

Global Change and Sustainability Center
University of Utah

STEM After School Outreach Educational Modules



Emerson Arehart | Kevin Craft | Rees Davidson | Dale Forrister | Kim Kernan | Jory Lerback
Global Changes and Society- 2017



Table of Contents

Note on Social Context	Pg. 3
Module 1: Introduction	Pg. 6
Module 2: Lego Sensor Building	Pg. 9
Module 3: Data Communication	Pg. 12
Module 4: Civic Engagement	Pg. 17
Module 5: Creative Expression	Pg. 22

GCSC Air Quality Education

Note on Social Context

Background

Salt Lake Valley (SLV) has an air quality problem. Living with bad air quality has tangible economic costs for all groups of people, but impacts lower income households disproportionately. Behavior changes to reduce energy usage in SLV can decrease emissions in places that bear the weight of externalized air pollution.¹ In addition to far-reaching externalities, decreasing air the production of pollution and enforcing emissions regulations will benefit health consequences both globally and locally.²

In SLV, air pollution places a relatively larger health cost burden on economically underrepresented groups.^{3,4} This inequality hinders the path towards sustainability and encourages political apathy.⁵ However, when citizens do become engaged, they can incite large scale changes.

Research indicates that educating children about environmental issues increases the knowledge of their larger community. Children have power to influence their families to make changes to improve their environment.. Our project emphasizes the importance of air quality data collection, self-expression, and civic engagement to a broader K-8 community in the SLV. STEM outreach to a broad audience is also important due to the lack of diversity currently seen in STEM graduation rates and employment.⁷⁻⁹ The equitable sharing of environmental knowledge and extracurricular education can help address issues previously discussed environmental and social inequalities.

PROJECT GOALS

Programs such as AirU and Breathe Utah currently target public and private school populations. Our project aimed to bring air quality education to demographics that are traditionally overlooked by science outreach, such as free after school programs at public libraries. Our lesson modules build upon and extend existing Breath Utah and AirU content. Our modules included:

- 1) A basic introduction to air quality issues in Salt Lake Valley
- 2) Weather and how it influences air quality
- 3) Building lego air quality sensors
- 4) Civic Engagement - how to influence change to improve air quality
- 5) Creative Expression - how art can make a difference.

The Glendale Branch of the Salt Lake Public Library system has several schools whose students frequent the library in the afternoons, and expressed interest in hosting an after school activity. We presented our modules at the Glendale Library in Spring 2017, but other libraries such as the Day-Riverside and Marmalade Branches have interest in such a program.

SOCIAL CONTEXT

Conducting science outreach in an after school program poses some unique challenges as compared to a traditional K-8 school setting. Knowing your audience is key to addressing these challenges. Participants span a large age range and may not attend the after school program every day. When presenting these modules, educators can consult the librarians overseeing the after school programs for specific advice regarding how to recruit and retain students for our program. Educators need to be aware of participants' abilities and interest level. The program should be more action-packed than students might experience in a traditional classroom. These modules are best suited for ages between 9 and 12.

Designed for after school programs, our lesson modules do not track official curriculum standards. Rather, we targeted a wide range of ages and grade levels, tried to keep lesson modules inclusive of multiple learning stages, and provided opportunities to for siblings to work together. The modules emphasize participant initiative and agency.

Metrics for diversity are lower in STEM than in other fields, especially at the University of Utah in comparison to national demographics or Salt Lake City's population.⁹⁻¹² In day to day life and especially when doing outreach in new social settings, it is useful to consider implicit or subconscious biases. Our group benefited from obtaining direct advice from librarians familiar with the Glendale Library after school program participants. [Project Implicit](#) provides a great way to self-assess subconscious biases, which is particularly important to consider when working with students from diverse populations.

