Youth-Led Participatory Science for Community Environmental Assessment

Environmental Measurement Symposium - August 2025

SM Locke[a], B Greenfield[b], C Blake[a], G Bracey[a], P Bhusal[a],

C Colaninno[a], A Figueiredo Dexheimer[a]

[a]Southern Illinois University Edwardsville

[b]University of Southern Maine

1. Environmental Health Investigators (EHI): Building STEM Interest to Promote Careers in the Health Sciences

2. Y-CITYSCI: A Youth-Led Citizen Science Network for Community Environmental Assessment

Participants will

- Develop and sustain science interest
- Increase their science identity
- Increase their self-efficacy in using science methods and tools

Program features

1. Authentic science in a real-world context
2. Engage with and understand scientific content connected to their community
3. Interact regularly with professional scientists
4. Act as and be seen by others as scientists

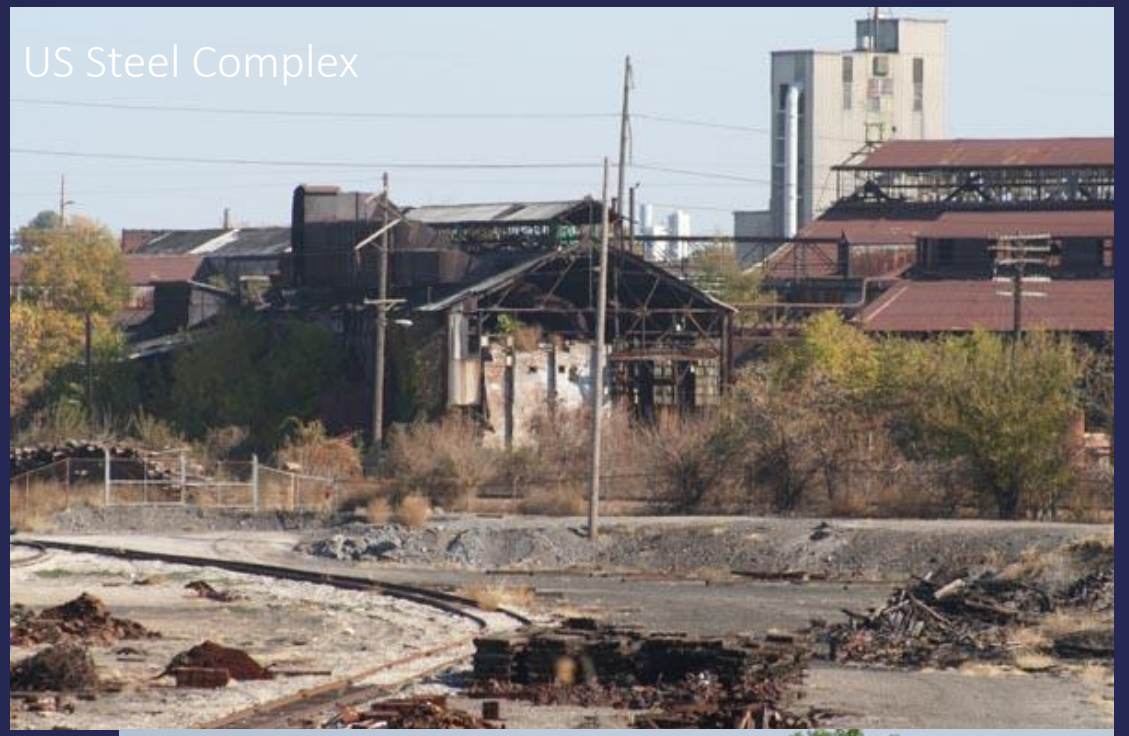
Study Area & Community

Madison, Illinois

- Est. population 3,065
- 58% Black or African American
- 31% below poverty line

Brooklyn, Illinois

- Est. population 610
- 97% Black or African American
- 35% below poverty line


US Steel Complex


Horseshoe Lake State Park

Photo Credits: Robert Powers, Built St. Louis; Horseshoe Lake: Illinois DNR

Exposure Monitoring with Portable Sensors

Content Area	Example Case/Issue	Data Collection
1. Noise Pollution	Elevated noise from roads and industry	Data Logging Sound Monitor
2. Air Pollution	Airborne fine particulate matter ($PM_{2.5}$) from vehicles and industry	PurpleAir PAII SD
3. Soil Pollution	Lead and zinc contamination from historic industry	Handheld X-ray fluorescence spectrometer
4. Natural and Built Environment	Industrial land and greenspace proximity to residences	Camera drone; Google Earth

