The Respiratory System and Oxygen Exchange

Florida Benchmark: SC.5.L.14.1 - Identify the organs in the human body (such as the lungs) and describe their functions, including the respiratory system's role in breathing and oxygen exchange.

NGSS Standard: MS-LS1-3 (adaptable for upper elementary) - Use evidence to explain that the body is a system of interacting subsystems, including the respiratory system's role in oxygen intake and carbon dioxide release.

A. GRADE LEVEL: 5th Grade
B. SUBJECT: STEM/Science
C. DATE: [Insert Date]
D. DURATION: 45-60 minutes

E. LESSON FOCUS: Understanding the respiratory system's organs and their role in oxygen exchange.

F. MATERIALS:

- Balloons (2 per student)
- Plastic bottles (one per group)
- Straws (one per student)
- Rubber bands
- Diagram of the respiratory system
- PowerPoint presentation
- Observation worksheet

G. LESSON OBJECTIVES: By the end of the lesson, students will be able to:

1. Identify major respiratory system organs (lungs, trachea, diaphragm, etc.).
2. Explain the function of each organ in the respiratory system.
3. Conduct an experiment to model how the lungs expand and contract during breathing.

H. PROCEDURES:

1. **INTRODUCTION:**
    - Begin with a brief PowerPoint presentation showcasing the respiratory system's organs and their functions. Highlight the key role of oxygen exchange in the lungs.
    - Ask students: "What happens when you hold your breath for a long time?" to spark curiosity about oxygen's importance.
2. **EXPERIMENT:**

- Guide students to build a lung model:
  a) Cut the bottom off a plastic bottle.
  b) Stretch a balloon across the bottle's open bottom and secure it with a rubber band (this represents the diaphragm).
  c) Insert a straw into the neck of another balloon, secure with a rubber band, and place the straw and balloon inside the bottle.
  d) Seal the bottle's opening with modeling clay around the straw (to prevent air from escaping).
- Demonstrate how pulling the balloon diaphragm down makes the balloon lung expand, simulating inhalation. Releasing it contracts the balloon, simulating exhalation.

3. **OBSERVATION:**
   - Have students observe and record how the "lungs" respond when the diaphragm moves.
   - Prompt students to describe the changes in air pressure and the movement of air.
4. **GENERALIZATION:**
   - Facilitate a discussion connecting the experiment to real-life breathing. Emphasize how oxygen enters the body and carbon dioxide exits.
   - Ask students to explain why physical exercise causes faster breathing.
5. **ASSESSMENT:**
   - Students will complete an observation worksheet, labeling the parts of the respiratory system and describing their functions.
   - A short quiz will assess their understanding of oxygen exchange.

Note 1: Safety Considerations

- Ensure students handle scissors carefully during the bottle-cutting step.
- Remind students not to inhale or blow air directly into the straws during the experiment.
- Supervise the use of rubber bands to avoid snapping injuries.

Note 2: Accommodations for ELL, ESE, etc.

- For ELL students, provide visual aids with labeled diagrams and key vocabulary words in both English and their native language.
- For ESE students, offer step-by-step guidance during the experiment and pair them with peer buddies for additional support.
- For advanced learners, provide additional questions that challenge them to connect the respiratory system to the circulatory system for deeper understanding.