REFERENCES

1. Kuylenstierna et al., 2002, A Perspective on Global Air Pollution Problems, *Issues in Environmental Science and Technology*, No. 17, Global Environmental Change p. 21-56.
2. Pope, C.A. III & D.W. Dockery, 2006, Health Effects of Fine Particulate Air Pollution: Lines that Connect, *Journal of the Air & Waste Management Association*, 56:6, 709-742
3. Anna Makri, Nikolaos I. Stilianakis, Vulnerability to air pollution health effects, *International Journal of Hygiene and Environmental Health*, Volume 211, Issues 3–4, 15 July 2008, Pages 326-336, ISSN 1438-4639, <http://doi.org/10.1016/j.ijheh.2007.06.005>.

- 
4. Matthew J. Neidell, Air pollution, health, and socio-economic status: the effect of outdoor air quality on childhood asthma, *Journal of Health Economics*, Volume 23, Issue 6, November 2004, Pages 1209-1236, ISSN 0167-6296, <http://doi.org/10.1016/j.jhealeco.2004.05.002>.
 5. National Academies of Sciences, Engineering, and Medicine. 2016. *Communicating Science Effectively: A Research Agenda*. Washington, DC: The National Academies Press. doi: 10.17226/23674.
 6. Legault, L. & Pelletier, L.G. (2000). Impact of an environmental education program on students' and parents' attitudes, motivation, and behaviours. *Canadian Journal of Behavioural Science*, 32(4).
 7. Hess, C. et al. *THE STATUS OF WOMEN IN THE STATES: 2015*. Institute for Women's Policy Research. R400. ISBN 978-1-933161-14-3. p. 103. Washington, DC: 2015.
 8. National Science Board. 2016. *Science and Engineering Indicators 2016*. Arlington, VA: National Science Foundation (NSB-2016-1).
 9. National Science Foundation, National Center for Science and Engineering Statistics. 2017. *Women, Minorities, and Persons with Disabilities in Science and Engineering: 2017*. Special Report NSF 17-310. Arlington, VA. Available at www.nsf.gov/statistics/wmpd/.
 10. US Bureau of Labor Statistics. *Women in the Laborforce: A Databook Report 1059 (2015)*
 11. Office of Budget and Institutional Analysis. *Data on Demand*. University of Utah. 2017. <http://www.obia.utah.edu/dm/>
 12. The Kem C. Gardner Policy Institute, 2015. *Demography Utah*. Bureau of Economic and Business Research, University of Utah. Accessed 2017. <http://ucdp.utah.edu/county/salt-lake-county/salt-lake-city/>

GCSC Air Quality Education

Module 1: Introduction

“Knowledge and Context of Air Quality”

Summary

1. Subject(s): Air Quality in Salt Lake Valley
2. Grade/Level: After School Elementary and Middle School Ages
3. Objective: Introduction following concepts:
 - a. What do you know about air pollution in Salt Lake Valley?
 - b. Why do we care? (Health Effects)
 - c. What is unique about SLV? (geography, model of SLV)
 - d. Demonstrate inversion (diffusion tank)
 - e. Where does pollution come from?
 - f. Transition - because we care:
 - i. Weather & Communication - go to Module 2
 - ii. Data Collection/Air Sensor Building - Module 3
 - iii. Civic Engagement- Module 4
 - iv. Creative Self Expression- Module 5
5. Time Allotment: 15-20 minutes

Implementation

Procedure

- Introduce ourselves, and the context of this “Air Quality Camp”
 - Note: Used promise of snacks to recruit! Save snacks for end of session.
- Everyone stand up! (get them up and moving)
- Question and Answer Session - *What do you know about Air Quality.* “Go to the other side of the room if you know...”
 - What Red days and Green days are?
 - What happens on Red days?
 - What air pollution is?
 - Where air pollution comes from?