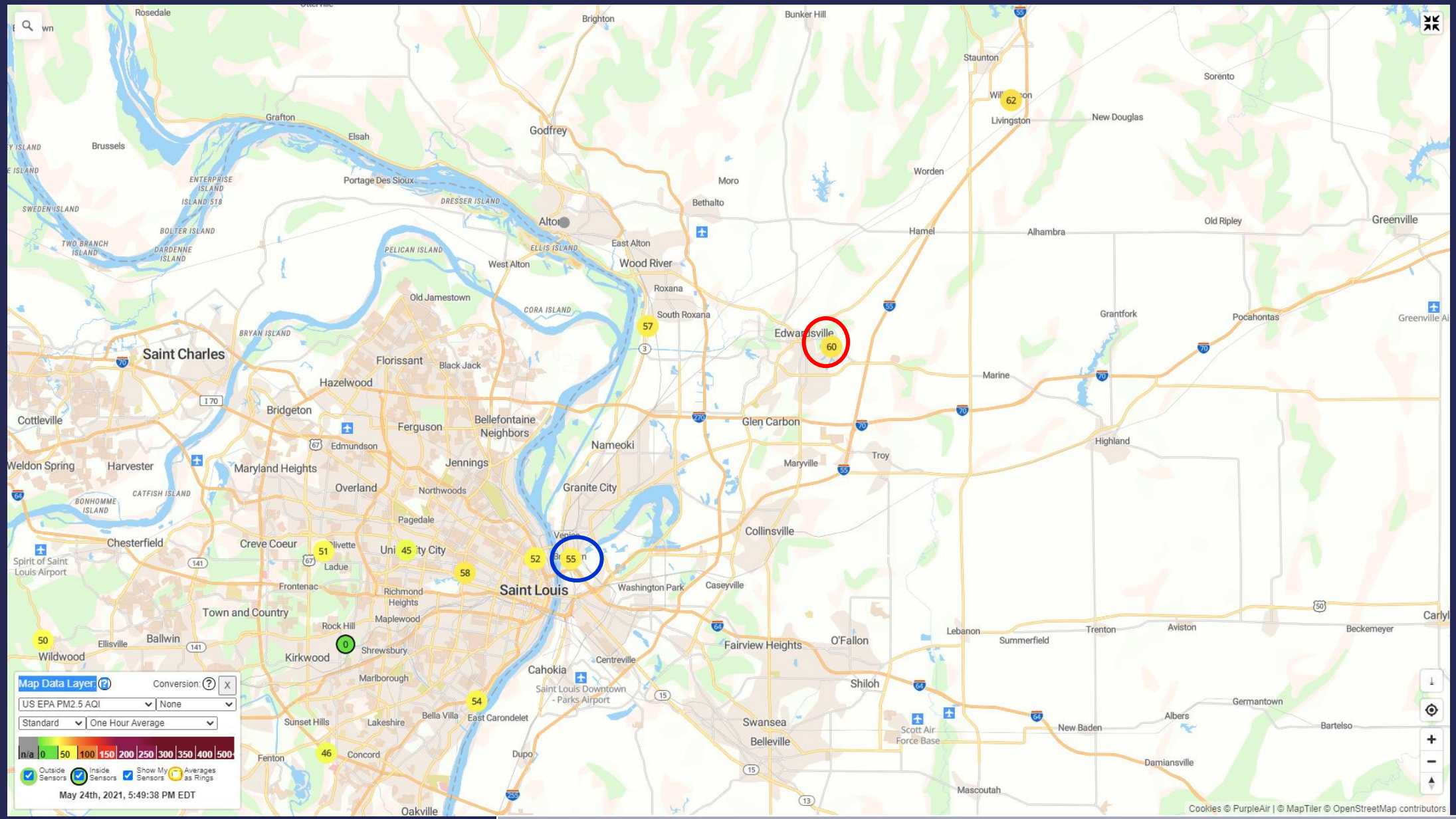


Image Credit: PurpleAir. Web query from PurpleAir's interactive map of air quality monitoring results on May 24, 2021. https://www.purpleair.com/map

