Inquiry Project Design Plan

Teacher/Designer Names: Lisa Maddalena **School: Paideia 24**	
Name of Project: Air and Water in the Environment	**Grade Level: K**
Est Launch Date:	**Est Duration (in weeks): 4-6**
Disciplines Involved: Science, ELA, Writing, Math, Technology	
Problem Statement: Assess the importance of air and water for health, survival of living things, including self and the environment.	

STAGE 1: DESIRED RESULTS

Big Idea: Environment, Activism

Enduring Understandings:

- We can use our voice to inform other about the importance of caring and protecting our environment.
- Living things require clean air and water. Water and air are natural resources.
- ∉ Individuals can contribute to protecting and improving the quality of air and water in their environment.

Essential Question(s):
(MEANT TO BE SHARED WITH STUDENTS)

- How can we protect our environment?
- Why is clean air and water important to us?
- ∉ Why is it important to take care of and keep our air and water clean?
- ∉ Could we survive without natural resources?

Established Goals (Standards, Performance Indicators, Learning Goals):
*choose relevant standards to unit/project plan timing and learning goals; do not need to use all disciplines below.
** unpack into SWK and SWBAT under identified standards as this will lead to aligned assessment design

Science Standards (list if using, unpack under each standard into SWK and SWBAT)**:**
K-PS1-1 Plan and conduct an investigation to test the claim that different kinds of matter exist as either solid or liquid, depending on temperature.

K-ESS3-3 Communicate solutions that will reduce the impact of humans on living organisms and non-living things in the local environment.

SWK:

- Air and water pollution
- Natural resources
- Temperature
- Air and water are connected
- ∉ Air and water form a major part of our physical environment and they are essential for life
- ∉ Changes to air and water affect living things and the environment
- ∉ Our actions affect the quality of air and water, and its ability to sustain life

SWBAT:

- Communicate solutions to reduce the impact of humans on the environment
- Create a project to improve water and air pollution
- Explain how living things, including humans, require clean air and water for breathing, cooling, drinking, cooking, bathing, and prevention of illness to maintain a healthy

Inquiry Project Design Plan

body
- Suggest ways that individuals can contribute to protecting and improving the quality of air and water in their environment (e.g., conserve water, do not pour chemicals down the drain, do not burn hazardous materials, and reduce travel via motorized vehicles)
- Communicate and share project creations that solve a real-world problem

Mathematics Standards (list if using, unpack under each standard into SWK and SWBAT)**:**
K.CC.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.

SWK:
- Greater than less than or equal to
- Graphs, bar graphs, pictographs

SWBAT:
- Comparing graphs
- Finding greater than, less than, or equal to.
- Record, using tables, diagrams, pictographs, or bar graphs, individual, classroom, and/or household use of water, for a given period
- Create graphs, bar graphs, pictographs

ELA Standards (list if using, unpack under each standard into SWK and SWBAT)**:**
KR1: Develop and answer questions about a text. (RI&RL)
KR5: Identify literary and informational texts. (RI&RL)
KR8: Identify specific information to support ideas in a text. (RI&RL)
KR9: Make connections between self, text, and the world. (RI&RL)

SWK:
- Informational texts
- Main idea
- Details

SWBAT:
- Communicate solutions to reduce the impact of humans on the environment
- Create a project to improve water and air pollution
- Explain how living things, including humans, require clean air and water for breathing, cooling, drinking, cooking, bathing, and prevention of illness to maintain a healthy body
- Suggest ways that individuals can contribute to protecting and improving the quality of air and water in their environment (e.g., conserve water, do not pour chemicals down the drain, do not burn hazardous materials, and reduce travel via motorized vehicles)
- Communicate and share project creations that solve a real-world problem

Writitng Standards:
KW1: Use a combination of drawing, dictating, oral expression, and/or emergent writing to state an opinion about a familiar topic or personal experience and state a reason to support that opinion.
KW2: Use a combination of drawing, dictating, oral expression, and/or emergent writing to name a familiar topic and supply information.