- In an inversion:
 - 48% - Mobile sources (Ex: Cars)
 - 13% Point sources (Ex: Mines/factories)
 - 39% Area sources (Ex: Houses)
- Why do we care about air pollution?
 - Health
- What makes Salt Lake City (SLC) special when we have air pollution?
 - SLC is a bowl
 - *(Note 1- moving around the room can get kids active and feel less like a classroom).*
 - *(Note 2- we tossed chocolate eggs to participants to make it feel fun)*
- What makes SLC special?
 - 3-D model of SLC (pass around)
 - **Turn hot water on now**
 - Density tank demonstration (needs vasoline around edges of divider)
 - Food coloring
 - Pour water in at SAME time to prevent pre-mixing
 - Explain why temperature and density are important in the bowl of Salt Lake Valley
- Video on Health: [Beware of Smidge](#)

(By this time they may get bored and want another activity)

- Introduce workshop questions:
 - How can we measure air pollution to determine Red days and Green days? Science! **Lego Air Sensors.**
 - How do we communicate science so that people can use it? **Weather report.**
 - How do we influence and create change to fix problems such as pollution problems? **Civic Engagement.**
 - How can we creatively express ourselves in the context of our environment to make an impact? **Art.**

Materials & Resources

- a. Instructional Materials:
 - a. A/V and technological equipment (for video Smidge)

- b. Internet access
 - c. 3-D Model of Salt Lake Valley
 - d. Diffusion Tank
 - e. Cold water (container with ice)
 - f. Hot pot to make boiling water
 - g. Food coloring - red & blue
- b. Resources:
- a. BreathUtah.org
 - b. AIRU.org

Assessment: suggestions for improvements from our experience and student input.

1. Put effort into recruiting. Librarian can help.
2. Be organized and keep it moving.
3. Save big snacks for end of session.

GCSC Air Quality Education

Module 2: Lego Sensor Building¹

“Hands On Approach to Scientific Learning”

Summary

1. Subject(s):
 - a. Science and Engineering
2. Topic or Unit of Study:
 - a. Air Quality- Based on modules created by AIRU and Breath Utah
3. Grade/Level: After School Elementary and Middle School Ages
4. Objective:

To empower participants to engage with science, engineering and data collection. Develop the skillset necessary to exact meaningful air quality changes in their direct environment. Encourage students to appreciate the contributions of STEM and to consider STEM career options themselves.

Time Allotment: 25-45 min

Implementation

Learning Context

Review knowledge base by asking what students already know from Module 1 (Introduction).

For additional narrative and description of components, please refer to the following document made by AIRU and Breath Utah.

https://docs.google.com/document/d/1e7Lt3p-S6vX-wXyWXkja_n7vpUcDgb1iDSYJgFBLy0g/edit

¹ Adapted from AIRU and Breathe Utah Lessons.
Thanks to the National Science Foundation for their support (Award: 1646408, PIs: Kelly and Butterfield)

Procedure

1. Group participants into small groups for 2-4. Keep sibling pairs together.
2. Show pre-built lego sensor. Demonstrate how differing air quality affects sensor.
3. Show air quality monitoring network (on a projector, or mounted display in Glendale Library)
 - a. <https://air.utah.edu/>
4. Hand out [5 step lego instructions for reference](#), and lead by example. The team leaders can make their own sensor at the pace of the participants. This way the participants can look over for guidance and also ask for help at steps at the same time as the leaders are making them.
5. Let younger participants play with just the legos, but make sure each team has appropriate lego sets in order to finish a tunnel.
6. Help groups set up and double/triple check the wiring on the Arduino boards, and then give them a battery.
7. Help calibrate their machines by using a fog machine or fake particulates.
8. Walk around to different areas inside and out of the library to see where bad air quality is.

Materials & Resources

- a. Instructional Materials:
 - a. Legos
 - b. Arduino board
 - c. Photoresistor w/ glued wires
 - d. LED light w/ glued wires
 - e. Fan w/glued wires
 - f. Neopixel light board w/ glued wires
 - g. Battery and attachment
- b. Resources:
 - a. Video Tutorial:
<https://youtu.be/OvXfrPZX5Vk>
<https://youtu.be/xq7YiR8wdCM>
 - b. AIRU Instructions:
https://docs.google.com/document/d/1e7Lt3p-S6vX-wXyWXkja_n7vpUcDgb1iDSYJgFBLy0g/edit#
https://docs.google.com/document/d/1e7Lt3p-S6vX-wXyWXkja_n7vpUcDgb1iDSYJgFBLy0g/edit

c. GCSC Instructions:

<https://docs.google.com/presentation/d/1Pq13cJ220b-t3QsTApuhHBNmxzo-ku719ZoprKVJfAQ/edit?usp=sharing>

Funding for AIRU and Breathe Utah modules:

Thanks to the National Science Foundation for their support (Award: 1646408, PIs: Kelly and Butterfield).
National Science Foundation, Rocky Mountain Power Foundation, and Utah Clean Air Partnership.