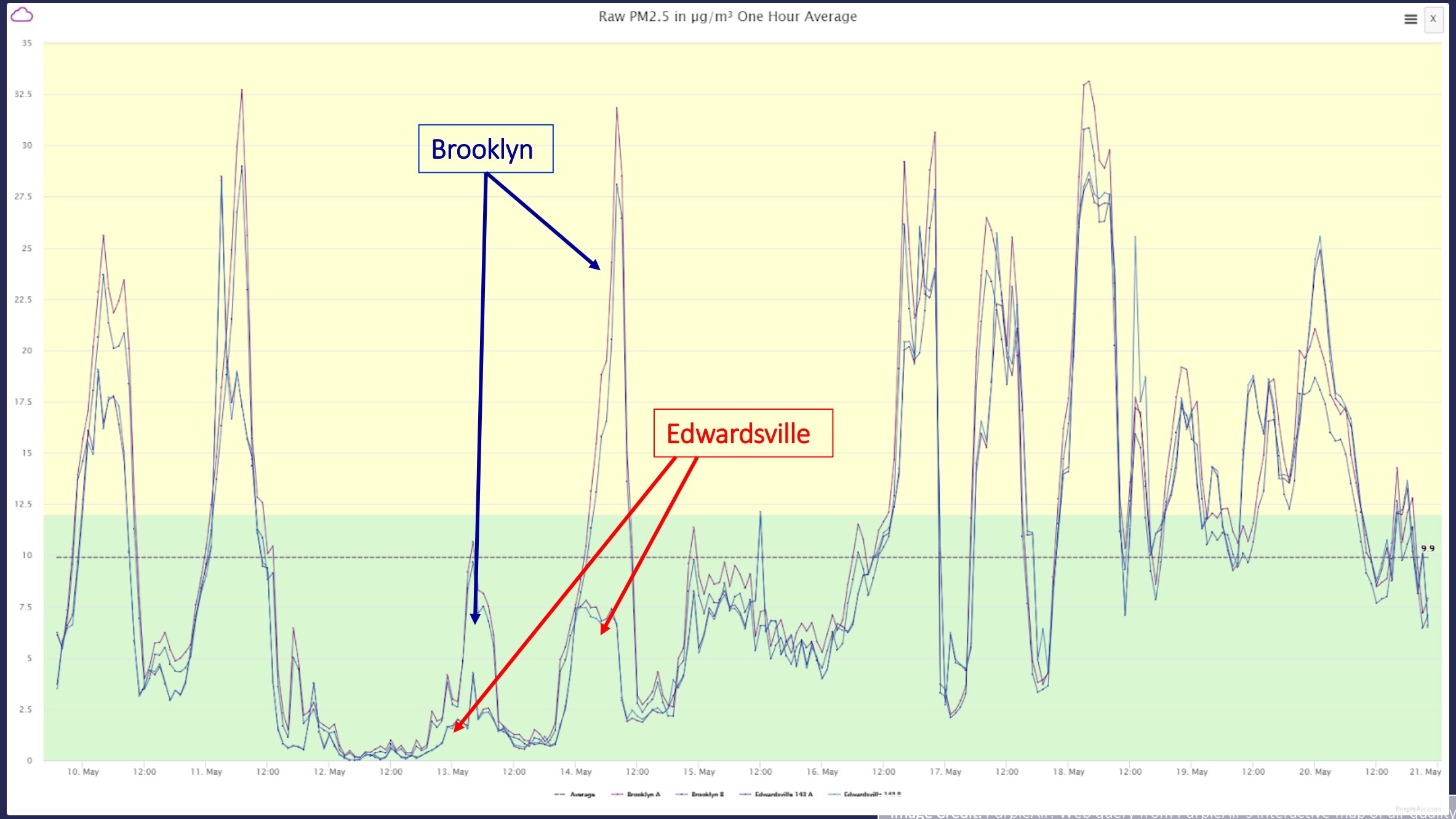
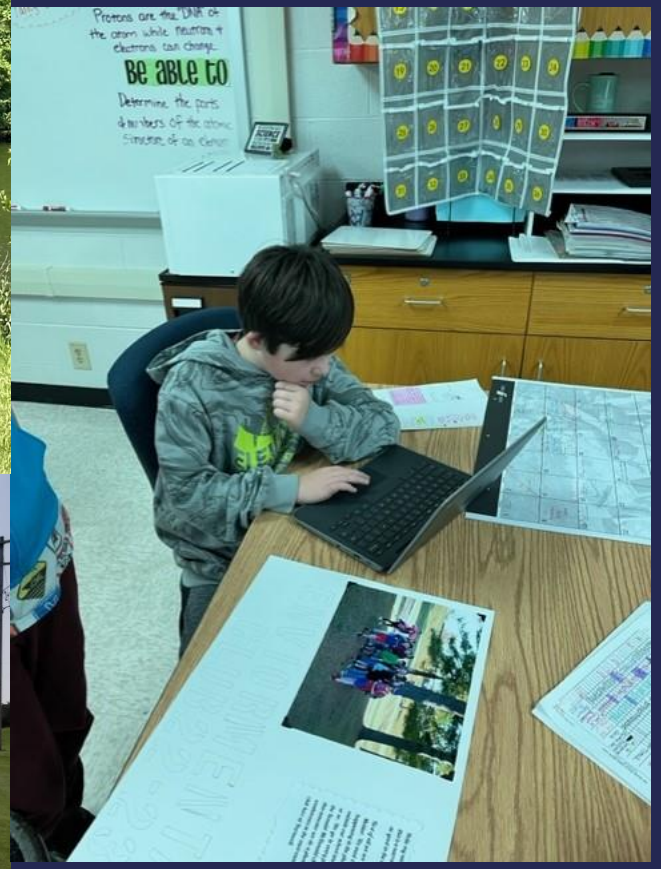


Image credit: PurpleAir. Web query from PurpleAir's interactive map of air quality monitoring results on May 20, 2021. https://www.purpleair.com/map

Community-Based Participatory Research

An orientation to research that equitably involves all partners, including researchers and youth community members, in all phases of the research process, from study design to dissemination.

Observations through Participatory Photography



Photovoice - Wang & Burris (1997)

Photovoice is a research method using photography

With Photovoice, community members take photographs

Photovoice allows community members to highlight successes or express concerns through photography

What do you want to change or have more of in your community?

What is important to you?

Taking Action

Photographs

Take pictures of environmental concerns or assets that YOU see in your community.

Caption writing

After taking your pictures, write a short story about the image.

This story helps deliver a message to your audience.

SHOWeD Method

S What do we **see** in this photo?

H What is really **happening** in the photo?

O How does this relate to **our** lives?