Inquiry Project Design Plan

KW3: Use a combination of drawing, dictating oral expression, and/or emergent writing to narrate an event or events in a sequence.
KW4: Create a response to a text, author, or personal experience (e.g., dramatization, artwork, or poem)
KW6: Develop questions and participate in shared research and exploration to answer questions and to build and share knowledge.
KW7: Recall and represent relevant information from experiences or gather information from provided sources to answer a question in a variety of ways (e.g., drawing, oral expression, and/or emergent writing).

Speaking and Listening:
KSL1: Participate in collaborative conversations with diverse peers and adults in small and large groups and during play.
KSL1a: Follow agreed-upon rules for discussions, including listening to others, taking turns, and staying on topic.
KSL1b: Participate in conversations through multiple exchanges. KSL1c: Consider individual differences when communicating with others.
KSL2: Participate in a conversation about features of diverse texts and formats.
KSL3: Develop and answer questions to clarify what the speaker says. Presentation of Knowledge and Ideas
KSL4: Describe familiar people, places, things, and events with detail.
KSL5: Create and/or utilize existing visual displays to support descriptions. KSL6: Express thoughts, feelings, and ideas.

SWBAT:

- Communicate procedures and results of observations of the physical properties of air and water, using drawings, demonstrations, and written and oral descriptions

- Explain how living things, including humans, require clean air and water for breathing, cooling, drinking, cooking, bathing, and prevention of illness in order to maintaina healthy body

Vocabulary Acquisition:
KL5: Explore and discuss word relationships and word meanings.
KL5c: Use words to identify and describe the world, making connections between words and their use (e.g., places at home that are colorful). KL5d: Explore variations among verbs that describe the same general action (e.g., walk, march, gallop) by acting out the meanings.
KL6: Use words and phrases acquired through conversations, reading and being read to, and responding to texts.

Technology Standards:

- **NYS Computer Science and Digital Fluency** (select at least 1 for Smart Start)**:**
- **K-1.DL.4** Use a least one digital tool to create a digital artifact.
- **ISTE: 1.6 Creative Communicator**
- Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats and digital media appropriate to their goals.

Links to Standards/Reference Frameworks:
NYS NextGen ELA and Math, NGSS, NGSS by DCI Nat'l C3 SS Framework, NYS K-8 SS Standards, ISTE, Social Justice Standards, CASEL SEL Framework, NYS CS and Digital Fluency

Teaching/Learning Goal Notes for Stage 1:

- **Air and water are connected**
- **air and water form a major part of our physical environment and they are**

Inquiry Project Design Plan

essential for life

- **changes to air and water affect living things and the environment**
- **our actions affect the quality of air and water, and its ability to sustain life**
- **explain how living things, including humans, require clean air and water for breathing, cooling, drinking, cooking, bathing, and prevention of illness in order to maintaina healthy body**
- **record, using tables, diagrams, pictographs, or bar graphs, individual, classroom, and/or household use of water, for a given period**
- **Communicate procedures and results of observations of the physical properties of air and water, using drawings, demonstrations, and written and oral descriptions**

STAGE 2: EVIDENCE & ASSESSMENTS:

Performance Task Narrative

-Air and water are major parts of our physical environment and essential for life. Through investigations you have learned about the characteristics of air and the various forms of water in the environment. You discovered how clean air and water contribute to the health and survival of living things. We are concerned about the water and air pollution in our country.
-Make a poster about ways to protect our Earth.

-Conduct surveys around your home about how much water you use. Discuss how we as individuals contribute to pollution, and what we can do to prevent it.
-Use a list of questions to interview people.
-The results of the survey will be diplayed with a class graph, pictograph or chart.
-Design a poster that includes at least one way to help keep our air and/or water clean. Remember, we are all responsible! By working together and taking concrete actions, we can all help ensure that we have access to clean air and water and a healthy environment for generations to come.
Demonstrate understanding of concrete graphs and pictographs.

-We will be making a book titled Water, Water Everywhere! to share with the Kindergarten class. We will be given a list of several forms of water on Earth (e.g. ocean, sea, lake, river, stream, marsh, puddle, rain, snow, hail, sleet, fog, cloud, frost, mist dew, and condensation). We will learn about needing, saving and wasting water in books and/or on the internet.

