Grade: 4th grade

Subject Area: Science / Earth and the Processes that Shape It

Title: Is Air Really There?

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Standards:

Physical Setting
S 4.3.2 Begin to investigate and explain that air is a substance that surrounds us and takes up space, and whose movements we feel as wind

Goals and Objectives:

The learner will investigate and explain that air is a substance that surrounds us and takes up space and whose movements we feel as wind by developing a plan using common objects to demonstrate and explain characteristics and properties of air.

Materials:

- Science Journals
- Chart paper or individual KWL Charts
- Paper for quartile booklets
- Personal system for compiling anecdotal records on each student's participation & understanding throughout the activity
- 5 prepared bins for Individual Group Activities with listed materials (Activities and materials needed are listed separately at the end of this LP)

Activities:

A. Anticipatory Set: The learners will use air to lift their teacher off of the floor.
B. The learners (groups of 3 to 5) will discuss, develop, and agree on a plan to demonstrate one property of air using common everyday materials and objects
C. The learners will carry out their plan, revise their thinking as needed and present their finding to the class.
D. A Science Journal will reflect all aspects of the scientific process

Procedures:

1. Students are presented with the following challenge:
   "Using a paper bag, a straw, and masking tape, who thinks they can lift the teacher off of the floor as she stands on this board?"
2. Students discuss for 2/3 minutes and then ask for students to share their thinking. Call on 4 volunteers to help demonstrate the following:
   a. Insert the straw into the bag so that one end sticks out, and tape straw securely onto the bag.
   b. Place the paper bags under the board so that the end with the straw is accessible to the student. All together blow!!

3. On chart paper start a KWL about their ideas on air. Guide students to generate questions that specifically include, but are not limited to, the concepts that air is a substance, that it surrounds us, that it takes up space, and that we can feel it as wind.
4. Divide students into groups of 3 to 5 learners. Place prepared activity bins with materials in the middle of each group.
5. Instruct students to read the paper in the bin first. Explain that their task is to develop a plan using the materials in the bin that will answer the problem stated on the paper. Make sure they understand the following procedure then let them begin the investigation.
   - Learners will first agree on a plan.
   - Each Learner will write a hypothesis statement in their Science Journals. (If we_____ then _____will happen)
   - Learners will write their process in their journals. (numbered)
   - Learners will follow their plan and revise their thinking as problems arise focusing on trying to answer the problem on the paper.
6. As learners try out their thinking, circulate and guide as needed, keep anecdotal records of each learner's participation.
7. As learners finish the task, instruct them to write their findings in their journals.
8. After adequate time has been given, pull the attention back to whole group.
9. Have groups share/demonstrate their task, plan, how it actually went, any revisions in the plan, and the final product or results.
10. Record learned concepts on the KWL and encourage students to take notes in their Science Journals. **Be sure to emphasize the four main concepts learned by the different groups during the activity. Tell the learners that these four concepts are the main point of the activity.**
11. For assessment purposes, pass out a piece of paper to each learner and instruct them to fold it into 4 pages (Quartile booklet). Instruct students to write and or draw (with labels) the four main concepts of air that they learned during the activity. Be sure to put the KWL chart and Science Journals away. Quartile booklet is kept for portfolio.

Assessment:

Formal Assessment: Rubric using points that can be translated into a grade based on the unwrapped Power Science Indicator 4.3.2 (included)

Informal Assessment: Anecdotal records looking at participation and group work, completion of Science Journal, & class discussion

Is Air Really There?
Formal Rubric based on Unwrapped Power Science Indicator 4.3.2

Exemplary:

- Everything listed as proficient and including one or both of the following
- Learner took a **leadership role in the investigation** process by forming, recording, and/or revising the ideas, thinking, and plan of the group.
- Learner took a **leadership role in becoming the teacher to explain** the results, thinking, process, and conclusions of their group

Proficient:

- Learner participated in **investigating** (planning and carrying out the plan in small group activity) that air was either a substance, that it surrounds us, that it takes up space, or that we feel air as wind. Assessed through observations during small group activity and noted mentally by teacher or on anecdotal records.
- Learner can **explain** (through drawing and labeling and/or writing in the quartile booklet) all four main points learned, and demonstrated in the activity.
    - air is a substance
    - air surrounds us
    - air takes up space
    - air can be felt as wind

Progressing:

- Learner only observed the **investigation** process that air was either a substance, that it surrounds us, that it takes up space, or that we feel air as wind. Assessed through observations during small group activity and noted mentally by teacher or on
- Learner can **explain** (through drawing and labeling and/or writing in the quartile booklet) all four main points learned, and demonstrated in the activity.
    - air is a substance
    - air surrounds us
    - air takes up space
    - air can be felt as wind

Not Yet:

- Learner only observed or minimally participated in **investigating** (planning and carrying out the plan in small group activity) that air was either a substance, that it surrounds us, that it takes up space, or that we feel air as wind. Assessed through observations during small group activity and noted mentally by teacher or on anecdotal records.
- Learner cannot **explain** (through drawing and labeling and/or writing in the quartile booklet) all four main points learned, and demonstrated in the activity.
    - air is a substance
    - air surrounds us
    - air takes up space
    - air can be felt as wind

Individual Group Activity #1

Challenge:
Use the materials in your bin to create a plan to answer the following question.

