UCONN
INDOOR AIR
QUALITY INITIATIVE

Cleaner Classroom Air

Mini Lesson Series
Grade Level: K-2

Overview: This lesson series is meant to compliment the implementation of Do-It-Yourself air purifier. The lessons introduce indoor air quality and focus on the Science and Engineering Practices (SEPs) such as asking questions, analyzing data, and communicating information. The lessons can stand on their own or be adapted to supplement curricular units.

Revised: 01/07/2026

Background Information

Indoor air quality matters, because we spend about 90% of our time indoors. Things in the air such as particulate matter (PM) and airborne viruses such as COVID-19 can have negative impacts on human health, especially for younger people whose respiratory systems are still developing and older people who often spend even more time indoors. Many factors influence indoor air quality, including temperature and relative humidity. Indoor air quality includes pollution from outside such as wildfire smoke, emissions from vehicles, and ozone.

More information can be found at EPA Indoor Air Quality in Schools

While commercial air purifiers exist, a DIY air purifier can be built using inexpensive materials, including a box fan, four MERV filters, cardboard, and duct tape. The fan pulls air through four standard HVAC filters that catch airborne pollutants. The DIY air purifiers reduce the amount of particulate matter and airborne viral particles. Design criteria for an air purifier include effectively filtering airborne viral particles, dust, allergens, and particulate matter. Constraints include cost, size, noise, and time. Classrooms are a unique challenge, because there are more people than in a home or a typical office, and students need to be able to hear their teacher and classmates. Schools do not have unlimited budgets, and commercial air purifiers are expensive. This makes the DIY option a more accessible option.

More information can be found at the Corsi-Rosenthal Foundation website

Lesson Series Overview

The four mini lessons below are sequential, but they do not need to be done four days in a row. Having students collect and analyze air quality data can be a longer-term project, depending on time and school curriculum. The lessons offer a brief introduction to indoor air quality and how air purifiers work, as well as practicing multiple SEPs.

Lesson Series Outline

1. Introduction to Air Quality
    a. Students will be introduced to air quality and the air monitor, before defining the problem.
    b. SEPs: asking questions and defining problems; constructing explanations and designing solutions
2. Testing the air purifier
    a. Students ask questions and make observations about a DIY air purifier. Students carry out investigations using tissues.
    b. SEPs: asking questions; planning and carrying out investigations
3. Analyzing Data
    a. Students analyze and interpret data from the air quality monitor.
    b. SEPs: analyzing and interpreting data
4. Sharing the Results
    a. Students will communicate their findings to the community.
    b. SEP: constructing explanations and designing solutions; obtaining, evaluating, and communicating information

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Lesson 1: Air Quality

Driving Question

What is indoor air quality and why does it matter?

Student Learning Objectives

- Students will be able to ask questions, make observations, and analyze data to define a simple problem
- Students will be able to explain air quality.

NGSS Performance Expectations

K-2-ETS1-1. Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

NGSS Science and Engineering Practices

- Asking questions and defining problems
- Analyzing and interpreting data

Materials

Slides, Worksheet

Lesson Sequence

1. Purpose of the lesson
    a. "Today we're going to talk about air quality, and then we'll work together as scientists and engineers to solve a real problem in our classroom."

2. Introduce air quality

a. “Do you think about the air you breathe? Have you ever?”
    i. "Have you ever seen a weather report about bad air or poor air quality? What was happening that day?"
    ii. Prompt students with images of dust, pollen, masks, smog, wildfire smoke, etc
    iii. After a short discussion, students circle things that are in the air

3. Indoor Air Quality: Show the video Clean Air for Everyone. You can play the whole thing or stop it at 1:27.
    a. Question prompts (depending on prior content)
        i. How might the air around us affect our health?
        ii. How do our bodies take in air? Where does air go when it is inside our bodies? Why does that matter?
    b. “Indoor air can have bad things floating around in it, but there are ways to capture some of the bad things.”
    c. Show the gif with person and air purifier.
        i. “What do you notice? What questions do you have?”

4. Air quality monitor
    a. “Let’s make predictions. What is this device? What does it tell us? Why do we have it?”
        i. The air quality monitor measures multiple factors that influence air quality. It provides some of those measures (temperature, relative humidity, etc), as well as the air quality index, a number calculated from multiple factors. The school has multiple air monitors to determine the indoor air quality.
    b. “Scientists and engineers can measure how clean the air is. They call it the air quality index. It’s like a report card for the air. Let’s look at this animation and think like scientists!”
    c. “Scientists and engineers use air quality monitors to measure the stuff in our air. It calculates the air quality index. We said this was like a report card for the air. In school, the higher the number, the better the grade. In air quality, it’s a little different. Let’s compare the two faces on the screen. What do you notice?”
    d. Making inferences: “What do you think the colors and faces mean?”

i. Green means good, clean air.
ii. Yellow means dirty air.
iii. The number is the AQI. We want it to be lower. The higher it is, the more bad stuff in the air

5. Collecting baseline data
    a. Students can collect initial data from the air quality monitor by hand or in a digital form. Younger students can draw a smiley, neutral, or sad face with the color of the air monitor.
        i. Data table in Word (best for printing and handwritten data)
        ii. Data collection form (data is compiled in spreadsheet)
    b. This step does not need to be done by the whole class. One student could travel to each air monitor, record data, and share with the class.