GCSC Air Quality Education

Module 3: Data Communication

“Science Communication Through Simulated Weather Report”

Summary

1. Subject(s):
 - a. Draw conclusions about the effects of weather and how they relate to air quality.
 - b. Understand the important aspects of weather forecasts and what information they convey.
 - c. Use maps and weather data to analyze different weather conditions
 - d. Write a first-person report forecasting an upcoming weather event (storm or inversion).
2. Topic or Unit of Study:
 - a. Meteorology
 - b. Salt Lake city weather patterns and their relationship to air quality.
3. Grade/Level: After School Elementary and Middle School Ages
4. Objective:

To allow students to decipher information and creatively communicate *knowledge* based on interaction with weather and air quality *data*.
5. Time Allotment: 25-30 min

Implementation

Learning Context

Goal: Engage students and have them put together a weather report that they will act out in front of the television/projector as if they were a weather reporter on TV reporting on Salt Lake’s winter time inversion.

Procedure:

Step 1: (5 minutes discussion + 1.5 minute video)

- Assess students understanding of the relationship between weather patterns and air quality.
- Discussion questions:
 - When do inversions and bad air episodes happen in Salt Lake City? What is the weather usually like?
 - When do they end? What type of weather is required for an inversion to end?
- Perhaps show this short video to illustrate what happens.
 - (<http://www.ucair.org>) 1 min 28 seconds.

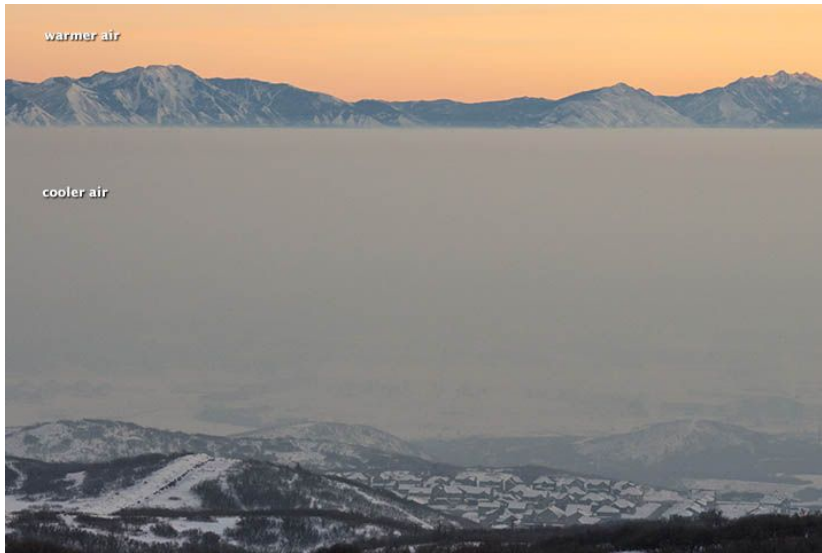
Step 2: (5 minute discussion)

- Assess students' prior knowledge by discussing television weather forecasts. Questions or prompts you may want to use include:
 - How do people learn about SLC weather?
 - Where do they learn about air quality? How can we as citizens stay informed about what's going on?
 - What does a TV weather reporter do?
 - Where does weather information come from?
 - Is reporting the weather a science?
- Watch 2 min video reporting on Air Quality in SLC.
 - <http://www.good4utah.com/good4utah/the-inversion-is-back/209120343>
 - Discuss the information the reporter focused on (air temperature, wind speed, humidity, etc.).
 - Notice they don't mention the current weather forecast. Why does this matter?

