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# Youth Participatory Science: In Search of Science (Education) for the People

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When people march for science, what kind of science are they marching for?

## Youth

The Y in YPS recognizes the unique contributions youth make to intergenerational struggles for social justice. It does not romanticize these contributions, but rather challenges adultism and the criminalization of urban youth of color (Kwon 2006).

## Participatory

The P in YPS emphasizes the participation of youth in all aspects of knowledge production. It pushes citizen science by engaging youth not just as samplers or data collectors, but also in development of localized questions, analysis of data, dissemination of results, and development of appropriate responses.

## Science

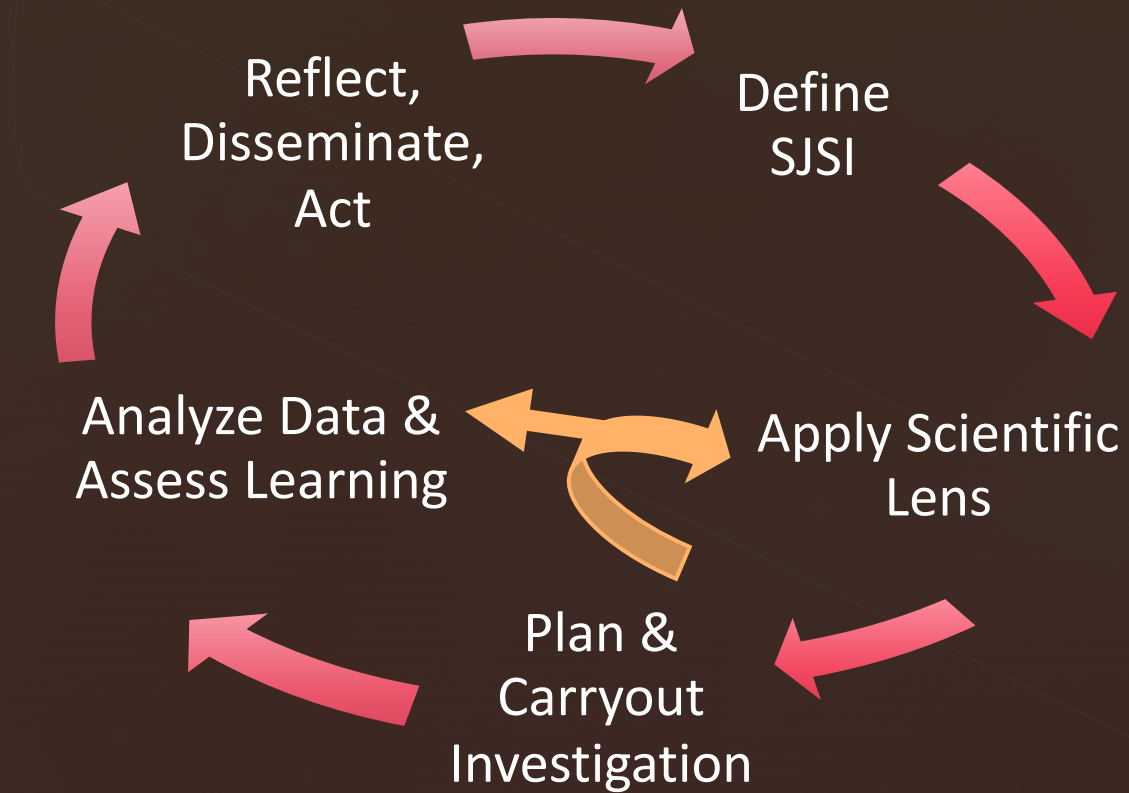
The S in YPS acknowledges the unique insights and limitations associated with scientific ways of knowing. Engaging in YPS requires acknowledging that the disciplines we teach have been shaped by (and, in turn, have undergirded) various forms of oppression (like white supremacy, settler colonialism, & patriarchy).

