

Curriculum Unit Overview

Curriculum Area: Science and Technology

Grade Level: Pre-K

Unit Summary: Over the course of the year, students will have opportunities to observe and explore the natural and physical world and use their discoveries to draw their own conclusions about the world around them.

Learning Targets

Curriculum aligned with Standards: New Jersey Preschool Teaching and Learning Standards 2014

21st Century Skills: Critical Thinking & Problem Solving X, Creativity and Innovation X, Collaboration, Teamwork and Leadership X, Cross-Cultural Understanding and Interpersonal Communications X, Communication and Media Fluency X, Accountability, Productivity and Ethics X

Interdisciplinary Connection: Math=MA, English=ELA, Science=SCI, Social Studies=SS, Physical Education=PE, Art=ART, Music=MU, Technology=TECH, World Language=WL

Standards

Standard 5.1: Children develop inquiry skills.

- 5.1.1 Display curiosity about science objects, materials, activities, and longer-term investigations in progress (e.g., ask who, what, when, where, why, and how questions during sensory explorations, experimentation, and focused inquiry).
- 5.1.2 Observe, question, predict, and investigate materials, objects, and phenomena during classroom activities indoors and outdoors and during any longer-term investigations in progress. Seek answers to questions and test predictions using simple experiments or research media (e.g., cracking a nut to look inside; putting a toy car in water to determine whether it sinks)
- 5.1.3 Use basic science terms (e.g., observe, predict, experiment) and topic-related science vocabulary (e.g., words related to living things [fur, fins, feathers, beak, bark, trunk, stem]; weather terms [breezy, mild, cloudy, hurricane, shower, temperature]; vocabulary related to simple machines [wheel, pulley, lever, screw, inclined plane]; words for states of matter [solid, liquid]; names of basic tools [hammer, screwdriver, awl, binoculars, stethoscope, magnifier]).
- 5.1.4 Communicate with other children and adults to share observations, pursue questions, make predictions, and/or conclusions.
- 5.1.5 Represent observations and work through drawing, recording data, and “writing” (e.g., drawing and “writing” on observation clipboards, making rubbings, charting the growth of plants).

Standard 5.2: Children observe and investigate matter and energy.

- 5.2.1 Observe, manipulate, sort, and describe objects and materials (e.g., water, sand, clay, paint, glue, various types of blocks, collections of objects, simple household items that can be taken apart, or objects made of wood, metal, or cloth) in the classroom and outdoor environment based on size, shape, color, texture, and weight.
- 5.2.2 Explore changes in liquids and solids when substances are combined, heated, or cooled (e.g., mixing sand or clay with various amounts of water; preparing gelatin; mixing different colors of tempera paint; and longer term investigations, such as the freezing and melting of water and other liquids).
- 5.2.3 Investigate sound, heat, and light energy through one or more of the senses (e.g., comparing the pitch and volume of sounds made by commercially made and homemade instruments, recording how shadows change during the course of a day or over time, using flashlights or lamp light to make shadows indoors).
- 5.2.4 Investigate how and why things move (e.g., slide block, balance structures, push structures over, use ramps to explore how far and how fast different objects move or roll).

Standard 5.3: Children observe and investigate living things.

- 5.3.1 Investigate and compare the basic physical characteristics of plants, humans, and other animals (e.g., observing and discussing leaves, stems, roots, body parts; observing and drawing different insects; sorting leaves by shape; comparing animals with fur to those with feathers).
- 5.3.2 Observe similarities and differences in the needs of living things, and differences between living and nonliving things(e.g., observing and discussing similarities between animal babies and their parents; discussing the differences between a living thing, such as a hermit crab, and a nonliving thing, such as a shell).
- 5.3.3 Observe and describe how natural habitats provide for the basic needs of plants and animals with respect to shelter, food, water, air, and light (e.g., digging outside in the soil to investigate the kinds of animal life that live in and around the ground or replicating a natural habitat in a classroom terrarium).
- 5.3.4 Observe and record change over time and cycles of change that affect living things (e.g., monitoring the life cycle of a plant, using children’s baby photographs to discuss human change and growth, using unit blocks to record the height of classroom plants).

Standard 5.4: Children observe and investigate the Earth.

