adopted a theme of social responsibility where children are encouraged to make logical choices and accept responsibility for those decisions.

It is an additional intent of the organization to establish a seed library in collaboration with the local public library where families and community members will be invited to exchange and swap seeds, heightening appreciation for locally grown produce. Moreover, during our harvest celebration, children and families will be encouraged to participate in a ***Story Walk***.

ADDITIONAL LITERARY RESOURCES:

- *From Seed to Plant*
  By: Gail Gibbons (1993)
- *Pumpkin Jack*
  By: Will Hubbel (2010)
- *The Tiny Seed*
  By: Eric Carle (2009)
- *Seeds, Seeds, Seeds*
- By: Nancy Elizabeth Wallace (2013)
- *Yucky Worms*
  By: Vivian French (2012)

In March of 2013, SCC was awarded the School Garden Grant from the Whole Kid's Foundation in support of our evolving campus gardens.

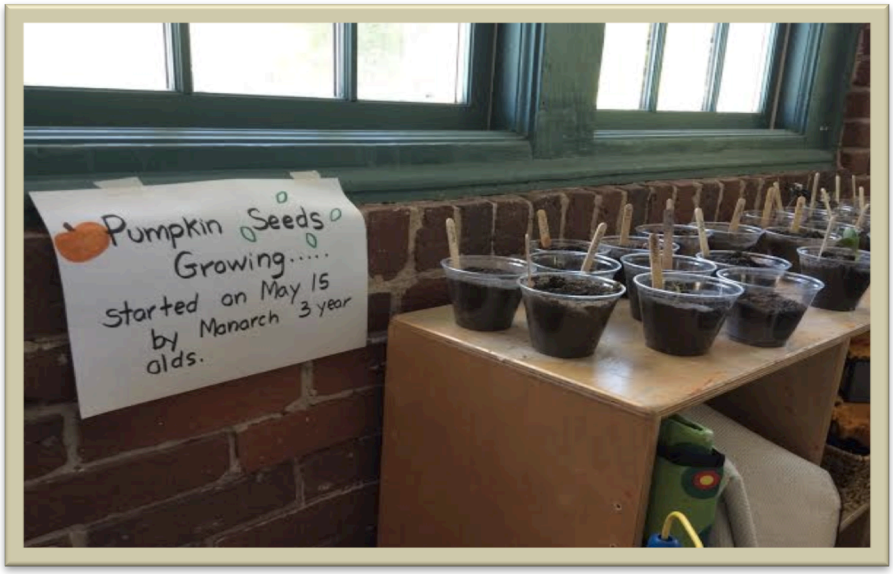
During the summer of 2014, SCC harvested over 15 types of plants, and has the goal of becoming completely sustainable in the upcoming years.

Project Execution

By the spring of 2014, classroom happenings were well underway. Children were exploring the vast characteristics of living things, and educators were directing lessons toward understanding species of animals and plants in conceptual contexts. However, the location of the Pumpkin Patch was still undetermined. With warm weather shortly approaching, educators approached the children for help.

An activity was spontaneously created in which children observed the amount of sunlight throughout the day of two locations on SHED Children's Campus. After reviewing the observations, it was concluded that two patches would be constructed, one designated specifically for experimental purposes in the location that received less sunlight. In June of 2014, construction was complete.

Due to weather conditions and limitations, the pumpkin seeds were first planted inside the classrooms to ensure the soil was warm enough. In May of 2014, children placed 2 or 3 pumpkin seeds in clear plastic cups with soil and monitored for a period of 10 days.



After allowing the seeds to germinate indoors for roughly two weeks, children transported the plants to our raised beds in late June 2014. Children were instructed to remove the plants from the cups carefully in order to minimize root disturbance, and place them into a two-inch hole a few feet apart from one another. Before covering the hole with dirt, children were given an additional pumpkin seed to place in the hole along with a bean and corn kernel. Educators explained to the children the advantages of planting the "three sister" seeds together.

By the conclusion of the 2013-2014 school year, all of the pumpkin seeds were planted in the ground, and an irrigation system was installed to ensure the pumpkins were receiving adequate water supply. During the initial weeks, the growth process was gradual, yet week by week progress was becoming more and more visible.

Planting pumpkins, beans, corn together is a technique known as companion planting, which originated from the Native Americans in the late 1500's.

DID YOU KNOW…

- Pumpkin vines are known to grown as much as 6 inches in one day.
- The largest pumpkin ever grown was 1,340 pounds.
- Pumpkins grow in every continent besides Antarctica.
- Pumpkins take 85 to 125 days to mature.