# Framework Comparison

YPS	5E (Bybee et al, 2006)	Praxis (Duncan-Andrade J. & Morrell, 2008)	NGSS Practices (Achieve Inc, 2013)
Define SJSI	Engage	Identify a Problem	1. Ask questions/define problems
Apply Scientific Lens	Explore	Research the Problem	6. Constructing explanations 2. Developing & using models
Plan & carryout investigation	Explain	Develop a collective plan	3. Plan & carryout investigations
Analyze data, Assess learning	Evaluate	Implement the plan	4. Analyze & interpret 5. Use math 7. Argument from evidence
Reflect, Disseminate, Act	Extend/Elaborate	Reflect	8. Obtain, evaluate, communicate information

# YPS Curriculum Framework

## Learning to Critique and Change Science & Society



## Learning to Appropriate & Appreciate Science in Context



# Defining the Social Justice Science Issue (SJSI)

## SJSI...

- Push beyond “natural phenomena”
- Are locally relevant
- Challenge nature-culture binary
- Place SJSI in larger sociopolitical context

## YPS pedagogies...

- Work with communities to identify SJSI (meet with local organizations, listen to parents, students, neighbors)
- Foreground youth & community knowledge, assets, & concerns (journaling, Socratic seminar, small group discussions, etc.)
- Use SJSI Texts (readings, lectures, documentary films) to introduce specific local examples/details of SJSI and place them in a larger context

# Defining the Social Justice Science Issue (SJSI)

- Photo Voice Assignment: Take pictures in your community of
  - Something beautiful
  - Something ugly
  - Something clean
  - Something contaminated
- Activity using the city map and various models to predict heavy metal contamination patterns

Consensus Activity: Invite environmental justice organizer into classroom





# Apply a Scientific Lens

- Teach students to appreciate *and critique* science
  - The enterprise of science has contributed to many of the problems that we define as SJSI
  - It may also help us understand these problems and act in informed ways, but it is not necessarily the only or best way to understand or address them
- Use language and pedagogy that allows students to “**cross**” into the “**culture of science**” to develop a useful set of tools and knowledge.
  - Support students to see how canonical science is **useful** as **one way of knowing** about the SJSI.
  - Teach students the applicable science (practices/skills, ideas/concepts)



# Apply a Scientific Lens

- Consensus activity:
  - Flame test and “measuring rainbows” labs
- Other activities:
  - Cross-cultural introduction to units of measurement and the metric system



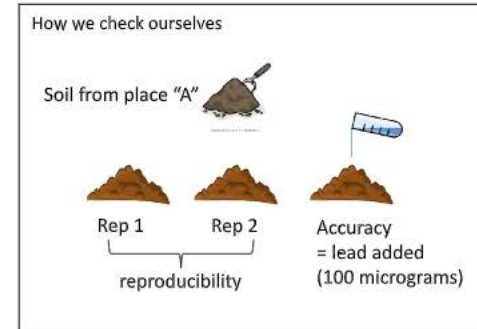
# Plan & Carryout Investigation

- Science education has long valued learning science by doing science, with the latest being encoded in the NGSS as S&E practices
- But YPS encourages students to also think about science for whom? Science to what ends?
- Consensus activity: Soil sampling and visit to university labs

# Analyze Data & Assess Learning

- Students and teachers make meaning of data collected during YPS projects.
- Students and teachers prepare to share and/or act on what they have learned.
- Consensus activity: spiked soil lab
- Students and teachers consider what they have learned, which includes considering the affordances and limitations of scientific knowledge.