- 5.4.1 Explore and describe characteristics of soil, rocks, water, and air (e.g., sorting rocks by shape and/or color, observing water as a solid and a liquid, noticing the wind’s effect on playground objects).
- 5.4.2 Explore the effects of sunlight on living and nonliving things (e.g., growing plants with and without sunlight, investigating shadows that occur when the sun’s light is blocked by objects).
- 5.4.3 Observe and record weather (e.g., chart temperatures throughout the seasons or represent levels of wind by waving scarves outdoors).
- 5.4.4 Demonstrate emergent awareness of the need for conservation, recycling, and respect for the environment (e.g., turning off water faucets, collecting empty yogurt cups for reuse as paint containers, separating materials in recycling bins, re-using clean paper goods for classroom collage and sculpture projects).

Standard 5.5: Children gain experience in using technology.

- 5.5.1 Identify and use basic tools and technology to extend exploration in conjunction with science investigations (e.g., writing, drawing, and painting utensils, scissors, staplers, magnifiers, balance scales, ramps, pulleys, hammers, screwdrivers, sieves, tubing, binoculars, whisks, measuring cups, appropriate computer software and website information, video and audio recordings, digital cameras, tape recorders).

Unit Essential Questions

Students will wonder...

- Why is it important to observe the world around us?
- How can you learn about things you find in the natural and physical world?
- How is the weather different today than yesterday?
- How can we reuse this empty “yogurt” container in our classroom?
- How have you changed since you were a baby?

Unit Enduring Understandings

Students will understand that...

- They need to observe the materials and processes in their environment.
- An experiment is something you do in order to test an idea.
- They can make a prediction based on what they have observed.
- There are many different types of tools to use in order to observe the natural and physical world.
- Data is evidence collected from observations and experiences.

Unit Learning Targets

Students will know:

- Observing: Children observe the materials and processes in their environment.
- Classifying: Children classify materials, actions, people, and events.
- Experimenting: Children experiment to test their ideas.
- Predicting: Children predict what they expect will happen.
- Drawing conclusions: Children draw conclusions based on their experiences and observations.

Students will be able to:

- Children are curious and use all their senses to learn more about the natural and physical world. They gather information by observing what others do and discovering how tools and materials work.
- Children group similar things together. They identify relationships between things and the categories they belong to. Children look for new ways to organize the knowledge they already have and for ways to fit new discoveries into familiar categories.
- Children experiment to test whether an idea is true or a solution will work. They may encounter problems with materials that they do not have answers for. They experiment by manipulating materials, using

- Communicating ideas: Children communicate their ideas about the characteristics of things and how they work.
- Natural and physical world: Children gather knowledge about the natural and physical world.
- Tools and technology: Children explore and use tools and technology.

- trial and error, and then approaching the problem with possible solutions in mind.
- Children indicate through words and/or actions what they expect an outcome to be. They think about what happened in similar situations and anticipate what might happen. Children make predictions based on experimentation.
 - Children share their questions, observations, investigations, predictions, and conclusions. They talk about, demonstrate, and represent what they experience and think. They express their interest in and wonder about the world.
 - Children attempt to fit their observations and reasoning into their existing knowledge and understanding. They construct knowledge in their own way as they collect data to help them form theories about how the world works (e.g., “It’s night because the sun goes to bed”).
 - Children become familiar with characteristics and processes in the natural and physical world (e.g., characteristics of plants and animals, ramps and rocks; processes of growth and death, freezing and melting). They explore change, transformation, and cause and effect. They become aware of cycles that are meaningful to them.
 - Children become familiar with tools and technology in their everyday environment (e.g., stapler, pliers, computer). They understand the functions of equipment and use it with safety and care. They use tools and technology to support their play.

Evidence of Learning

Suggested Assessments

Students learning is documented through anecdotal records and the Children’s Observation Record (COR)

Developmental Range:

The children will approach each activity at different developmental levels:

Earlier:

Student requires adult supervision throughout the activity. Student needs to be redirected back to activity several times. For small group activities, student explores materials. For large group activities, student observes others or participates with adult assistance. Student uses little or no language and requires prompts to follow directions.

Middle:

Student requires some adult supervision and can do an activity independently for brief periods. Student needs some verbal prompts to be redirected back to the activity.