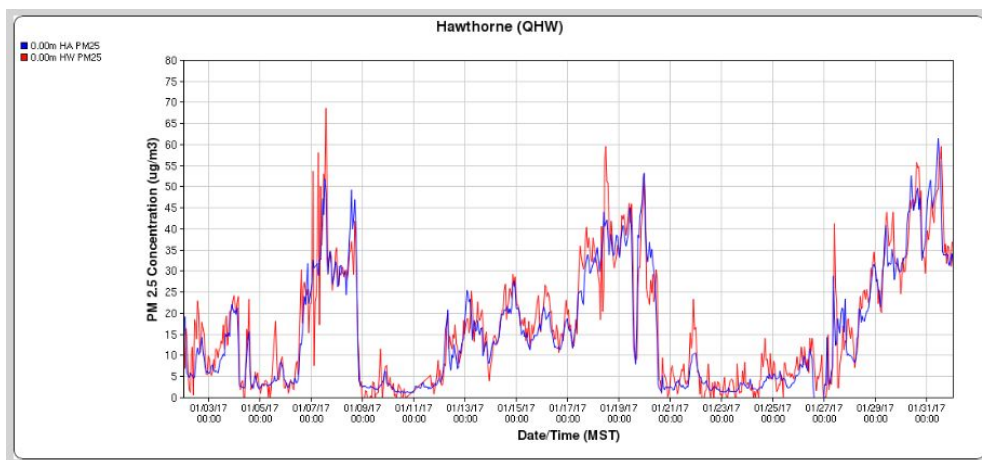
Step 3: Introduce weather report activity.

Background about weather event:

On January 7th to January 9th, the Salt Lake Valley experienced a severe wintertime inversion event. A high pressure system moved into the region resulting in two temperature layers to form in the Salt Lake Valley.



Over the next few days the valley remained cold and pollution from cars, houses and factories was trapped within in the cool air pool causing causing Air Quality to steadily worsen.



The air was finally cleared once a storm rolled in on January 9th allows the cold air and the warm air to mix and air pollution to dissipate.

Activity:

Students should take turns doing a weather report for each day of this wintertime inversion which includes the following:

- Short term forecast and weekly forecast.
- Storm alerts or lack thereof
- Current and projected air quality.
- Any recommendation about the air quality (i.e. carpool, don't drive, Don't run or play outside)

Step 4:

Break out into groups of X (3 people) and begin project of making a news report about SLC weather and air quality:

Have students draft, revise, and complete their weather report. Before they begin writing, however, clearly define the roles of each person in the group. With older students you might discuss the fact that one newsperson, usually a veteran, is safe and warm in the newsroom while another, often a less experienced reporter, is in the center of severe conditions.

- News Anchor: The person in the studio introduces the story by telling the viewers about the Storm of the Century. This portion of the script should include background information and an introduction of the reporter on the scene.
- Reporter on the Scene: This person is trying to give a serious report on the dangerous conditions while they are in the center of the storm. Obstacles this reporter may face include being blown around by gale force winds, the ground shaking during an earthquake, or snow piling up in front of him during a blizzard.
- Camera Person: This person will be responsible for taping both the news anchor and the reporter.

Step 5:

20 minutes to plan and rehearse their scripts, using props (from school or brought in from home) for special effects.

Step 6:

Have students videotape their weather reports in small groups.

Discuss the quality and success of the weather report based on the following criteria:

- Scientific content on weather and air quality
- Explaining the importance of air quality to health
- Offering solutions and advice on how to reduce pollution.

