



# Safety as a Framework for Adaptation Education: Empowering educators and students with agency in the face of the climate crisis

Kelly Keena, PhD – Moderator  
Institute for Research Experiences & Education

Adaptation Futures  
Te Pae Christchurch Convention Centre, Ōtautahi  
Christchurch, New Zealand  
15 October 2025

© 2025 Underwriters Laboratories Inc.



WHAT IS

Safety?





**Research  
Institutes**



**Standards &  
Engagement**



# Understanding Global Perspectives on the Mental Health Impacts of Climate Change Education

## *Education for an Adaptive Climate Psychology*

Eliana Stromberg  
October 15, 2025

© 2025 Underwriters Laboratories Inc.



Photo by [Margot RICHARD](#) on [Unsplash](#)

# Research Questions



# 1

What demographics are being studied in current literature about the mental health impacts of climate change education and awareness?

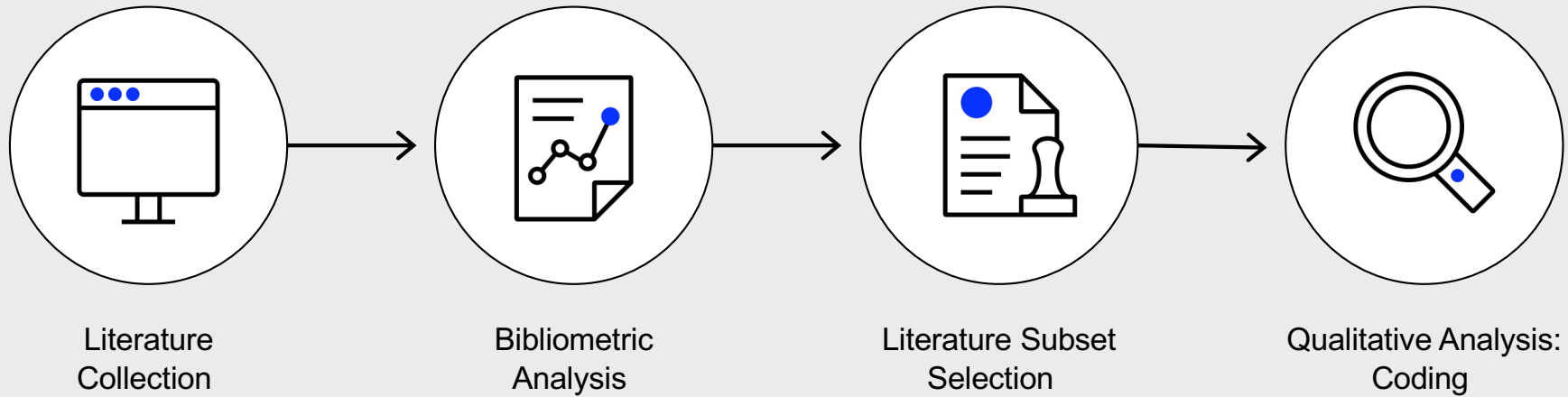
1.1 What is the researchers' context?