Goal: Students will assess the importance of air and water for health, survival of living things, inlcuding ourselves and communicate solutions to reduce the negative impact on the envrionment.

Role: Environmental Scientist, Journalist, Data Scientist, Creators, Presenters, Engineer

Audience: School Community, including parents and families

Situation: *Set the context of the scenario. Define the narrative.*

-There is a lot of trash and pollution in the park where kids play. Engineers have been asked to come up with a way to remove a lot of trash without needing to expose people to the pollution.

-We will be making a book titled Water, Water Everywhere! to share with the Kindergarten class. You will be given a list of several forms of water and air on Earth (e.g. ocean, sea, lake, river, stream, marsh, puddle, rain, snow, hail, sleet, fog, cloud, frost, mist dew, and condensation). We will learn about needing, saving and wasting water in books and/or on the internet.

Product(s): *Clarify what the students will create and why they will create it.*

Inquiry Project Design Plan

- web or concept map
- Water watch home study
- Interviews
- Fill out What We Have Learned on our KWL chart
- Poster about ways to protect the Earth
- Graphs
- Drone survey photos or video
- Class book, 'Water, Water Everywhere'
- Robots that clean pollution
- Videos of student activities

Criteria for Success): *Provide students with a clear picture of success. Identify specific standards for success such as rubrics, checklists, quizzes, etc.*

- O Observation – anecdotal records, conferences, checklists.
- O Conversations
- O Water watch home study
- O learning logs/science journals
- O self-assessment (In science I learned…)
- O In science journals write and draw about all you have learned about air and water.
- O Student Self-Assessment (see attached sheet Student Self-Assessment – Looking at My Science Learning)
- O Fill out What We Have Learned on our KWL chart. (See attached sheet KWL
- O Videos
- O Exit tickets
- O Projects

Other Evidence/Assessments:

- web or concept map
- Observation – anecdotal records, conferences, checklists.
- Conversations
- Water watch home study
- learning logs/science journals
- self-assessment (In science I learned…)
- In science journals write and draw about all you have learned about air and water.
- Student Self-Assessment (see attached sheet Student Self-Assessment – Looking at My Science Learning)
- Fill out What We Have Learned on our KWL chart.
- Videos
- Exit tickets
- Projects

Inquiry Project Design Plan

STAGE 3: THE LEARNING PLAN:

Learning Activities

(potential layout below. Can be daily, divided by periods, or even using the Engineering Design Process to divide into stages such as Ask, Imagine, Plan, Create, Improve)

Week 1

Learning Goals:

- Air is the most important thing that gives life to humans, plants, and animals
- Without air none of these things could live
- Air is a natural resource

Learning Events:

- Water Trivia Fun Facts About Water! (I.e. How long can a person live without water? How much water is used to flush a toilet? – see attached sheet on Water Trivia Facts or go to http://www.lenntech.com/water-trivia-facts.htm)
- Show or read The Magic Schoolbus at the Waterworks by Joanna Cole
- Start a web or concept map during computer time that students can add information to them as they learn concepts during the unit, do the K and W part of KWL either individually or as a group (see KWL chart)
- Morning Message – i.e. Did you know that air is the most important thing that gives life to humans, plants, and animals? Without air none of these things could live. Ait is a natural resource. We need to conserve and protect natural resources. Do this everyday.

Formative Assessments:

- Observation – anecdotal records, conferences, checklists.
- Conversations
- self-assessment (In science I learned…)
- In science journals write and draw about all you have learned about air and water.
- Student Self-Assessment (see attached sheet Student Self-Assessment – Looking at My Science Learning)
- Fill out What We Have Learned on our KWL chart.

Notes/Resources:

Week 2

Learning Goals:

- Investigate observable physical properties of air and water within their environment.
- Investigate observable physical properties of air and water as natural resources within their environment.

