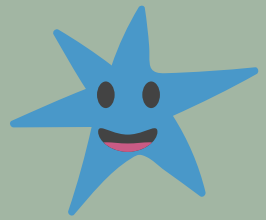
Culturally ConnectED:

Bridging Culture and Science Through Anchoring Phenomenon

Introduction



Lived Experiences

Lived experiences (cultures, societal challenges etc) affect how knowledge is acquired

NGSS

Next Generation Science Standards encourage students to ‘think like scientists’ by engaging in scientific process and skills like producing evidence based explanations

Anchoring Phenomenon

Intriguing process and/or event that students use to explain science concepts

Student Context

01 Suburban High School - 9th Grade CP Biology

02 2 Classes: 35 & 26 Students

03 36% Latinx
28% Asian
18% Caucasian
18% 2+

04 15 RFEP
1 IEP
1 504

Dilemma of Practice

1. **Disinterest in curriculum**
   Students bored and disconnected

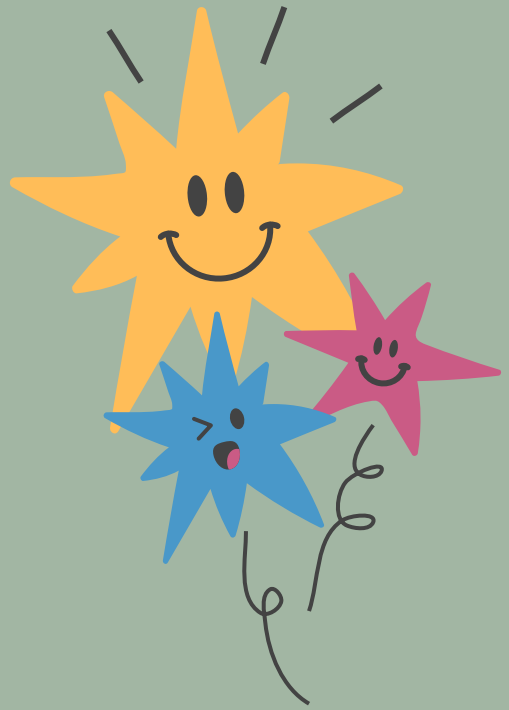
2. **Lack of relevance in curriculum**
   Students unable to relate to content, identities not reflected

3. **Low disciplinary engagement**
   Low self efficacy and motivation in science skills

Inquiry Question

How might the implementation of culturally relevant anchoring phenomenon encourage 9th grade CP Biology students to analyze and interpret data to create evidence based explanations in a safe collaborative learning environment?

Theoretical Framework



Gloria Ladson-Billings

- Culturally Relevant and Culturally sustaining Pedagogy
- Students cultures, life histories and interests should be reflected and validated by the curriculum

Megan Bang

- Everyone has “settled expectations” of what smart looks like based on life experiences

Funds of Knowledge

- Knowledge based on prior experiences that is often overlooked (Genzuk 1999)

Intervention Strategies

Academic Learning Outcomes

- Culturally relevant anchoring phenomenon
- Graphic Organizers
- Evidence based explanations in the form of CER (claim, evidence, reasoning

Classroom Culture

- Collaborative evidence based explanations (CER)
- Gallery walks

Inquiry Cycle 1

Culturally Relevant Phenomenon

Inquiry Cycle 1

Implementation of Culturally Relevant Phenomena

Indigenous Bajau Community

Observations:

- Graphic organizers effective
- Maintaining interest in phenomenon throughout unit = difficult
- CERs lacking appropriate evidence

Outcomes:

- 61% Developing
- 22% Proficient
- 16% Skilled

Inquiry Cycle 2

Student Agency

Inquiry Cycle 2

Increasing Student Agency

Choice of investigative phenomena topic - athletes

Observations:

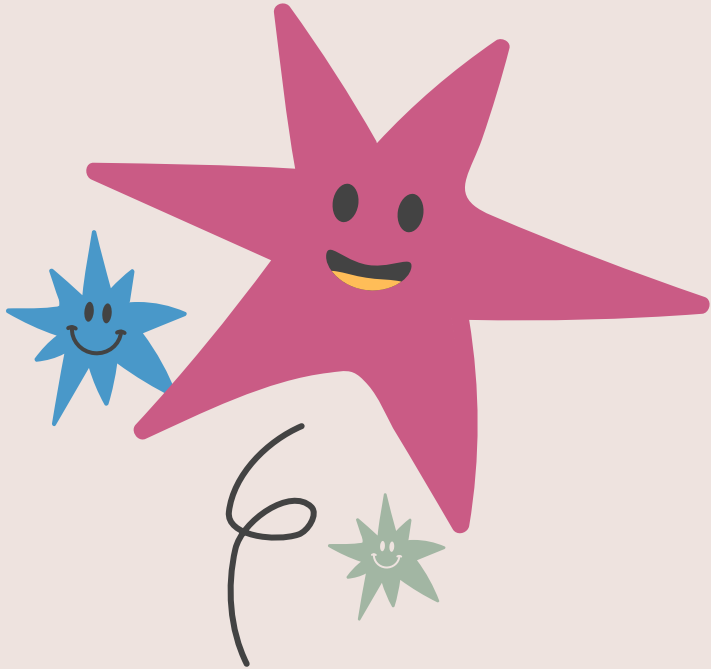
- Increased motivation with increase in agency - do not lose interest as quickly
- CERs lack overall coherence

Outcomes:

- 23% Developing
- 52% Proficient
- 23% Skilled

Inquiry Cycle 3

Collaboration



Inquiry Cycle 3

Collaboration

Group CER and Gallery Walk

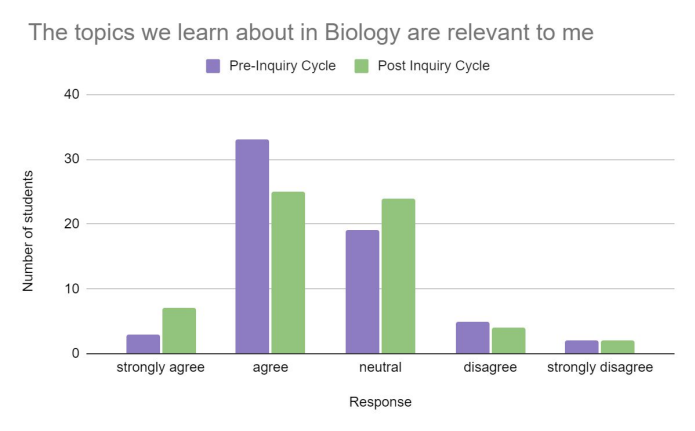
Observations:

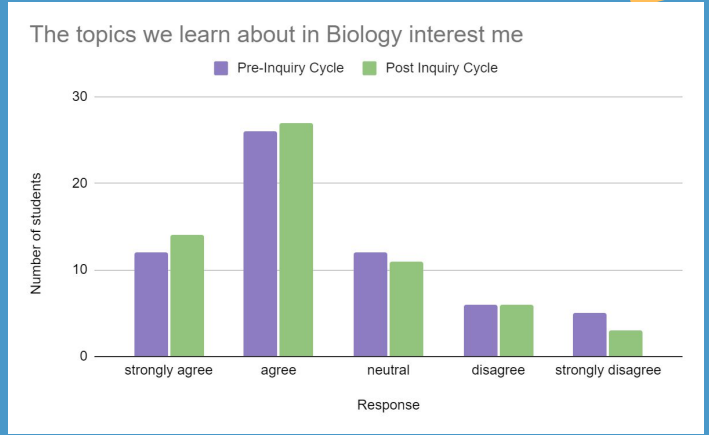
- Group structure = high engagement
- Gallery walk allowed for further interactions - commenting on each others CER

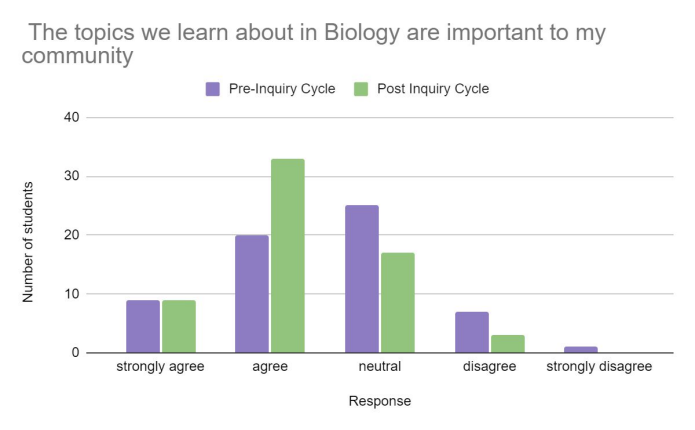
Outcomes:

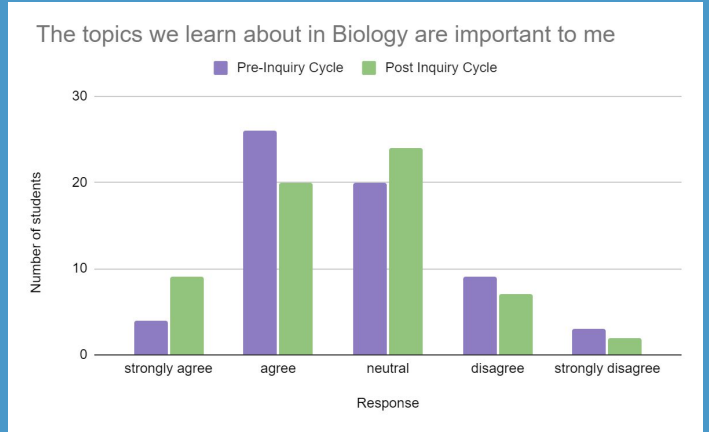
- 0% Developing
- 50% Proficient
- 50% Skilled

Data Analysis: Survey Results

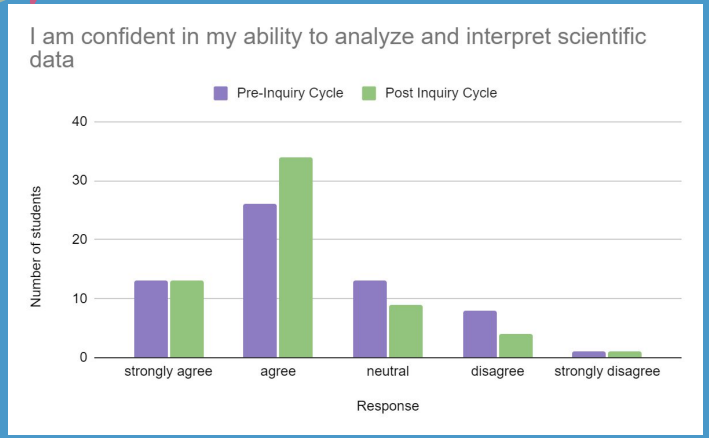


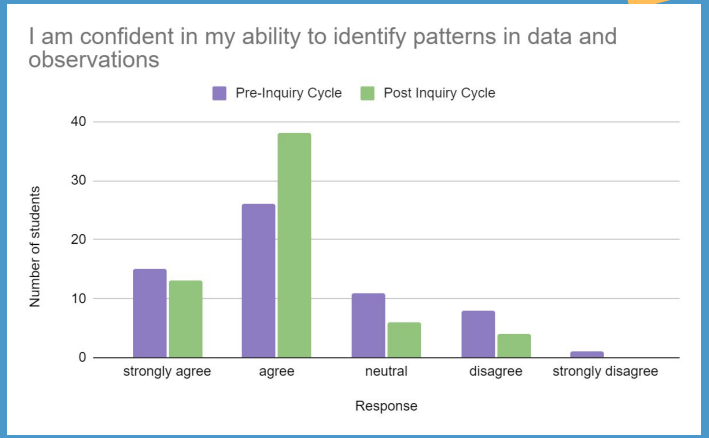


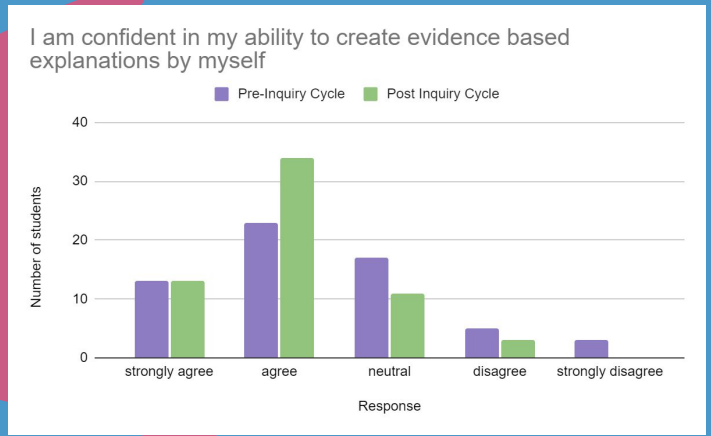


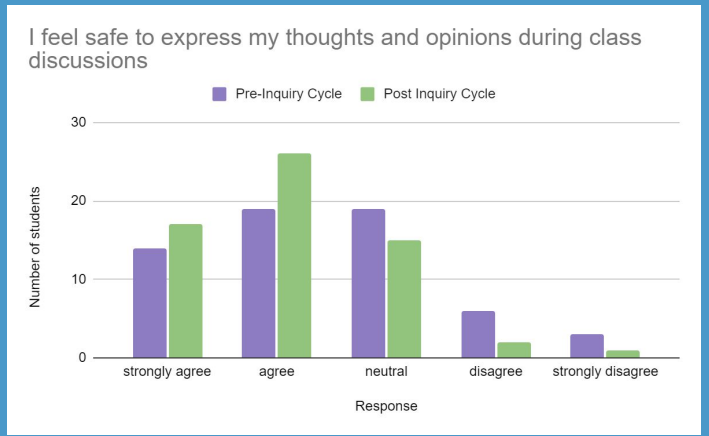


Data Analysis: Survey Results









Theme 1: Humanizing Experiences