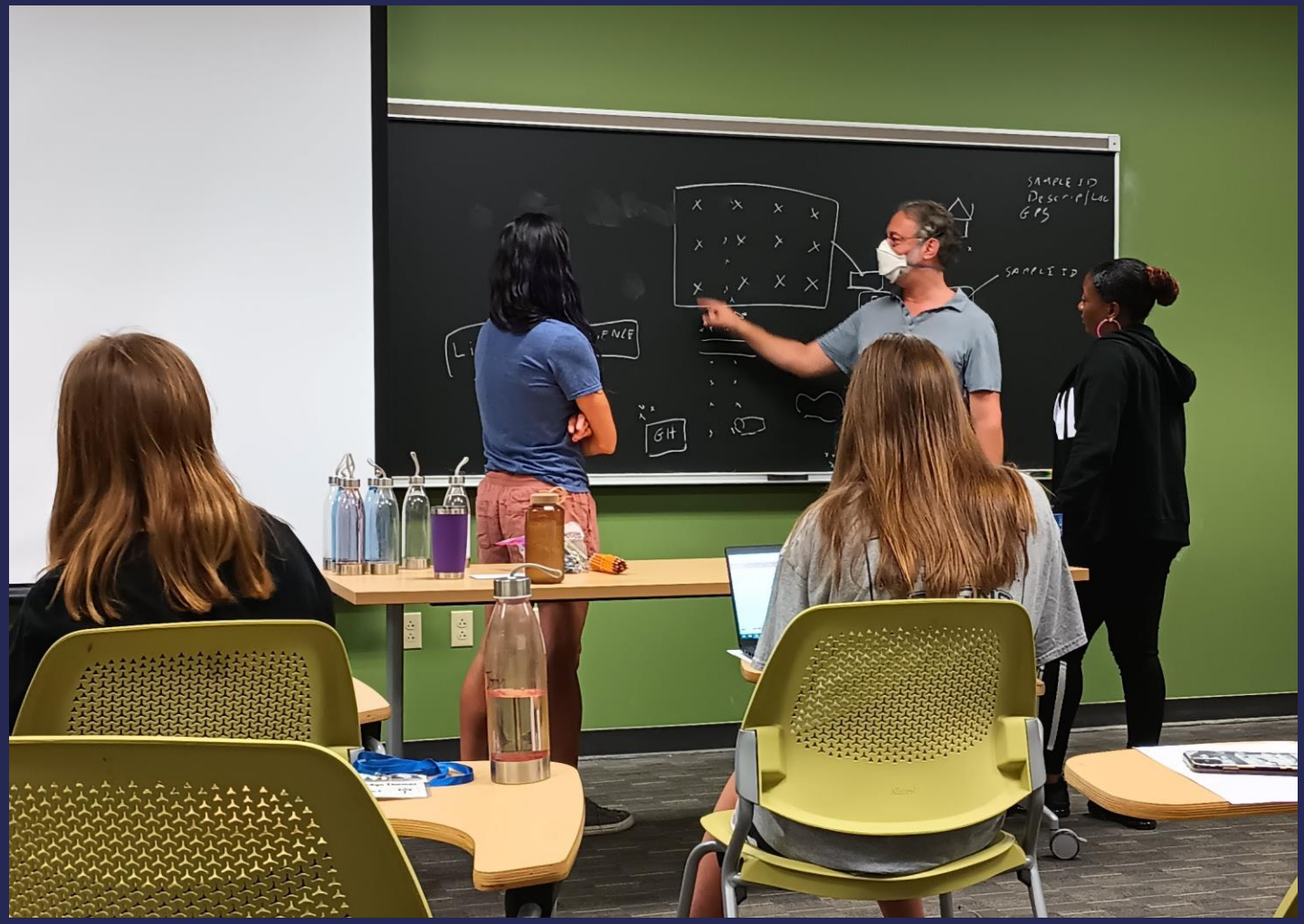
We **Why** does this concern or asset **exist**?

D What can we **do** to improve the situation?