Materials & Resources

a. Instructional Materials:

- a. [Powerpoint of weather forecast template/data](#)

https://docs.google.com/presentation/d/11dUSzxcvo7gc9HNLNZinZXHKm_cBmgmfw0rtAO_bxzw/edit?usp=sharing

b. Resources:

- a. A/V and technological equipment
b. Internet access

References:

Historical weather data:

<https://www.timeanddate.com/weather/usa/salt-lake-city/historic>

Current and past weather model runs:

<http://weather.utah.edu>

Salt Lake Air Quality Forecast:

https://www.airnow.gov/index.cfm?action=airnow.local_city&cityid=186

Salt Lake City PM2.5 trend (time-series) data:

http://meso2.chpc.utah.edu/aq/cgi-bin/time_series.cgi

GCSC Air Quality Education

Module 4: Civic Engagement

“When Kids Speak, Adults Listen!”

Summary

1. Subject(s):
 - a. Effects of Bad Air Quality
 - b. Elements of Civic Engagement
 - c. Action pieces
2. Topic or Unit of Study:
 - a. Air Quality In SL Valley
 - b. Civic Engagement k-12
3. Grade/Level: After School Elementary and Middle School Ages
4. Objective:

To empower students with the skillset necessary to realize and exact meaningful air quality changes in their communities through family, friends and social interactions with a particular focus on PM 2.5 and contributions to this problem through wood burning.
5. Time Allotment: 1 hour, but can vary in length as needed

Implementation

Necessary Background

- Students should have participated in GCSC Air Quality Education - Module 1: Introduction.

Learning Context (10-15 min.)

Review knowledge base by asking what students already know from Introduction.

- Sources of pollution
- Remind the students about PM 2.5 & Smidge (if they missed intro, re-play video)
 - Where it comes from
 - Health effects
- PM2.5 pollution is associated with many bad health effects, especially in children.
 - Do you know anyone who has asthma?
 - If you have lung problems, and you are exposed to PM2.5, you may not be able to breathe as deeply or vigorously as normal. You may have respiratory symptoms including coughing, phlegm, chest discomfort,



wheezing and shortness of breath. You may experience these symptoms even if you're healthy. PM2.5 can also increase your susceptibility to respiratory infections.

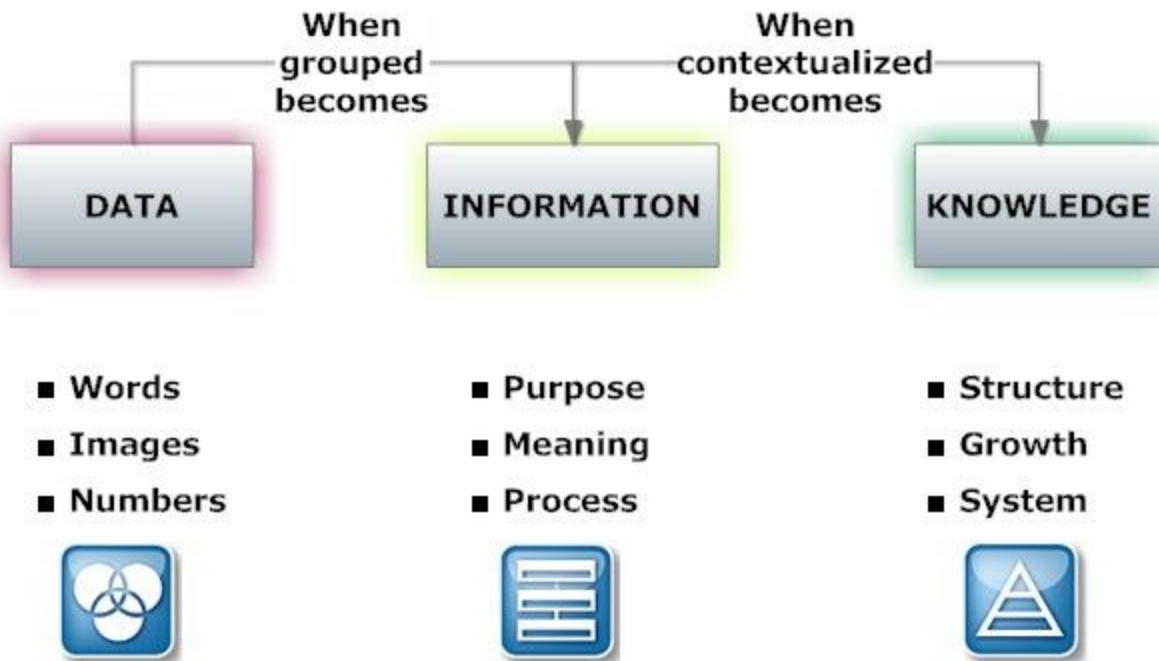
- PM2.5 poses the greatest health concern because it passes through the nose and throat, deep into the lungs, and across the lungs into the cardiovascular system. PM2.5 can aggravate heart diseases such as congestive heart failure and coronary artery disease.
- If you have heart disease, particles may cause you to experience chest pain, palpitations, shortness of breath and fatigue. PM2.5 has also been associated with cardiac arrhythmias and heart attacks. Particles can aggravate lung diseases such as asthma and bronchitis, causing increased medication use and doctor visits.
- Children are more susceptible to the health risks of PM2.5 because their immune and respiratory systems are still developing. Children breathe up to 50 percent more air per pound of body weight than do adults. The breathing of fine particles by children is believed to cause both acute and chronic respiratory problems such as asthma. PM2.5 pollution causes stunted lung development in children and decreased lung function into adulthood.
- So, PM 2.5 is bad for you. Where does it come from?
 - Autos, smokestacks, wood-burning
- Talk about wood burning
 - During an inversion, creates same amount of PM 2.5 as all of the automobiles. About one-third of the primary PM2.5 emissions was from wood burning and cooking combined—specifically, 38 percent, compared to 35 percent for all cars and trucks when the PM2.5 emissions was above 20 µg/m3.²
 - Video from UPHE:
 - [Video](#)
- So, if wood burning contributes just as much as cars to PM 2.5 during inversions, what should we do about it?
 - Example: Not supposed to burn on red days.
 - Enforced?
 - Does it matter if our government makes rules about it?
- Here: Look at Utah's lawmaker - Pursue Utah State Legislature Website
 - Show:
 - List of legislators, phone number, address, how to look up a bill.
- Introduce HB65 - specific example.
 - What it says.