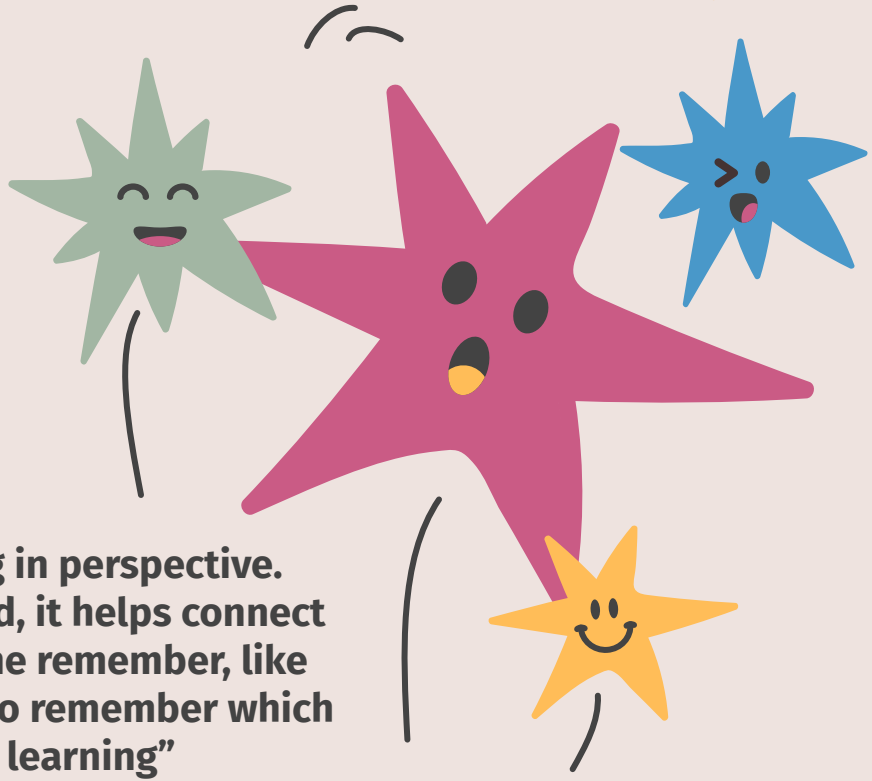
- Students identifying with the curriculum - situate themselves within the focal phenomenon
- Science made “more personal” and “more interesting”
- Increased motivation and self-efficacy

“ I think it explains why were different and like we are all different for different reasons but it's because of biology”