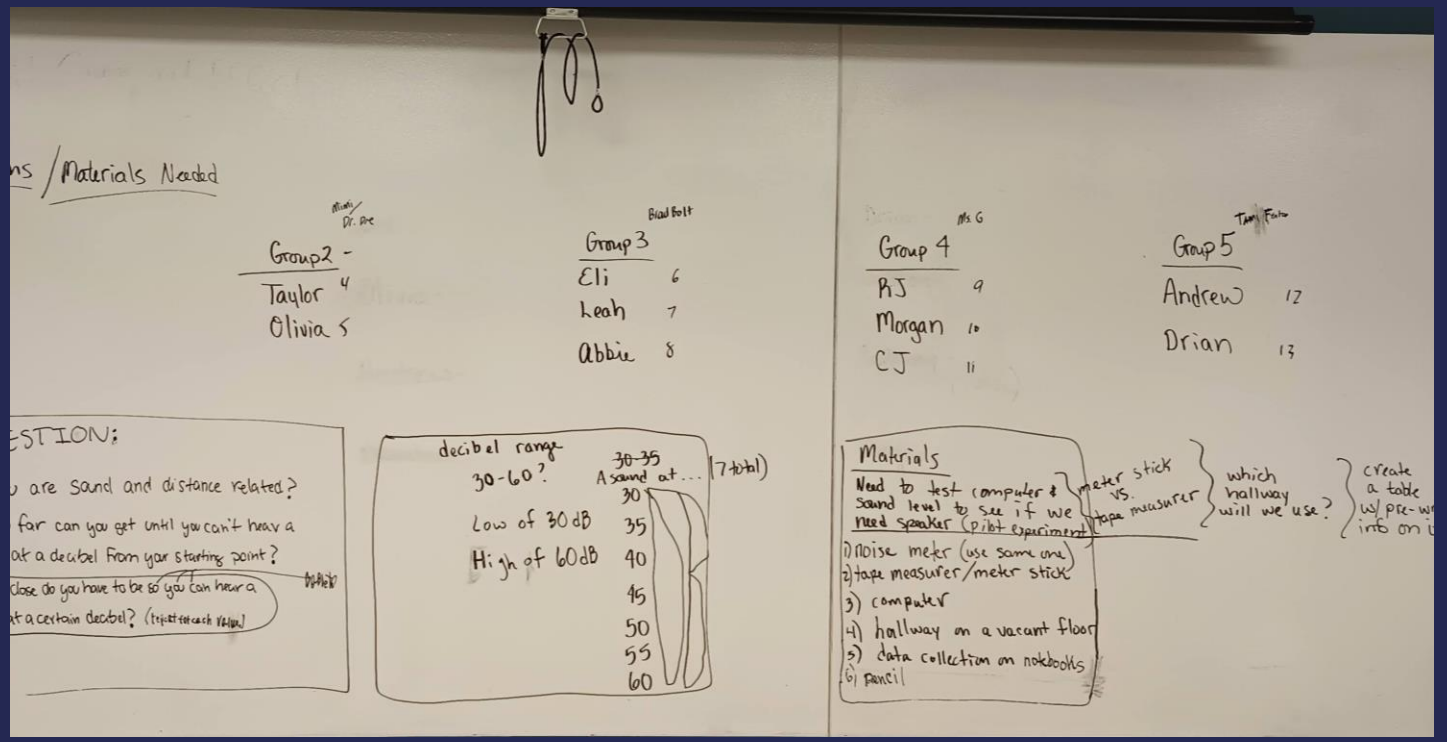
(Wang, 1999)