Pumpkin plant, June 2014

By the end of July 2013, both of the designed pumpkin patches were in full bloom with countless flowers stemming from the vines and even summer squash was appearing, which were planted with some of the pumpkin seeds. However, it was apparent that in some areas of the patches, some of the plants were receiving too much water and sunlight, and weeds were abundant throughout.

After researching the best possible solutions to the obstacle, it was decided that we would attempt to use seaweed particles as a way to stimulate growth and eliminate weeds. During a summer fieldtrip to Seacoast Science Center in Rye, NH, children gathered a variety of seaweed, and placed the seaweed throughout the patches. After 3 short days, several of the struggling plants were completely rejuvenated and began to bloom.

Experimental Pumpkin Patch, August 2013

DID YOU KNOW...

- Seaweed helps to keep soil and mulch moist.
- Seaweed eliminates the need to weed and repels slugs and other pests.
- Seaweed stimulates plant growth while aerating mulch.

Maintaining the Pumpkins

After discovering the benefits associated with using seaweed in the patches, the vines were growing at rapid paces and weeds were few and far between. Educators routinely brought children out to the patches during the afternoon hours to document progress and measure vine growth. During the beginning of August, it was determined that the plants in the middle of the patches were receiving too much water. Project leaders called upon Wildwood Nurseries to adjust the positions of the automatic hoses. In addition, educators prompted children to hypothesize reasons attributed with the sluggish growth and encouraged children to monitor periods of sunlight throughout the day.

On August 12th the first pumpkin was spotted in the garden. Shortly after, countless pumpkins began to emerge from the budding flowers.

In addition to the seaweed, the Monarch Preschool Summer Camp program concocted an organic weed killer comprised of vinegar, Epsom salt, and Dawn blue dish detergent which they sprayed on the leaves. Routine maintenance occurred for the remainder of the summer.

First Pumpkin, August 2014

Harvesting

By the beginning of September, several pumpkins were beginning to blossom. Unfortunately, due to adverse weather conditions, many of the vines began to rot and decay. Nevertheless, the grow process for many of the pumpkins was evidently noticeable and was documented by the children. To ensure the healthy pumpkins would not rot, hay was strategically placed underneath pumpkins to provide an additional level of support and comfort for the growing plants. In addition, the pumpkins were turned frequently to prevent from rotting.

As the vines were rapidly growing, children expressed deep levels of curiosity concerning how they were growing and what was causing the overnight growth. An activity was created in which the children measured the daily and weekly growth patterns of the vines throughout September.

WHEN ARE PUMPKINS RIPE?

- Color is vibrant orange.
- Both skin and stem are extremely hard.
- Pumpkin is hollow when gently hit.

Due to the placement of the sun in the patches, the maturity time for each pumpkin varied tremendously. Many pumpkins did not turn in color until nearly the first of October, while several of the plants were considerably orange by the beginning of September.

Interactive Activities

The hands-on activities listed and described below have been mindfully designed to provide developmentally appropriate activities for young learners to capture real life competences throughout their natural environments.

The Pumpkin Patch Project involves critical elements related to the *Brain Building in Progress* initiative. The project takes children on a journey from the preliminary stages of planning to the celebratory accomplishment of harvesting. Children have been exposed to the characteristics of sequence by active involvement in all necessary steps.

The competences that the activities address are vast, and are applicable to children's intellectual and social beings as they develop from preschoolers to kindergarteners and beyond. SHED Children's Campus encourages educators to adapt activities as they see fit, and share our information with fellow professionals.

The Pumpkin Patch Project satisfies both flexibility and equitability. Organizations are encouraged to approach the activities through an emergent lens, in which children's interests determine project direction.

Activity 1

Composting Confusion

Materials:

- Plastic bin
- Composting Stew: An A to Z Recipe for the Earth by Mary McKenna

Disciplinary Core Ideas:

- Natural Resources
- Human Impact on Ecosystems
- Structure and Properties of Matter

The purpose of this activity is to educate children on the importance of organic gardening along with the benefits of preserving natural resources.

Begin the activity by reading **Composting Stew: An A to Z Recipe for the Earth** by Mary McKenna. Following the book, prompt children to remember the items listed throughout the book. Help the children make a chart identifying classroom items that can be composted and items that cannot be composted.

Post the composting chart visibly in the classroom, and have the children add to the list continually.