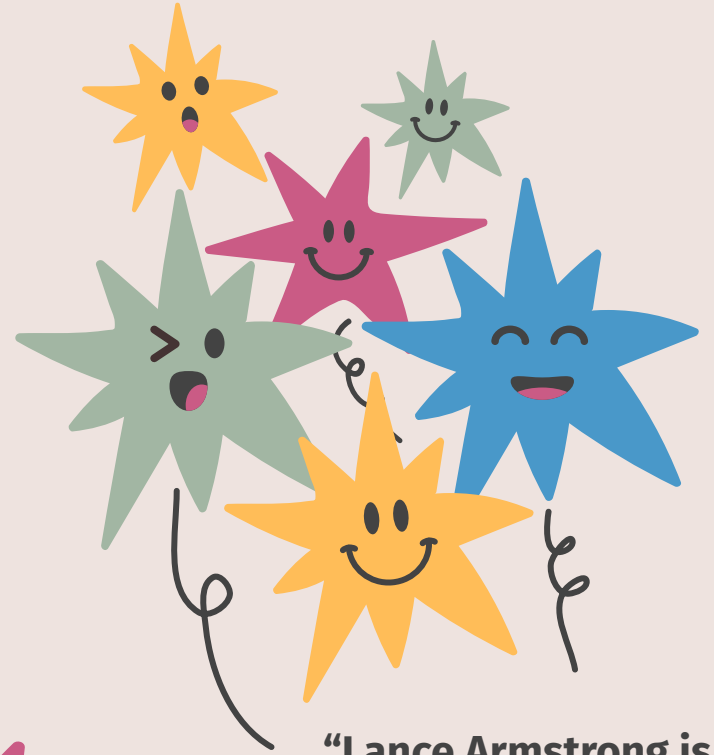
“I liked it because it made it personal to me and so it was more interesting”

Theme 2: Negotiation of Meaning

- Deeper sense making: Connections between prior funds of knowledge and new content knowledge
- Extending knowledge beyond the classroom - into personal lives and communities



“Phenomenons put what were learning in perspective. Instead of making lessons only fact based, it helps connect what we learned to the world..it helps me remember, like with the bajau people theyre something to remember which helps me remember what we are learning”



Theme 3: Equity and Access

- Funds of knowledge: students appreciated for what they bring in - increases access to curriculum
- All students regardless of identity participating in deeper sense making
- Funds of knowledge: challenges ideas of “settled expectations”

“Lance Armstrong is world renowned cyclist and has won the tour de france multiple times. Because he was diagnosed with cancer he should stick to moderate intensity cardio.Since he has cancer he needs to be careful so that he does not go into lactic acid fermentation and get too sore”

Future Plan of Action: Recommendations

Cultural Relevancy

Creates authentic learning experiences and allows for deeper sense making

Agency

Increasing student choice and agency to increase engagement and motivation

Social Justice

Moving from validating student identities to empowering agents of change

References

Bang, M., Warren, B., Rosebery, A. S., & Medin, D. (2013). Desettling expectations in science education. Human development, 55(5-6), 302-318.

Genzuk, M. (1999). Tapping into community funds of knowledge. In Effective Strategies for English Language Acquisition: Curriculum Guide for the Professional Development of Teachers Grades Kindergarten through Eight. (pp. 9-21). Los Angeles: Los Angeles Annenberg Metropolitan Project/ ARCO project.

Ladson-Billings, G. (1995). But that's just good teaching! The case for culturally relevant pedagogy, Theory Into Practice, 34:3, 159-165, DOI: 10.1080/00405849509543675

Ladson-Billings, G. (2021) Three Decades of Culturally Relevant, Responsive, & Sustaining Pedagogy: What Lies Ahead?, The Educational Forum, 85:4, 351-354, DOI: 10.1080/00131725.2021.1957632

Lee, O., & Grapin, S. E. (2022). The role of phenomena and problems in science and STEM education: Traditional, contemporary, and future approaches. Journal of Research in Science Teaching, 59(7), 1301– 1309. https://doi.org/10.1002/tea.21776

Love, B. (2020). We want to do more than survive: Abolitionist teaching and the pursuit of educational freedom. Beacon.

Thanks!

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Do you have any questions? Contact me!

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