Suggested Assessment Evidence

PERFORMANCE TASK (S):

Small Group (adapted from Small-Group Times to Scaffold Early Learning):

Students will be constructing ramps for small cars as they explore the concepts of velocity and weight. Teacher will provide a chart to record types of cars and types of ramps and the combination producing the fastest cars. Students construct ramps of different heights with cardboard tubes and blocks. They test different types of cars in the tubes (metal, plastic, wood) and record which one comes down the fastest. They try the cars down ramps of different inclines and record which one comes down the fastest.

Students will demonstrate:

- How to record data onto the chart
- How to classify between the different types of cars
- How to compare the different types of inclines
- Knowledge of differences in speed and height
- Ability to make changes in ramps

For small group activities, student uses materials in a purposeful way, copies actions of other students, or starts using materials purposely with verbal suggestion from adult. For large group activities, student participates with some verbal prompt from adult or copies actions of other students. Student uses some language to describe, request, suggest, and comment during activities.

Later:

Student can independently participate in activities after the adult introduces them. Student needs to be redirected a few times or does not need redirection. For small group activities, student uses materials in purposeful and complex ways. Student is able to assist peers with their materials. For large group activities, student participates independently and offers suggestions during the activity. Student uses sentences to describe what they are doing, ask questions, and participate in conversations.

Large Group:

Students will go on an outside walk at different times of the year (as the season changes). They will make observations of what they see outside. They will gather materials they find outside and sort them. When they return, they will either draw their observations or describe them to a teacher. The teacher will take pictures during the outside walk so the suggestion is from adult. For large group activities, student participates with some verbal prompt from adult or copies actions of other students. Student uses language to describe, request, suggest, and comment during activities.

Later:

Student can independently participate in activities after the adult introduces them. Student needs to be redirected a few times or does not need redirection. For small group activities, student uses materials in purposeful and complex ways. Student is able to assist peers with their materials. For large group activities, student participates independently and offers suggestions during the activity. Student uses sentences to describe what they are doing, ask questions, and participate in conversations. Students can use them to compare and contrast each time they go. They will look for similarities and differences in their observations and in the materials they gather.

The students will demonstrate:

- Naming objects found outside and describing attributes of what they see
- Ability to compare and contrast what they see from one outside walk to the next
- Ability to draw an object they find outside or describe it with words
- Sorting their outside collection and naming their categories
- Using the pictures to describe change, cause and effect, and sequence

OTHER EVIDENCE:

- Teacher observations (anecdotal notes) during work time, small group time, clean up time, outside time
- Science journal
- Report card
- Nature collections
- Writing samples (when they draw found objects)
- Data charts

Learning Activities:

- Message Board
- Art Area, Toy Area, Block Area, Sand and Water Table during Work Time
- Small Group Time: science related activities
- Outside Time: observing things seen outdoors; collecting objects found outside
- Clean up Time: sorting and classifying toys
- Planning/Recall time
- Filling sand/water table with variety of sensory materials
- Collect and sort objects

- Play “Guess Who,” “I Spy,” and other attribute games
- Grow classroom plant

Modifications and/or Accommodations:

- **Special Education:** Utilize a multi-sensory (VAKT) approach during instruction, provide alternate presentations of skills by varying the method (repetition, simple explanations, additional examples, modeling, etc.), modify test content and/or format, allow students to retake test for additional credit, provide additional times and preferential seating as needed, review, restate and repeat directions, provide study guides, and/or break assignments into segments of shorter tasks.
- **English Language Learners:** Extend time requirements, preferred seating, positive reinforcement, check often for understanding/review, oral/visual directions/prompts when necessary, supplemental materials including use of online bilingual dictionary, and modified assessment and/or rubric.
- **Students at Risk of School Failure:** Deliver instruction utilizing varied learning styles including audio, visual, and tactile/kinesthetic, provide individual instruction as needed, modify assessments and/or rubrics, repeat instructions as needed.
- **Gifted Students:** Create an enhanced set of introductory activities, integrate active teaching/learning opportunities, incorporate authentic components, propose interest-based extension activities, and connect student to related talent development opportunities.

Teacher Resources:

- Educating Young Children (HighScope)
- Essentials of Active Learning in Preschool (HighScope)
- Small-Group Times to Scaffold Early Learning (HighScope)
- 50 Large-Group Activities for Active Learners (HighScope)
- Lesson Plans for the First 30 Days (HighScope)
- Story Starters for Group Times (HighScope)
- Real Science in Preschool (HighScope)
- www.highscope.org