² Adapted from study by Utah Physicians for a Health Environment (UPHE), <http://uphe.org/wp-content/uploads/2015/07/UPHE-wood-smoke-report-2015-pdf.pdf>, citing K.E. Kelly, R. Kotchenruther, R. Kuprov, G.D. Silcox, Receptor model source attributions for Utah's Salt Lake City airshed and the impacts of wintertime secondary ammonium nitrate and ammonium chloride aerosol. *Journal of the Air & Waste Management Association*, 63:5, 575-590.

- What is the effect.
- Lots of organizations that care about air quality against it:
 - BreathUtah.org
 - UtahMomsforCleanAir.org
 - UPHE.org - Utah Physicians for a Healthy Environment
 - HEALUtah.org

All of these voices, moms, physicians, people committed to air quality issues, made their voices know, but did not change the legislators change their mind.

- Why did it pass? (probably needs to be preceded by all of the basics - who makes laws, how does a new law get passed, etc.)
- What could we do to change legislative action in the future?
- Mythbuster: Kids can change minds!
 - Examples:
- Talk about Data, Information and Knowledge
- Talk about Gathering Data, Inferring Information,
 - Data: Facts, Trivia, Random, Not useful
 - Information: Trends, Relative to data, Useful
 - Knowledge: Applied Information



- Go back to pie chart from introduction on sources of pollution.

Call a Legislator! The Who and How in Civic Engagement (20-25 min.)

- a. Anticipatory Set
 - a. Brainstorming ways to make a difference
 - i. Who, What, When, Where, Why questions about Air Quality
- b. Demonstration
 - a. Show le.utah.gov site
 - i. Show a bill and how people voted
 1. HB 65
 - ii. Show how to find who is your legislator
 - iii. Show Breathe Utah Legislator's [Grades](#) relating to Air Quality
 - b. Show how to find their Representative/Senator (Romero/Dabakis)
 - c. Call Representative Romero
- c. Direct Instruction
 - a. Talk about the call and ask what they would say
 - b. Brainstorm more ideas
- d. Guided Practice
 - a. Write script to help class call local representative.
 - b. Have volunteer call (with help) Sen. Dabakis

Personal Engagement via Letter Writing & Social Media (10-15 min.)