Learn scientific skills and tools

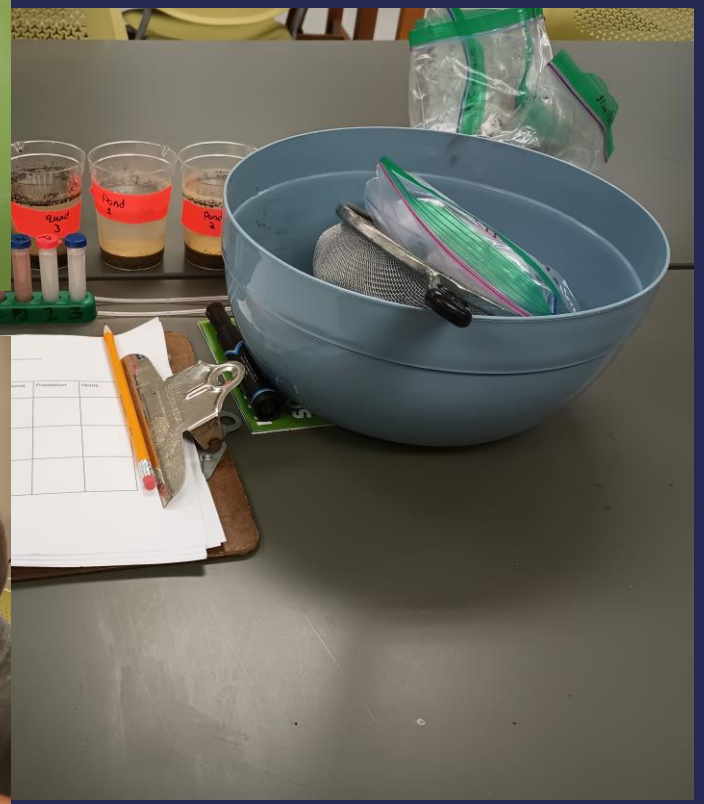
Generate research questions

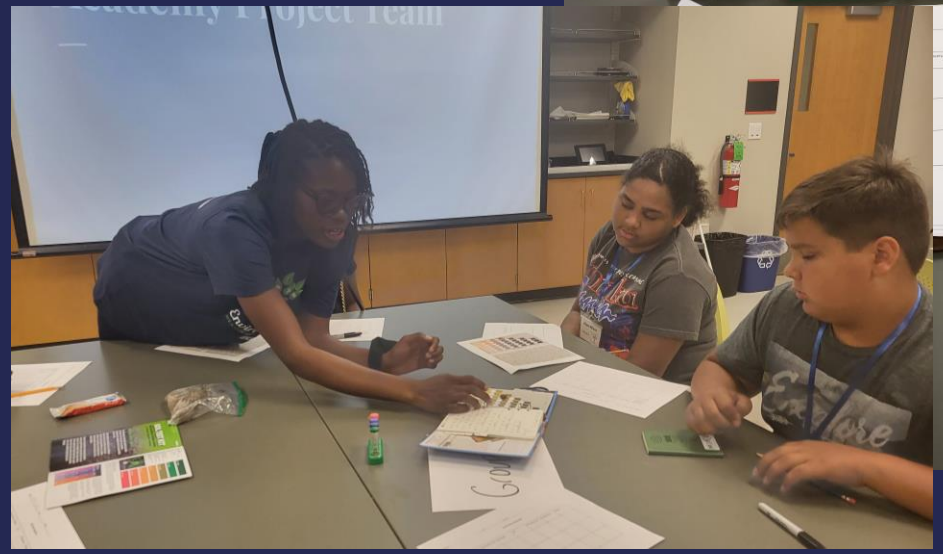


Plan research



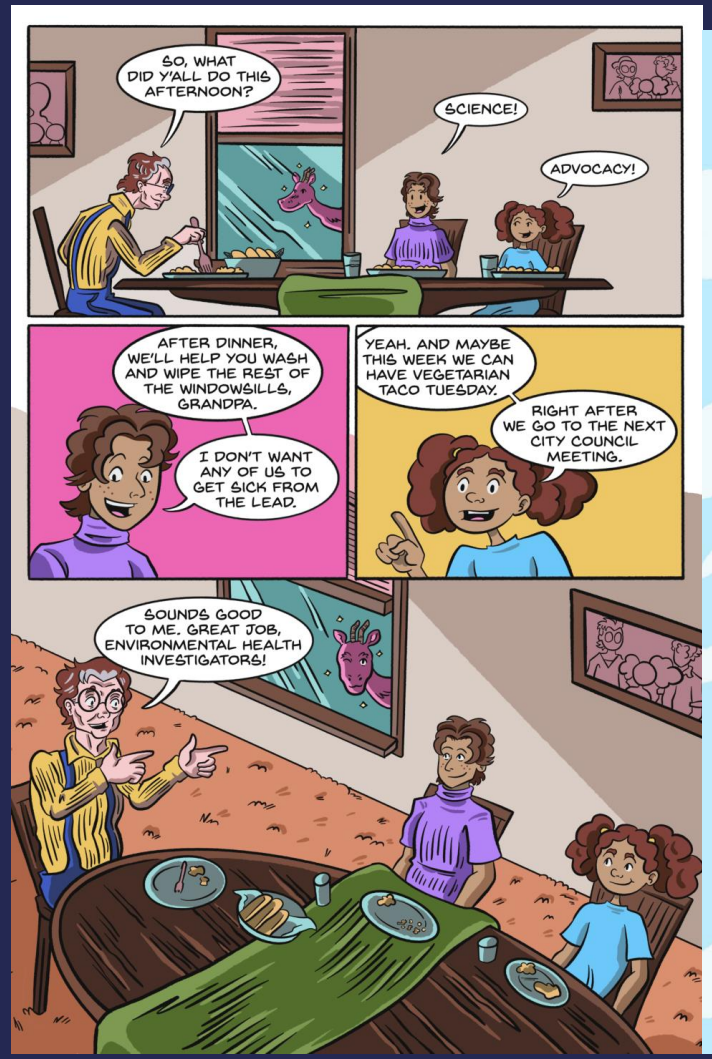
Collect and interpret data

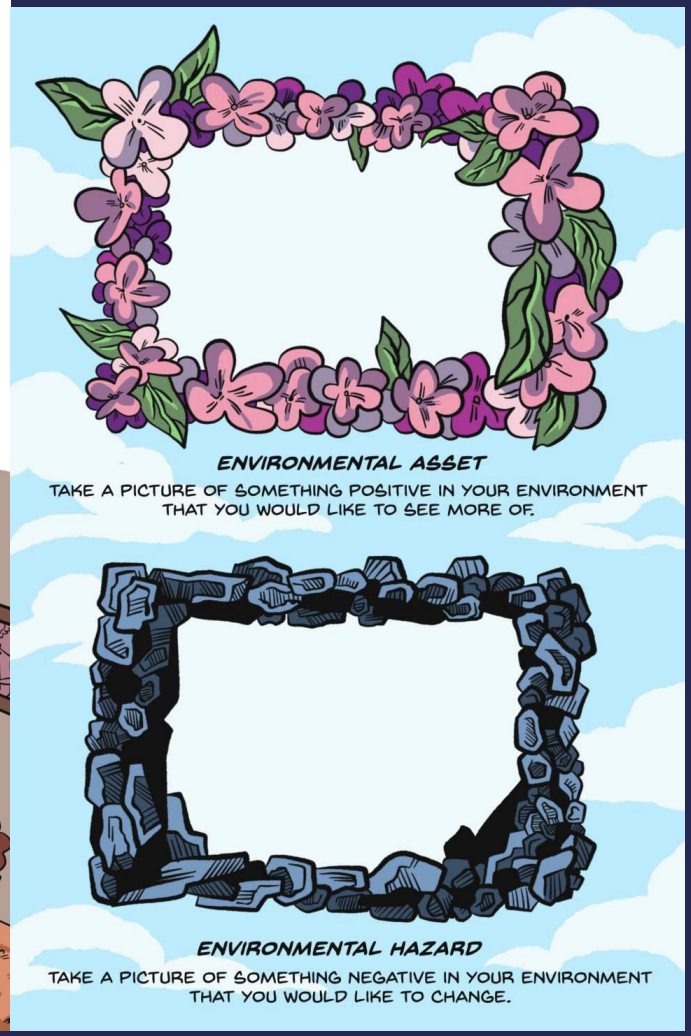


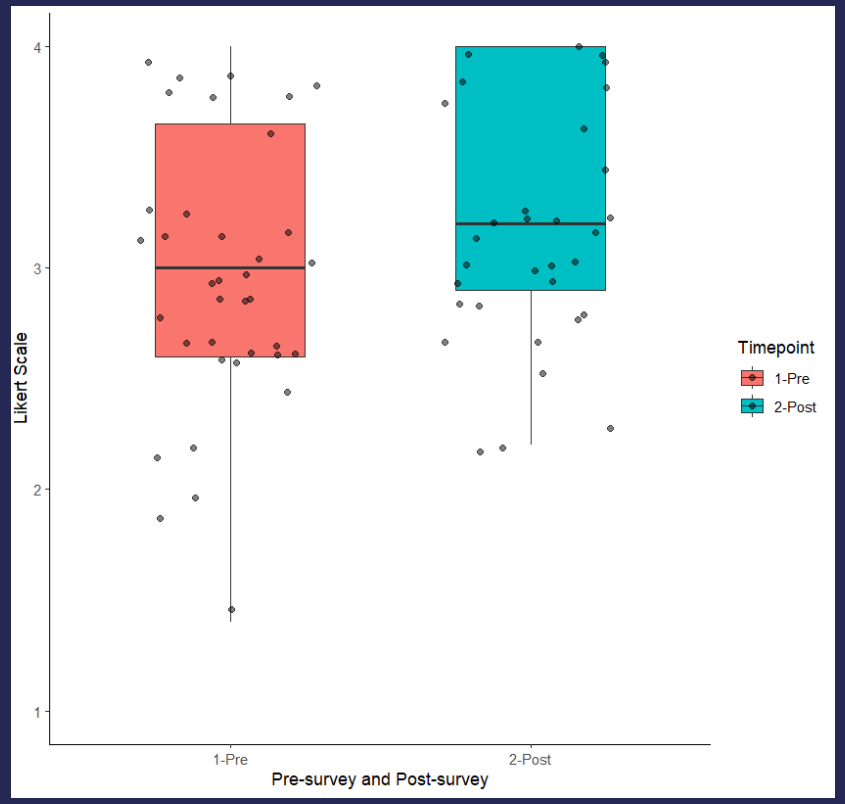


Disseminate research: Community Showcase