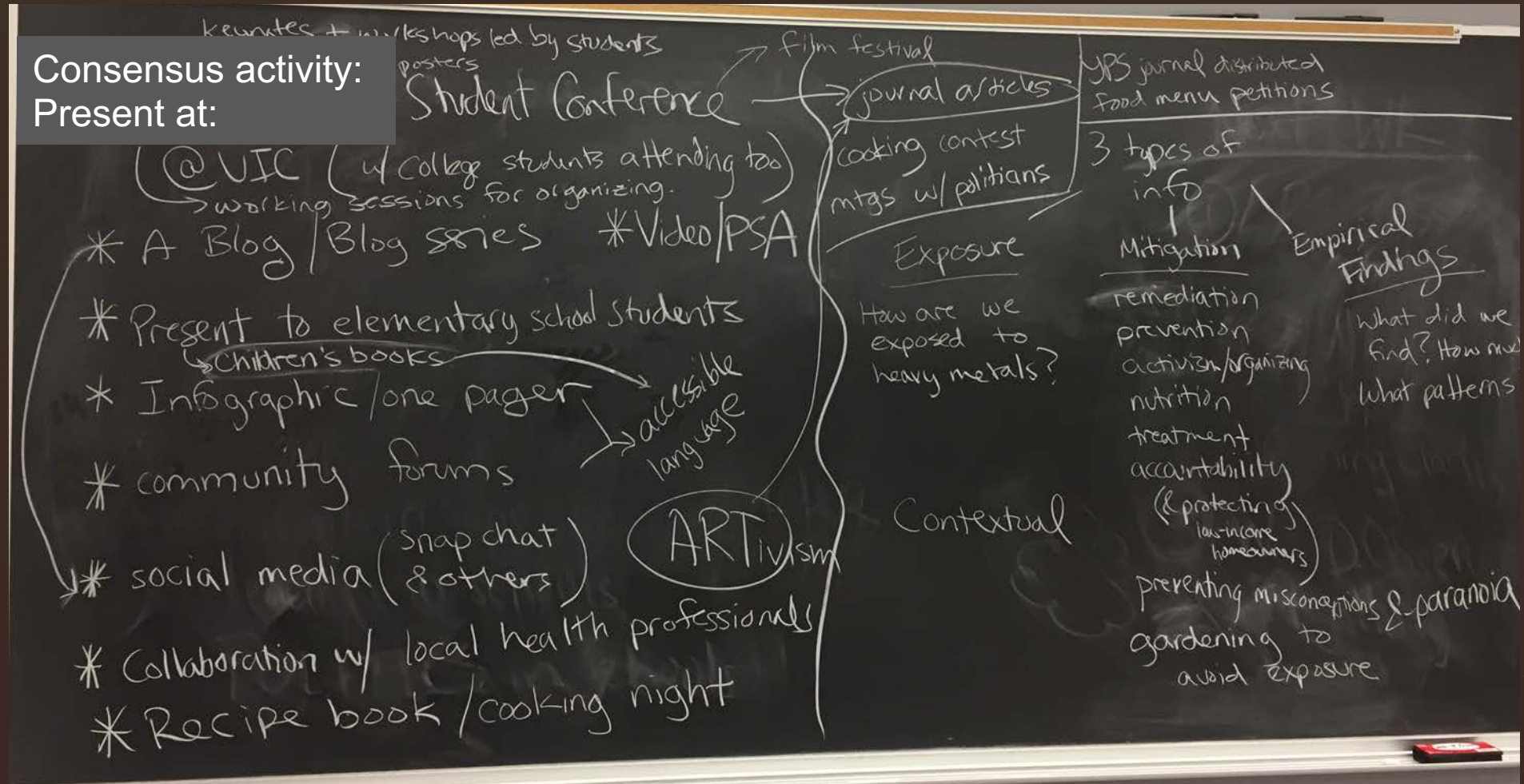
We also want to be **accurate**. If you think you weigh 100 pounds and I weigh you to be first 105 pounds and then again 105 pounds my measurement is *reproducible* but maybe it isn't *accurate*? One way to check for accuracy is to measurement something I really know the answer to. First I measure you (105 and 105 pounds for an *average* of 105 pounds). Next I hand you a 10 rock. If I measure you again and come up with 115, then I am pretty confident that you weigh 105 pounds.





# Reflect, Disseminate, Act

Consensus activity:  
Present at:







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Moving YPS forward...



### **Supports for teachers**

Danger in using curriculum framework as a formula

Substantial learning for teachers that can be done collectively



### **Emphasis on intergenerational work**

Danger in romanticizing the role of youth

Healing generational schisms is important decolonizing work

(Camarota & Fine, 2008)



### **Continuing to grapple with contradictions**

Danger in participating in “evidentiary regimes” (Liboiron, Tironi, Calvillo, 2018)

How do we grapple with EJ issues without the tools of science?