# 2

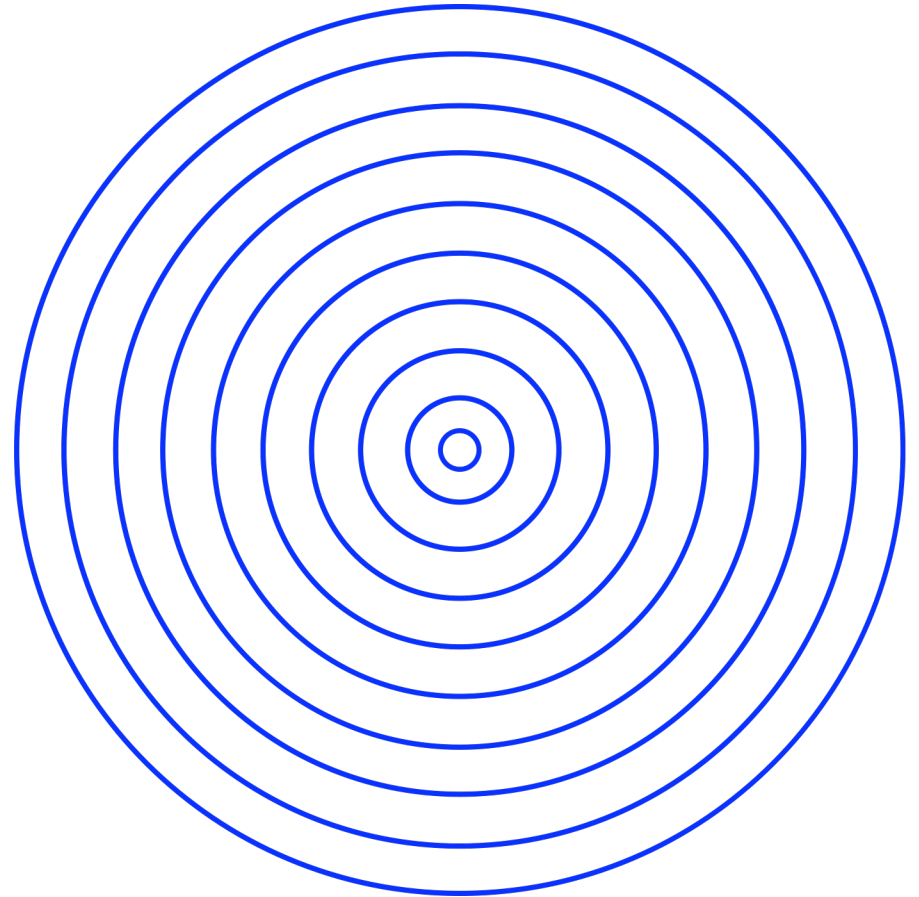
What are the theories of climate and emotions, and how do they shape climate education?

- 2.1 Where are there divergences in the field?
- 2.2 Where does the discipline of safety science sit in the broader field?