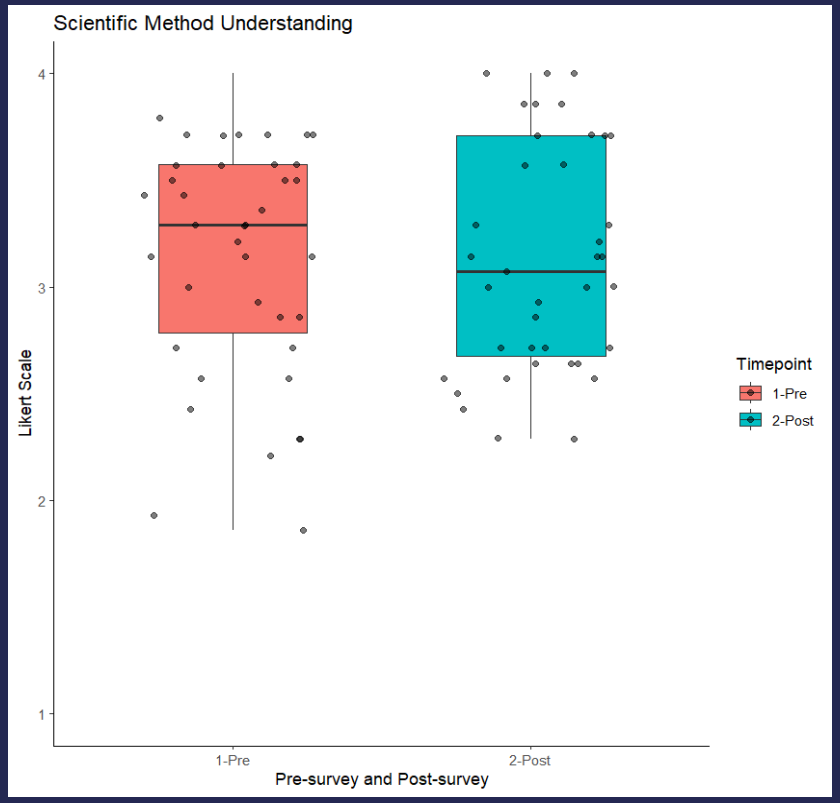
Engage others in region







Students' (N=39) self-reported environmental health content knowledge before (1-Pre) vs. after the summer program (2-Post) (Wilcoxon Signed Rank Test V=154, *p*=0.040). Each dot represents a student's average response for this scale. (Source: *P. Bhusal 2024, MS Thesis*)