Inquiry Project Design Plan

Learning Events:

- Observe, using all of their senses, physical properties of air and of water.
- Moving Air – read Millicent and the Wind by Robert Munsch.
- On a windy day, take a class walk to observe the effects of wind on the environment. Challenge students to find evidence that the air is moving. Encourage them to use all of their senses.
- Students can also look for evidence of water in the environment at the same time.
- Use a Think-Pair-Share to create charts showing positive and negative effects of air temperature and movement in both indoor and outdoor environments. Have students add to their own charts when they hear new ideas (chart – I noticed changes…). Discuss and record in science notebooks where they observed evidence of water, also.

- Forms of Water in the Environment – Display the globe, map, and pictures of forms of water. Ask questions such as: What do the blue parts of the globe show? Is there more water or land on Earth? What other kinds of water, other than oceans, are there on Earth? Encourage the students to think of as many forms of water as possible (i.e. oceans, seas, lakes, etc.)
- Then extend the focus on forms of water by asking: Where does the water in lakes, rivers, and puddles come from? Is rain the only kind of water that falls into the lakes and rivers? Students will likely suggest things such as snow, sleet, hail, frost, dew, clouds, and fog.
- Show Weather for Children All About Rain, Snow, Sleet, and Hail (see Resources below). Students can work on the second performance task (see attached sheet Water Words).

Formative Assessments:

- Observation – anecdotal records, conferences, checklists.
- Conversations
- self-assessment (In science I learned…)
- In science journals write and draw about all you have learned about air and water.
- Student Self-Assessment (see attached sheet Student Self-Assessment – Looking at My Science Learning)
- Fill out What We Have Learned on our KWL chart.

Notes/Resources:

Week 3

Learning Goals:

- Assess the importance of air and water for the health and survival of living things, including self, and the environment.

- Investigate observable physical changes in water.

- Explain how living things, including humans, require clean air for breathing, cooling, drinking, cooking, bathing, and prevention of illness in order to maintain a healthy body.

Learning Events:

- The Amazing Water Cycle – Did you know that the earth uses the same water over and over again? The water you use to wash your bike may be the same water a dinosaur drank many, many, many years ago! Hard to believe, but it's true. The water we drink, bathe in, and wash things with doesn't disappear once it travels down the

Inquiry Project Design Plan

drain. Water moves through different stages in a never-ending cycle.

- Show the movie from Brain Pop Jr. under weather – water cycle or All About the Water Cycle listed in the resources.
- Do The Amazing Water Cycle Experiment and the Water Cycle Wheel (sheets –The Water Cycle, The Amazing Water Cycle cont'd).
- Sources of Water – Brainstorm ways that humans use water. Include uses of water in the classroom, in the school, at home, in the neighborhood, city, province, country, and the world.
- Ask: Where do you think your drinking water comes from? Explain that where water comes from is called the source of water.
- Ask: How does water get to your homes? Read or discuss The Magic School bus at the Water works (from motivational set).
- Relate the waterworks system to our local area. Use the provincial map to locate the source of water for our community.
- Trace the route that the water takes from the source to your community.

Formative Assessments:

- Observation – anecdotal records, conferences, checklists.
- Conversations
- self-assessment (In science I learned…)
- In science journals write and draw about all you have learned about air and water.
- Student Self-Assessment (see attached sheet Student Self-Assessment – Looking at My Science Learning)
- Fill out What We Have Learned on our KWL chart.

Notes/Resources:

Week 4

Learning Goals:

- Assess the importance of air and water for the health and survival of living things, including self, and the environment.
- Record, using tables, diagrams, pictographs, or bar graphs, individual, classroom, and/or household use of water for a given period.
- Suggest ways that individuals can contribute to protecting and improving the quality of air and water in their environment (e.g., conserve water, do not pour chemicals down the drain, do not burn hazardous materials, and reduce travel via motorized vehicles).
- Assess the importance of air and water for the health and survival of living things, including self, and the environment.
- Suggest ways that individuals can contribute to protecting and improving the quality of air and water in the environment (e.g. conserve water, do not pour chemicals down the drain, do not burn hazardous materials, and reduce travel via motorized vehicles).