6. Closure: Turn and talk
    a. What was the problem we explored today?
    b. What can we do to solve the problem?

Possible Connections

Comparing numbers

CCSS.Math.Content.K.CC.C.6

Students can compare the air quality indoors and outdoors.

Lesson 2: Observing an Air Purifier

Driving Question

How can we improve our classroom's air quality?

Student Learning Objectives

- Students will be able to explain how the air purifier cleans air.
- Students will carry out an investigation.

NGSS Performance Expectations

K-PS2-2. Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.

NGSS Science and Engineering Practices

- Asking questions and defining problems
- Planning and carrying out an investigation

Materials

Slides, Tissues

Lesson Sequence

1. Purpose
    a. "What do you remember about air quality?"

2. Observing and Testing
    a. "Today we are going to investigate our very own air purifier! Let's look at the parts of it. What do you notice?"

        i. Fan pulls dirty air through the filter and pushes clean air up into the classroom. The filters "catch" the bad stuff in the air, like a net
    b. "How does it work?"
        i. Have one to four students hold a tissue about 6 inches away from the filters (one student per filter if possible). Turn the fan on. The tissue should get sucked against the filter. Students can let go of the tissue and it will stick to the filter.
    c. "How far can we hold the tissue where it will still get pulled toward the fan?"
        i. Students could work in small groups to test this.

3. Exit Ticket
    a. What is the purpose of the DIY air purifier?
        i. Cleaning the air. The fan pulls dirty air through the filters and pushes clean air out into the classroom.

4. After the lesson
    a. After the air purifier has been on for several hours, students can collect data using the air monitor or by observing the colors of the filters. It may take days or weeks for the color to change. Students should not touch the filters! They can observe at a distance and describe the changes they see.

Possible Connections

Modeling

K-2-ETS1-2. Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Investigate fan speed and sound

1-PS4-1. Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.

Lesson 3: Analyzing Data

Driving Question

Is the air getting cleaner?

Student Learning Objectives

- Students will be able to analyze data to determine if a tool works.
- Students will be able to describe the trend in air quality over time.

NGSS Science and Engineering Practices

- Analyzing and interpreting data
- Constructing explanations and designing solutions

Materials

Slides, Worksheets

Lesson Sequence

1. Look at the data ahead of time and consider unexpected results (hopefully, the air quality improves over time)
    a. Air quality stayed the same: It's possible that the location of the air monitor has proper ventilation or that the school has an efficient HVAC system. This is particularly true if the initial readings were quite low (AQI < 15) because the monitors are only sensitive down to a certain point.
    b. Air quality worsened: There could be other factors impacting levels in the classroom. The outdoor air quality might be worse, or the classroom is much more active on the day the air purifier was running.
2. Think-Pair-Share

a. "What is the purpose of the air purifier? Can we tell if it's working?"

3. Analyzing data
    a. Students can draw a picture of the air filters or smiley/neutral faces on the air monitor or write the air quality index. They can compare this data to the baseline data they collected during lesson 1.

4. Construct an argument with evidence
    a. Students can write a sentence about their data.

5. Exit Ticket
    a. "Who would want to know about these results?"

Possible Connections

CCSS.ELA-Literacy.L.1.1.e

Use verbs to convey a sense of past, present, and future (e.g., Yesterday I walked home; Today I walk home; Tomorrow I will walk home).

CCSS.ELA-Literacy.L.2.1.e

Use adjectives and adverbs, and choose between them depending on what is to be modified.

Lesson 4: Sharing the Results

Driving Question

Who cares about the air?

Student Learning Objectives

- Students will be able to communicate scientific information.
- Students will be able to argue with evidence in writing.

NGSS Science and Engineering Practices

- Constructing explanations and designing solutions
- Obtain, evaluate, and communicate information

Materials

Slides, Worksheet

Lesson Sequence

1. What is science communication and why does it matter?
    a. "Scientists and engineers work on real-world problems and need to communicate their findings to a wide range of audiences, not just other scientists."
    b. How do scientists communicate complicated information?
2. Introduce RAFT activity. Students can choose their audience and format, but they should justify their choice.
    a. Role: student
    b. Audience
        i. Parents
        ii. Principal
        iii. Politicians
        iv. UConn researchers

    c. Format
        i. Letter
        ii. Presentation (slides)
        iii. Infographic
        iv. Report
    d. Topic
        i. Indoor air quality
3. Gallery Walk
    a. Have students share their RAFT products with each other!
4. Exit Ticket: How has your thinking about air quality changed?
    a. I used to think _____. Now I think _____.
5. *The final products from the RAFT should be shared with their intended audience if possible!*

Possible Connections

CCSS.ELA-Literacy.L.1.1.e

Use verbs to convey a sense of past, present, and future (e.g., Yesterday I walked home; Today I walk home; Tomorrow I will walk home).