Compost	No Compost
Potatoes	Plastic
Brown Paper	Chicken
Apple Cores	Cheese
Egg Shells	Bread

After children have developed an understanding of the fundamentals, introducing a composting bin. Place the bin near the garbage and recycling bins. Remind children to incorporate their lunch scraps in the bin, and have them keep track of daily and weekly intake.

ACTIVITY 2
TESTING THE POWER OF SEEDS

MATERIALS:

- CLEAR PLASTIC CUPS
- GREEN BEAN SEED
- PENNIES
- TOOTHPICKS

DISCIPLINARY CORE IDEAS:

- FORCES AND MATTER
- STRUCTURE AND FUNCTION
- GROWTH AND DEVELOPMENT OF ORGANISMS

QUIDING QUESTIONS …

- *Will the size of the seed make the sprout more powerful?*
- *How many days until the seed pops up?*
- *Will the penny fall off?*

The objective of this activity is to show children the strength of seed sprouts. Have children fill plastic cups with soil, and poke an inch-deep hole in the center. The green bean will then be placed inside the hole and covered with soil.

Brainstorm with children what components seeds need to grow. Ask children what area in the classroom would be best to place the seeds, and how frequently the seeds should be watered.

Once the seed has sprouted, instruct children to place penny over the sprout and prompt them to place 4 toothpicks around the penny. The goal is to push the penny over toothpicks.

2014 Harvest

Activity 3
Understanding Cause & Effect

Materials:

- Mason jar
- Cotton balls
- Pinto bean sprout

Disciplinary Core Ideas:

- Weather and Climate
- Interdependent Relationships in Ecosystems
- Growth and Development of Organisms

The objective for this activity is to introduce children to the basics of scientific relationship and inquiry. Instruct children to dampen cotton balls, and place in jar. Ask children why do they think the cotton balls were wet. Following the first step, provide each child with a sprout to place inside the jar. Cover with lid, and have children place somewhere in the classroom.

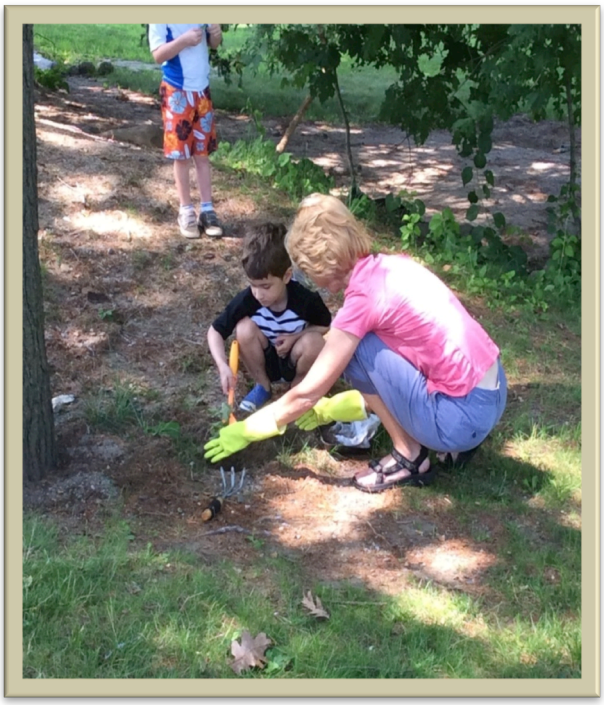
EXPLORATORY QUESTIONS…

- How do seeds sprout?
- Will the seed get bigger before it sprouts?
- Does the shape of the seed change?
- Why are the seeds sprouting with soil?

If all children placed jar in a sunny place, place an additional jar in the shade and ask children what sprout will grow, ones in the sun or in the shade, and why.

Encourage children to observe their sprout daily and weekly for changes, and document growth stages through illustrations.

ACTIVITY 4
WHAT MAKES THE SOIL HEALTHY?
TESTING PH



MATERIALS:
- RED CABBAGE
- DISTILLED WATER
- PLASTIC CUPS
- BAKING SODA
- VINEGAR

DISCIPLINARY CORE IDEAS:
- CHEMICAL REACTIONS
- INTERDEPENDENT RELATIONSHIPS IN ECOSYSTEMS
- NATURAL RESOURCES

The purpose of this activity is to teach children how level of pH effects plant growth. Prior to classroom lesson, chop head of red cabbage and boil in a pot of distilled water. After leaving cabbage in boiling water for about 10 minutes, drain juice.