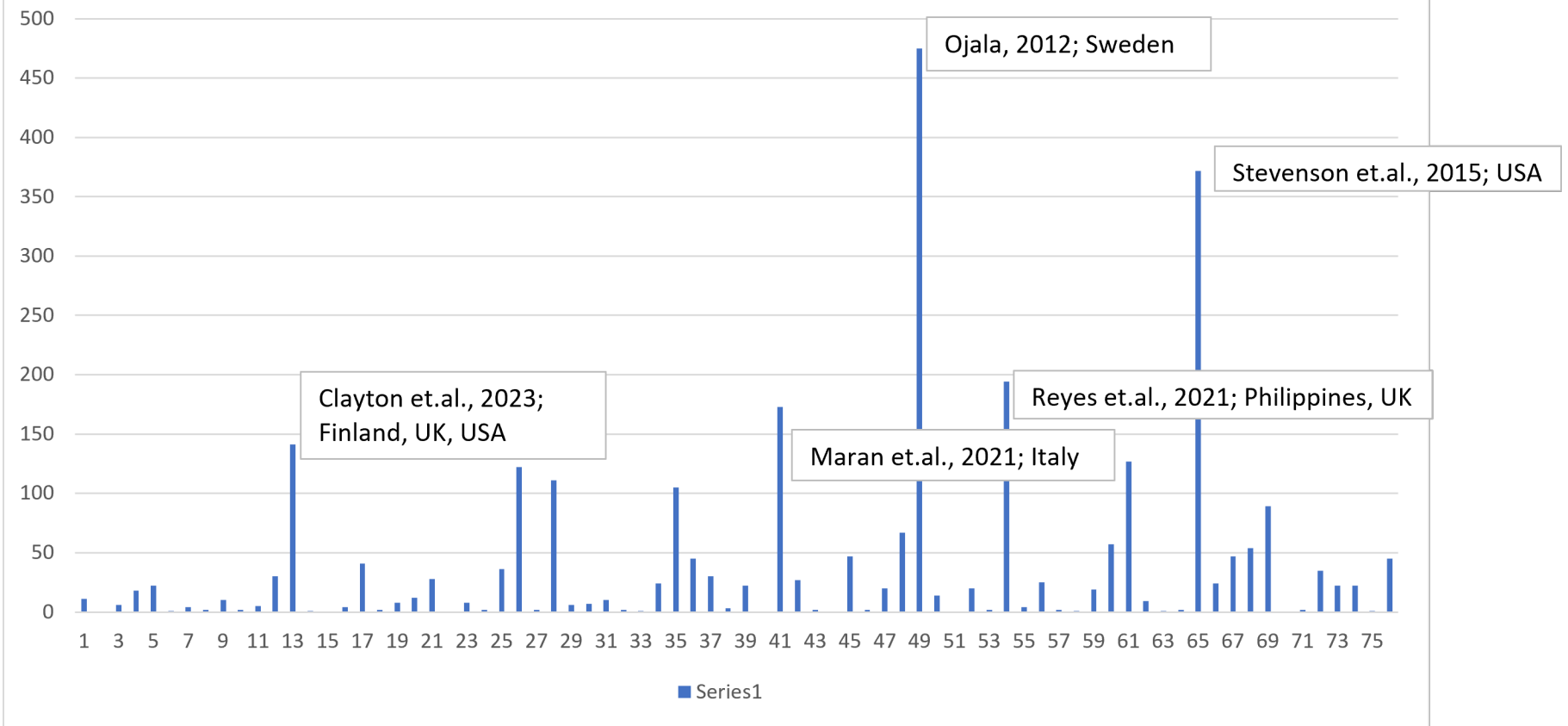
# Methodology



# Bibliometric Analysis

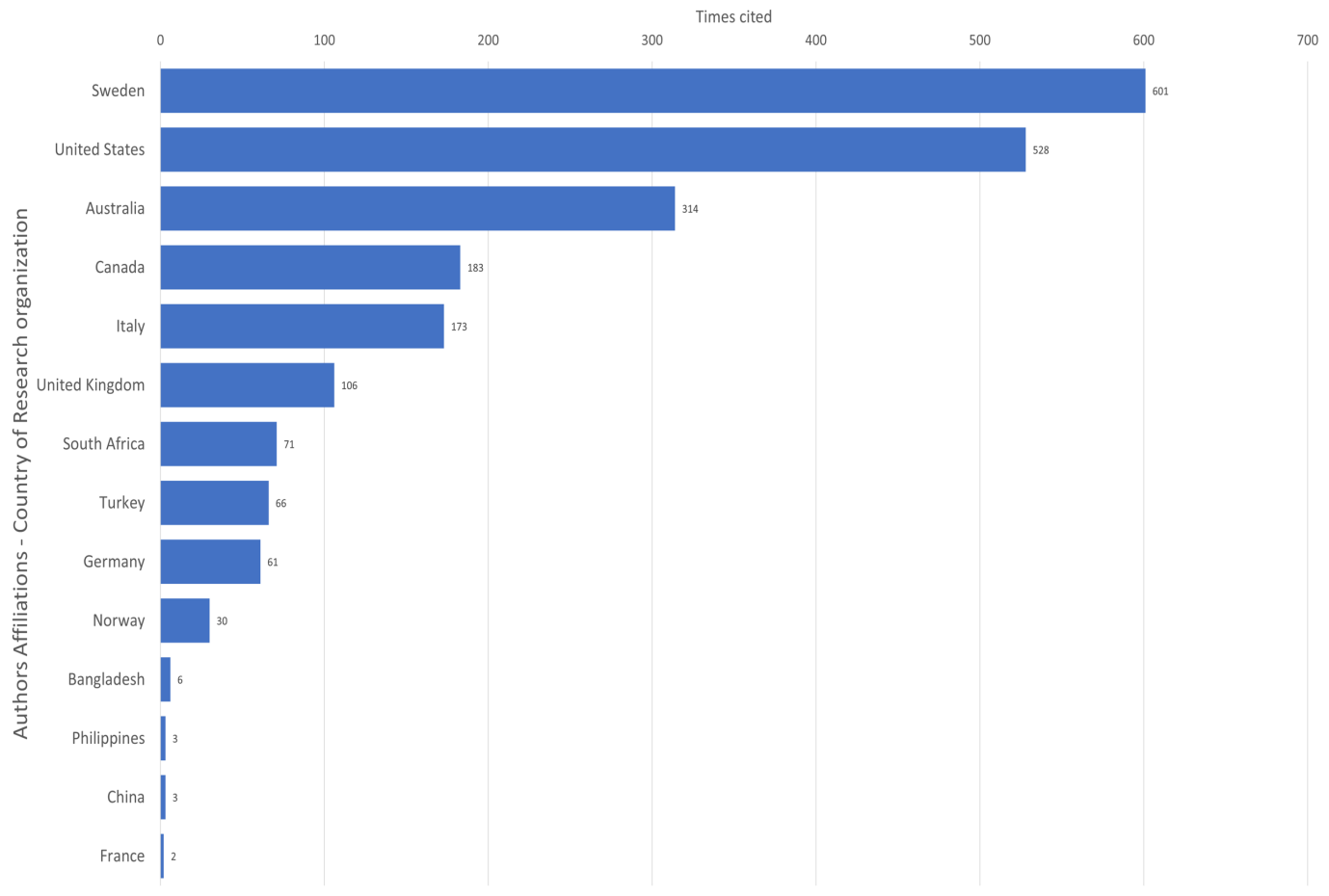


## Citation Frequency By Source

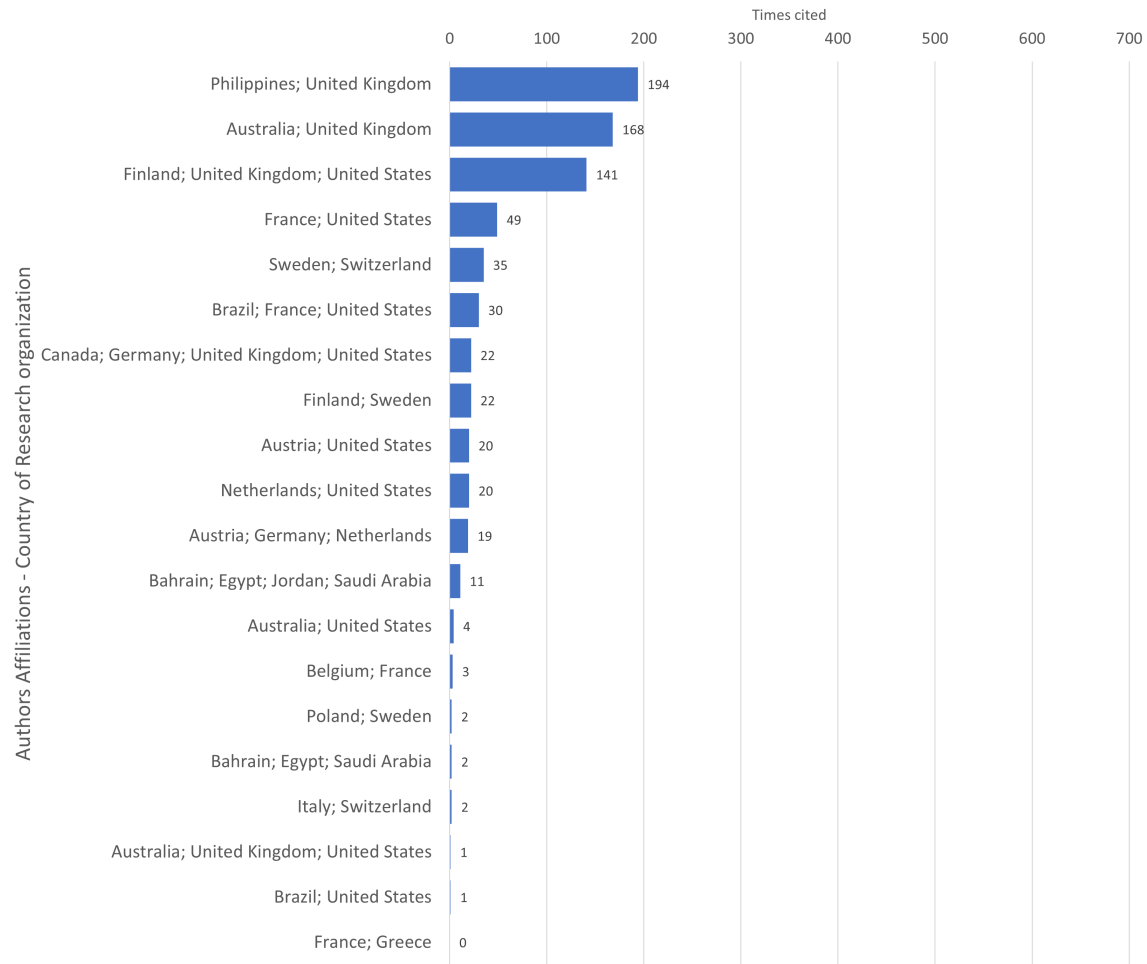