Learning Events:

- Water Usage - Ask: How much water do you think you use in your home everyday? Show students a litre container, and have them estimate on chart paper how many litres of water they think they use in a day. Now display a chart of actual water usage (see attached sheet Average Water Usage). Focus on the amount of water used to brush teeth. Have a student measure 4 litres of water into a container to show how

Inquiry Project Design Plan

much water is used to brush teeth when the tap is left on while brushing. Have another student measure one litre of water to show how much water is used if the tap is turned off while brushing. Explain that turning off the tap is a way of conserving water or reducing the amount of water we use. Review other data on the chart. Focus on the amount of water used for each activity, such as doing a load of laundry, flushing the toilet, or having a bath. Now challenge the students to record the amount of water they use at home. Provide them each with a tally sheet and a letter to parents that explains the activity. When all students have completed their tally sheets, have them present their findings to the class. Have students total the amount of water used in their home in a day. (See Daily Water Usage in My Home sheet attached and Water Watch Study Week one and week two).

- To extend this activity have students suggest ways that they can reduce the amount of water they use everyday. Focus on the water usage chart and ask: How could you save water? Students may see themselves as more active in water conservation if they give their solutions in "I" statements. For example: I can take showers instead of baths to conserve water. I can turn off the water while brushing my teeth.
- They could create a poster showing one way to save water (See Thinking about: Water, a Short Supply Sheet).
- Play the Bucket Relay Game in gym or outside another time. This game will help students understand how precious water is if they had to walk long distances to fetch the water. Outside, set up an obstacle course. Place a large bucket of water at the start of the course. At the end of the course, place several smaller buckets (one for each team). Divide the class into teams. Have the students, singly or in pairs, fill an ice cream pail with water from the large bucket. When they reach the end of the course, have them empty the pail into the small bucket, run back to the start, and pass the pail to a team member. The teams continue through the course until their collection bucket is full of water.

Formative Assessments:
Observation – anecdotal records, conferences, checklists.

Conversations

self-assessment (In science I learned…)

In science journals write and draw about all you have learned about air and water.

Student Self-Assessment (see attached sheet Student Self-Assessment – Looking at My Science Learning)

Fill out What We Have Learned on our KWL chart.

Week 5

Learning Goals:

- Assess the importance of air and water for the health and survival of living things, including self, and the environment.
- Explain how living things, including humans, require clean air and water for breathing, cooling, drinking, cooking, bathing, and prevention of illness in order to maintain a healthy body.
- Suggest explanations for how air and water in the environment can become polluted.
- Suggest ways that individuals can contribute to protecting and improving the quality of air and water in their environment (e.g., conserve water, do not pour chemicals down the drain, do not burn hazardous materials, and reduce travel via motorized vehicles).

- Pollution of Air and Water – Read the book Michel Bird-Boy by Tomie dePaola to the

class. Have students identify sources of air pollution in Michael's community, and the solution that Michael finds.

- Make a chart – Air Pollution and divide the chart into two columns – Sources of Air Pollution and Solutions.
- Ask: What things cause air pollution around the world? Record students' ideas on the first column of the chart.
- Ask: How could you stop or decrease air pollution? Have students focus on each source of pollution and provide solutions for these problems. Record these solutions on the second column of the chart.
- Have students read books or go online to make diagrams and sentences to show a source of air pollution and a source of water pollution, and suggest a solution to each of these problems (see sheet Pollution).
- Students can present their findings orally to the class. As an extension they could write letters to local factories or manufacturing plants to find out how these businesses are controlling air pollution.

Formative Assessments:

- Observation – anecdotal records, conferences, checklists.
- Conversations
- self-assessment (In science I learned…)
- In science journals write and draw about all you have learned about air and water.
- Student Self-Assessment (see attached sheet Student Self-Assessment – Looking at My Science Learning)
- Fill out What We Have Learned on our KWL chart.

Week 6

Learning Goals:

- Assess the importance of air and water for the health and survival of living things, including self, and the environment.
- Suggest explanations for how air and water in the environment can become polluted.