1. Anticipatory Set
 - a. Brainstorming the different ways we communicate (phone, text, email, facebook, twitter, snapchat, etc)
 - b. We can use all of those ways to talk to our Legislators!
2. Demonstration
 - a. Have the students pick a way to reach out to Legislator
 - b. Include information discussed in intro
3. Direct Instruction/Guided Practice
 - a. Pass out pens/pencils
 - b. Work together to craft letter using words introduced
 - c. Write script and help students address their letter to _____
(Governor, (US/State) Senator, (US/State) Representative) From Template
 - d. Address and send letters with provided envelopes, stamps

Closing (5-10 min.)

1. Group Discussion: Ask students questions that help them realize the importance of today's lesson with questions like, "how will you use this information in your everyday lives?"
2. Ask about other issues that are important to them and how talking to civic leaders can help make people aware of the situation
3. Reinforce the idea that young people have very powerful voices, because youth usually do not speak up, and so when they do, people listen.

Differentiated Instruction

- a. Visual Learners
 - a. Seeing the process on the projector will allow these students to retain the information
- b. Auditory Learners
 - a. Listening to the calls and reading from examples of letters written by kids about air quality can help give examples
- c. Kinesthetic Learners
 - a. Writing and Calling as well as searching for the information online will provide them with the experience to build upon.
- d. ESL Students
 - a. Emphasize that our voices all matter, no matter what we sound like, look like, talk like, etc.
- e. At-risk Students
 - a. Give examples of civil activists who overcame obstacles
- f. Advanced Learners
 - a. Encourage students to hand deliver letter/follow up with Congressperson or to write an additional letter about another issue that is important to them.

Materials & Resources

- a. Instructional Materials:
 - a. A/V and technological equipment
 - b. Internet access
 - c. iphones
- b. Resources:
 - a. Paper
 - b. Pens
 - c. Envelopes
 - d. Stamps
 - e. Grease board & markers

Tips:

1. Kids *loved* the idea that legislators can be fired by voting against them!
2. Making hashtags on the grease board was a big hit - everyone wanted to do it.

GCSC Air Quality Education

Module 5: Creative Expression

“Self Expression Through Art”

Summary

Objective:

- Teach participants that art and science aren't mutually exclusive, and that art offers a powerful way to make a statement.
- Participants create something that can be displayed at the location of the outreach event, or at home.

Time Needed: **20-45 mins**

Materials & Resources

- a. Instructional Materials:
- b. A/V equipment (to show brief presentation at the beginning)
- c. Powerpoint presentation: “GCS Outreach Art Presentation”

<https://docs.google.com/presentation/d/19ANuaGTuXsiV2L9469VHJRpfd0jTu1pmpsBbD1lQUJg/edit?usp=sharing>

- d. Art supplies - paper, colored pencils/crayons/markers, posterboard (if mounting drawings for display).

Implementation

Procedure

Background:

- Discuss the impact that creative work has made in the past. The **attached powerpoint** includes some examples.
- Artists are making a difference with air quality today

- Examples from China and India

Guided Practice:

- The students produce their own drawings, based on the following guidelines (provide a few of these as options to the students):
 1. Draw your own cartoon
 - Draw a cartoon about air quality
 - Draw a self-portrait on a good air day vs a bad air day
 - Draw your home on a good air day vs a bad air day
 - Draw salt lake city in inversion
 - Draw sources of inversion
 - Draw effects of inversion
 - Draw ways that (1) adults, government, (2) you, your friends, your family can help reduce the inversion
 2. Collaborate on a poster-sized picture of SLV on a good air day vs a bad air day

Check for Understanding

- Students discuss their art with the teacher, and give permission to display at the outreach location.
- This is a great time to provide snacks or other positive reinforcement to participating students.