Instruct children to pour a small amount of cabbage juice into 2 cups. Provide children with baking soda and vinegar to distribute in the separate cups. Prompt children to draw hypotheses concerning what color the solution will turn.

Vinegar should turn vibrant pink where as the baking soda solution should turn blue/green.

For pumpkins to grow adequately, neutral soil is required, which is indicated by a purple color.

Explain to the children that when a solution is purple it is neutral, acidic if it is pink, and blue or green (alkaline) if otherwise. In order to

Following the controlled exercise, place a handful of soil from the garden in a cup with cabbage juice. Have the children wait thirty minutes to check results.

❖ A HELPFUL HINT

Explain pH in terms of 'balance' to young learners. Children relate to terms such as high, low, or in the middle. A neutral soil would be considered 'in the middle'.

ACTIVITY 5
BUILDING A WORM FARM
THE UNDERGROUND FARMERS

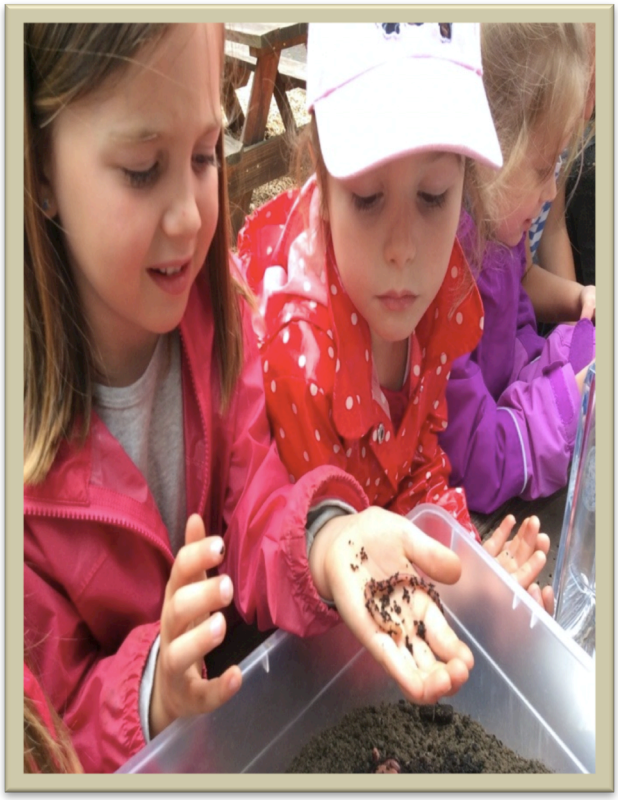
MATERIALS:
- YUCKY WORMS BY VIVIAN FRENCH
- MASON JAR
- COMPOST WORMS
- DIRT
- SAND

DISCIPLINARY CORE IDEAS:
- GROWTH AND DEVELOPMENT OF ORGANISMS
- INTERDEPENDENT RELATIONSHIPS IN ECOSYSTEMS
- INHERITANCE OF TRAITS

DID YOU KNOW…
- In most backyards, you will find about fifteen worms in every square yard of soil.
- A worm's tail can regrow if it's cut off, but cutting a worm in half will kill it.
- Worms breathe through their skin.
- Adult worms have a clitellum, which is a yellow ring found around their body.

Yucky Worms by Vivian French is a great introduction to building worm farms. After reading the book, have the children layer sand and dirt into a jar and place worm on the top layer. Provide the children with leaves to place into the layers to ensure worm has adequate food.

PROBING QUESTIONS…
- How do worms help our garden?
- How much water does a worm need?
- Why do worms go above the ground?
- What do worms eat?
- Do worms travel backwards or forwards?
- What do worms do when the soil becomes very cold?



ACTIVITY 6
GARBAGE GARDEN

Certain vegetables such as potatoes, onions, and celery grow both above and below the ground.

The parts that grow underneath the soil serve as the plants personal food supply, storing energy for the leaves.

MATERIALS:

- SHALLOW BOWL
- SOIL
- WATER
- CELERY STALK

DISCIPLINARY CORE IDEAS:

- GROWTH AND DEVELOPMENT OF ORGANISMS
- STRUCTURE AND FUNCTION
- INHERITANCE OF TRAITS

The purpose of this activity is to show children the adaptability of living things. By growing plants in a jar, children are able to view the entire plant including the leaves and stems, the main roots, and the feeders.