Learning Events:

- Wicked Wastewater – People must be careful of how they dispose of water after it has been used. Used water is called wastewater. Water in rivers, lakes, and oceans may look nice and clean, but can contain germs or pollution from chemicals and trash from wastewater. When this happens, the water is not safe for the fish, for you to drink or you to swim in. Wastewater needs to be cleaned before being put back into rivers, lakes, and oceans. People can help make this job easier by being careful to use household substances that are biodegradable. In the following experiment, discover why it is important to not pollute water (See Wicked Wastewater and Thinking about: Wicked Wastewater sheet).
- Oil Spill Clean Up – recap on the importance of water to all living things. (How do humans use water? How is water important to other living things? How does our water get polluted? How would polluted water affect humans? How would polluted water affect plants and other animals? Display pictures from the internet or books about oil spills or show a video about oil spills. Explain that oil tankers carry oil for cars and fuel across the oceans to countries all over the world. Do the experiment Oil Spill Clean Up (see attached sheet Oil Spill Clean Up). Fill out the Oil Spill Observation Chart (See attached sheet Oil Spill Observation Chart). Challenge the students to suggest ways that the oil spill could be cleaned up. Watch shows about how oil spills have been cleaned up and how animals are rescued during these disasters.
- MAGIC WATER – You will need the following materials: 4 clear plastic cups, food coloring (red, green, blue, yellow), white construction paper cut into 2 cm by 4 cm strips,

Inquiry Project Design Plan

water, cooking oil, and a tray. Place the four clear plastic cups on a tray. Fill the cups half full with water. Add a different food coloring to each cup and pour 75 ml of cooking oil on top of the colored water. Have students predict what color a strip of paper will be when it is dipped into a cup, then have them test their predictions by dipping the paper into the selected cup. Repeat the process with the other cups. Have the students observe carefully and explain why the strip of paper did not turn the same color as the water they were dipped in. NOTE: The strips of paper were first covered with oil as they were dipped in the cups, and the colored water could not adhere to the oil. This is similar to the way oil affects the feathers or fur of animals.

Formative Assessments:

- Observation – anecdotal records, conferences, checklists.
- Conversations
- self-assessment (In science I learned…)
- In science journals write and draw about all you have learned about air and water.
- Student Self-Assessment (see attached sheet Student Self-Assessment – Looking at My Science Learning)
- Fill out What We Have Learned on our KWL chart.

Notes/Resources:

Resources

1. Air and Water In the Environment - Earth and Space Science (hands-on science)
2. air and water in the environment by Demetra Georgopoulos and Renee Perry-Watson
3. Rivers and Ponds Thematic Unit Teacher Created Materials, Inc.
4. http://wwwlenntech.com/water-trivia-facts.htm
5. The Magic School bus at the Waterworks by Joanna Cole
6. Millicent and the Wind by Robert Munsch
7. Michael Bird-Boy by Tomie DePaola
8. Brain Pop Jr.
9. Oil Spills: slime time, big time. Phantastic Physical Phenomena Series PR 363.738 Oil Elem.
10. Weather for Children All About Rain, Snow, Sleet, and Hail VCR 551.6 All Elem
11. All About the Water Cycle 363.61 All PR Elem

Other good sites are:

12. http://www.clean-air-kids.org.uk/doingyourbit.html
13. Google: Thirstin's Wacky Water Adventure
14. Smart Exchange also has lessons for the SMARTboard
15. kidinfo.com

Other books include:

16. Water Pollution by Andrew Donnelly 363.739 DON ELE

Week 7

There is a lot of trash and pollution in the park where kids play. Engineers have been asked to come up with a way to remove a lot of trash without needing to expose people to the pollution.

In this adventure, students will design a robot that can help with pollution.

Students will explain what pollution problem their robot solves and how it solves that problem.

Use drone to view trash and pollution in the park where kids play.

Use DASH with bulldozer bar to clean up – Dash's Clean Up Challenge!

Inquiry Project Design Plan

Discuss and record:
Why should the city use robots instead of having humans pick up trash?
What could happen if the city does not use the robots?
List 3 reasons why the city needs robots.