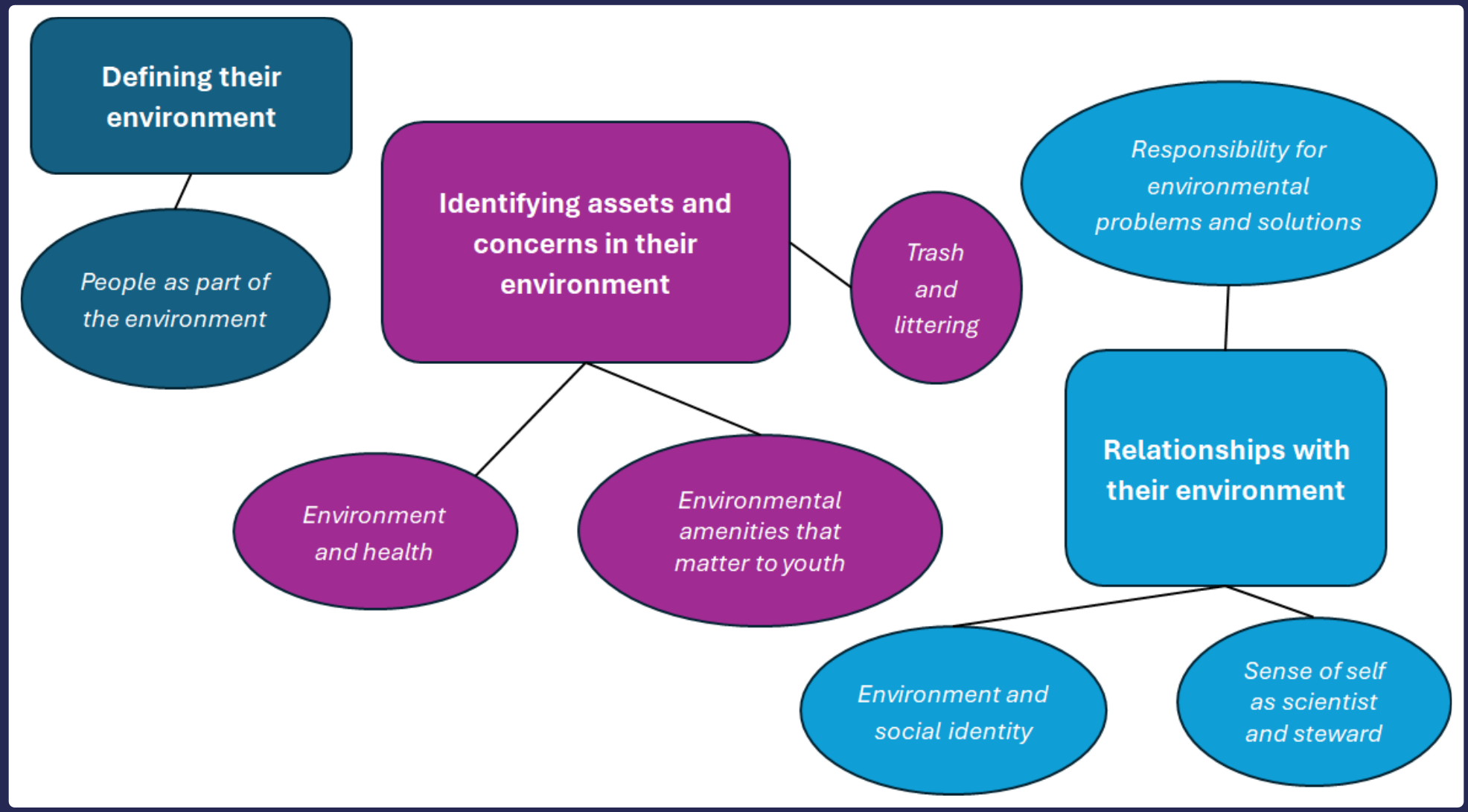
Students' (N=39) self-reported scientific method understanding before (1-Pre) vs. after the summer program (2-Post) (Wilcoxon Signed Rank Test V=261, *p*=0.963). Each dot represents a student's average response for this scale. (Source: *P. Bhusal 2024, MS Thesis*)

Qualitative Analysis

- Data from after school programs at three schools in the Fall of 2022
- Interviews and Photovoice projects from 16 participants

C Blake, 2025

Conceptual model (C Blake, 2025)



Summary

- Our research programs combined environmental science with educational theories to develop research-based curriculum.

- We deployed environmental sensors to collect data for community science and empowered grade 6 to 9 students to be researchers in these programs.

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NSF

ENVIRONMENTAL HEALTH INVESTIGATORS

YCITYSCI

Fun stuff and resources to share

https://stemcenter.siue.edu/

Comic book about environmental health (in English and Spanish)!