Instruct the children to place a celery stalk in a shallow bowl filled with 1 to 2 inches of water, and place the jar in indirect sunlight. Monitor the plant for a period of 7-10 days, and eventually sprouting will occur.

The activity simultaneously reinforces to properties and benefits associating with composting. Educators reminded children of the similarities of the activity along with daily composting activities.

3-bin Composting System – Built in Summer 2014

ACTIVITY 7
NATURAL WEED KILLERS

MATERIALS:

- VINEGAR
- EPSOM SALT
- *DAWN* BLUE DETERGENT
- SPRAY BOTTLE

DISCIPLINARY CORE IDEAS:

- CHEMICAL REACTIONS
- STRUCTURE AND PROPERTIES OF MATTER
- HUMANS IMPACT ON EARTH SYSTEMS

This activity is a simple and quick exercise. Mix 1-gallon vinegar, 2 cups Epsom salt, and ¼ of dawn blue detergent. Pour liquid into spray bottles and have children spray weeds.

INVESTIGATIVE QUESTIONS…

- Will it work?
- How many days until the weeds are gone?
- Will the weeds grow back?
- Is the solution safe for the plants?

Activity 8

Rain Barrels: Using Our Earth to Make Earth Better

Materials:

- Barrels
- Bricks or Cinder Blocks
- Hose/Spigot
- Accessible gutter

Disciplinary Core Ideas:

- Natural Resources
- Weather and Climate
- Humans Impact on Earth Systems

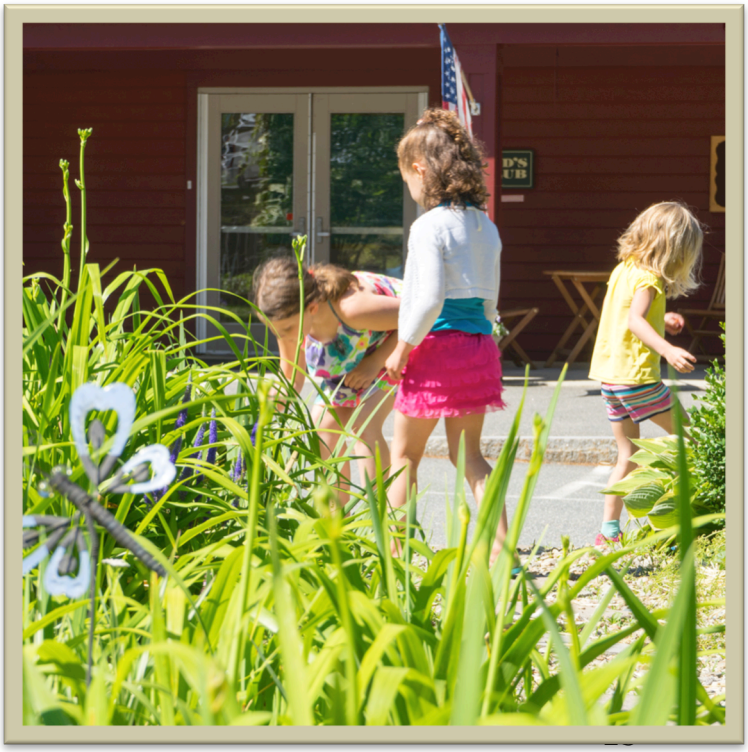
Building a rain barrel is a quite simple task that teaches children the importance of water conservation. Simply place a sturdy plastic barrel underneath an accessible gutter with a hose spigot embedded toward the bottom of the barrel. However, it is important to place your rain barrel on a level ground to prevent barrel from tipping. It is recommended to use a platform roughly 4 feet tall comprised of bricks or cinder blocks.

DID YOU KNOW…

- Rain water is highly oxygenated and free from chlorine often found in tap water
- The cleanest rain water comes from roofs that are metal or clay
- It is estimated that nearly 600 gallons of water is known to fall from a roof annually