Problem/Question:

Does air take up space?

Materials:

- Challenge and question on a piece of paper for the learners to read
- paper bags and plastic bags
- straws
- tape
- various objects: books, blocks, brick, etc

This activity is accommodated for Lower Level Learners. Its solution is based on the same principle that was demonstrated by the opening demonstration.

Solution: Put one end of a straw into a bag and tape the edges of the bag securely around the straw. Put various objects on top of the bag and attempt lifting different weighted objects on top of the bags by blowing air into the bags. Learners conclude that air takes up space because something has to be in the bag. When the bag is opened it looks empty but it couldn't be empty if it lifted the objects. The clear plastic bag shows that air is a substance that takes up space even if it can't be seen.

Individual Group Activity #2

Challenge:

Use the materials in your bin to create a plan that will solve the following problem.

Problem/Question:

Can you put the water into the jar using the straw in such a way that proves that air is a substance that takes up space? Rule#1: You must use all the materials in the bin and each material must have a purpose. Rule #2: You cannot have any water inside of a straw.

Materials in the bin:

- Challenge and question on a piece of paper for the learners to read
- Large Jar with modeling clay around the lip
- Funnel
- Drinking Straw
- Water
- Small Cork or Modeling clay attached to a string

This activity is accommodated for a High Level Learners or a group that has at least one High Level Learner to guide the rest of the group.

Solution: The funnel is placed onto the large jar so that the modeling clay seals the gaps between the funnel to the jar. A small cork or piece of modeling clay is placed in the whole of the funnel. Water is added to the funnel. The cork is then removed. The water will not enter the jar because air is taking up that space. Place a finger over one end of an empty straw. Carefully push the end of the straw into the whole of the funnel. Remove the finger from the other end of the straw. Learners see that air was taking up all of the space inside the jar and was blocking the water from entering the jar. When the straw is placed through the water and into the jar, it produces an avenue for the air in the jar to escape making room for the water.

Individual Group Activity #3

Challenge:

Use the materials in your bin to create a plan that will solve the following problem.

Problem/Question:

Can we feel and see air? Challenge: If so, does air always feel and look the same?

Materials:

- Challenge and question on a piece of paper for the learners to read
- 6 inch square piece of cardboard with a 5mm whole in the center (so that the brad will rotate freely)
- Brad
- Electric fan (non-finger-eating type)
- Pipe Cleaner or Chenille wire
- Tape
- 2x3 inch piece of cardboard
- marker

This activity is intended for Average Level Learners.

Solution: Place brad through the whole in the 6 inch square piece of cardboard so that it sticks up a few millimeters above the cardboard. Bend the brad ends. Wrap one end of the pipe cleaner around the end of the brad sticking out of the cardboard. Make sure that the Pipe cleaner swings freely. Tape the 2x3 inch piece of cardboard at the other end of the Pipe cleaner so that it forms a 90 degree angle to the 6 inch piece of cardboard. This created device will serve as a wind gauge. Students will hold it in front of the electric fan at different distances. Using the marker they can mark light air movement or wind, medium, and strong. Learners can run to try and match the different strengths of air movement or wind. Learners can see that air is causing the pipe cleaner to move to different height depending on the amount of the air movement.

- Individual Group Activity #4

Challenge:

Use the materials in your bin to create a plan that will solve the following problem.

Problem/Question:

Does air surround us and other objects?

Materials:

- Challenge and question on a piece of paper for the learners to read
- Clear plastic cup
- Bucket with water filled half way
- Tissue

This activity is accommodated for Average to Lower Level Learners.

Solution: Place the tissue inside of the cup and press to the bottom. Turn the cup upside down and submerge it into the bucket. Pull the cup straight out. The tissue remains dry because the air takes up the rest of the space in the cup and won't allow the water to enter. Air is surrounding the tissue and protects it from the water.

Individual Group Activity #5

Challenge:

Use the materials in your bin to create a plan that will solve the following problem.

Problem/Question:

Can air be used to move an object from one place to another?

Materials:

- Drinking Straws / two sizes so that one will fit inside the other
- Small Paper squares and triangles
- Tape

This activity is intended for Average Level Learners.

Solution: Place a piece of tape over one end of the larger diameter straw. Tape 3 or 4 pieces of cardboard to the sides of the straw at the opposite end that is not taped. Place the larger straw over the small straw and blow into the smaller straw. The device created is an air rocket that can demonstrate the idea that air is a substance whose wind can do work.