LEADING QUESTIONS…

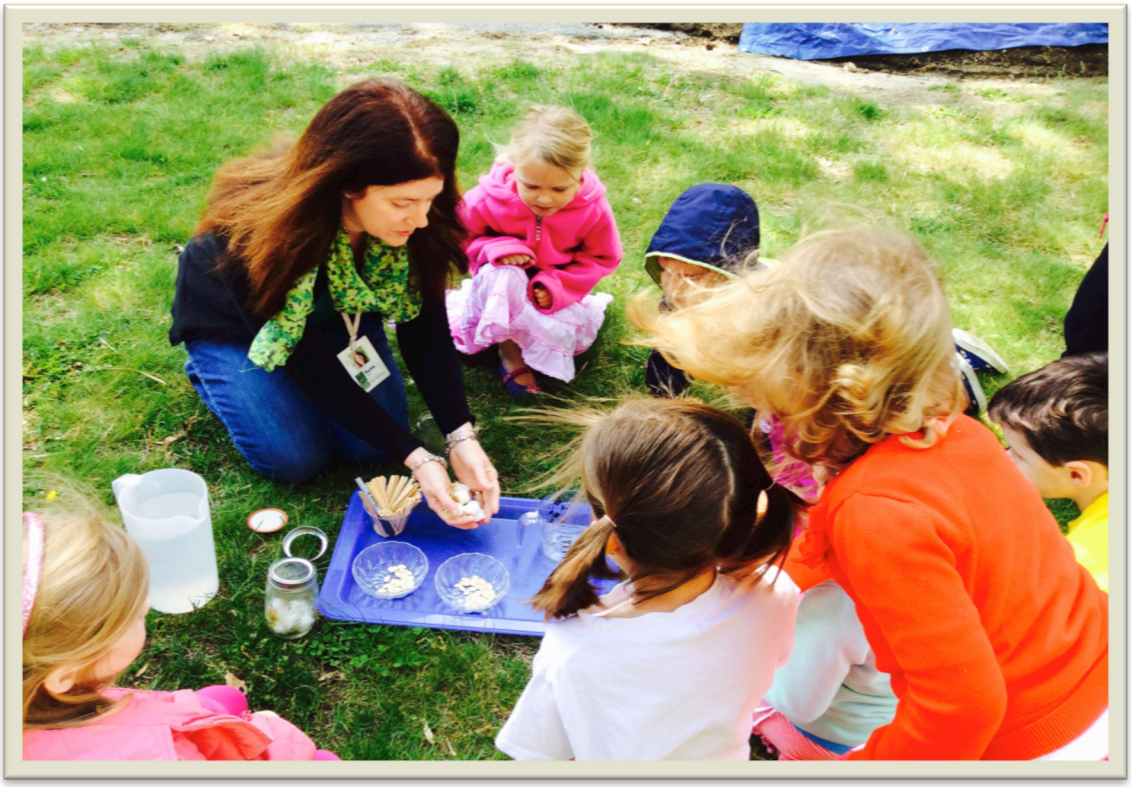
- What do plants need to grow?
- Why is water important to plants?
- Can plants ever receive too much water?



Documentation

The Pumpkin Patch Project utilized pedagogical documentation as the primary way of visualizing each child's learning journey. The concept of 'documentation' in a Reggio Emilia inspired curriculum entails combing numerous forms of text to make the learning journey visible. Educators were actively documenting how children were grasping concepts by analyzing portfolio entries, and used documentations to build upon their understandings. Children were encouraged to illustrate daily changes and prompted to verbalize what they were witnessing. Additionally, educators documented the verbal observations the children were forming, and encouraged children to further thoughts by drawing hypotheses and conclusions.

Educators gathered samples of the children's work throughout the duration of the project in number mediums. In addition to photographs, teachers wrote comments and transcribed the verbal communication of the children.



Family Involvement & Sustainability

SHED Children's Campus intends for the Pumpkin Patch Project to be annually conducted and grow into a core resource for the entire community. As part of the organization's future vision, we plan to establish a seed library in collaboration with our local library where families will be supported to nurture seeds and exchange with others. SHED Children's Campus hopes to invite surrounding community members to our campus to participate in seed swaps to preserve local plant variety as well as deepen communal roots.

As our outdoor places and spaces continue to evolve, the need for volunteers has simultaneously increased. SHED Children's Campus has an active family volunteer base in which tremendous support and time is given to maintain our growing gardens.

In addition, a harvest celebration will take place during late October where our children will invite family members and friends to celebrate their yearlong accomplishment of growing a seedling into a pumpkin.

Contact Information

Shed children's Campus
65 phillips street
Andover ma 01810
Phone: 978-623-8460
www.shedinc.org

linda Shottes-Bouchard, Executive Director
65 phillips street
andover, ma 01810
phone: 978-623-8460
lsbouchard@shedinc.org

kelly hartnett, development coordinator
65 phillips street
andover, ma 01810
phone: 978-302-8057
khartnett@shedinc.org

karen ulbin, senior program director
65 phillips street
andover, ma 01810
phone: 978-623-8462
kulbin@shedinc.org