### Citation Frequency by Individual Country

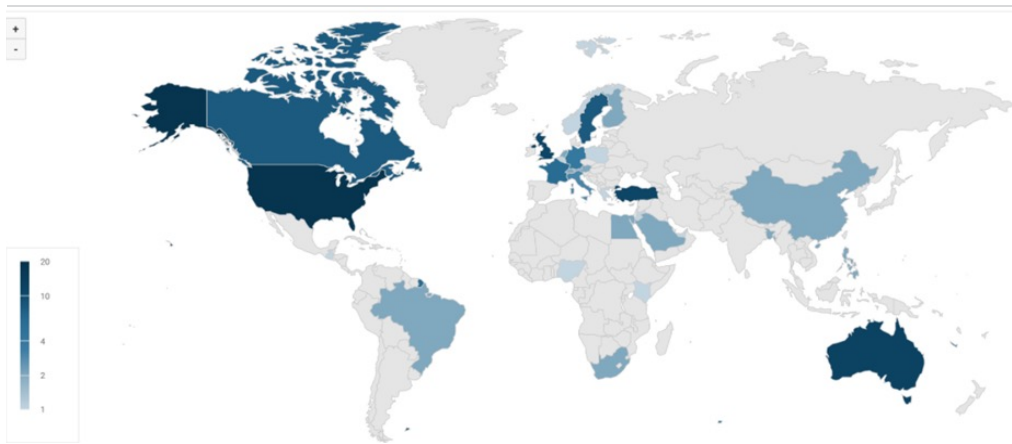


### Citation Frequency By Countries in Collaboration

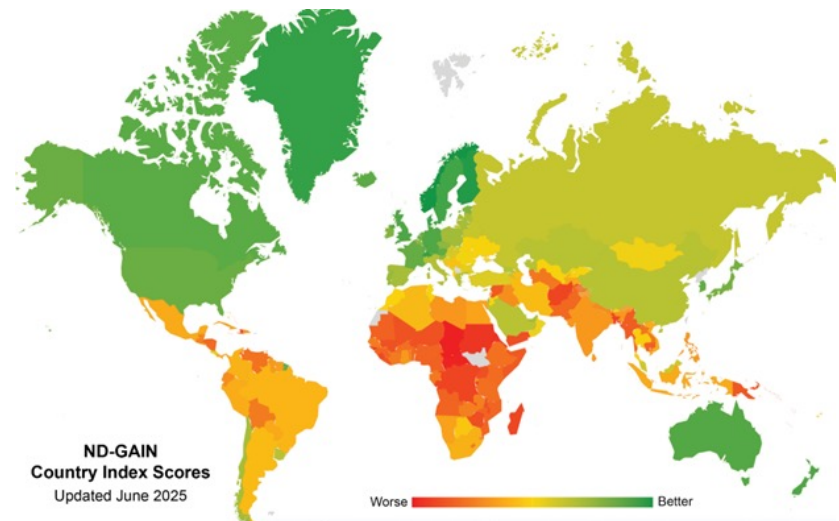


---

# Why do citations matter?



**Publication Frequency**



**ND-GAIN  
Country Index Scores**  
Updated June 2025

**Climate Vulnerability**

*Notre Dame Global Adaptation Initiative, 2025*

## Finding:

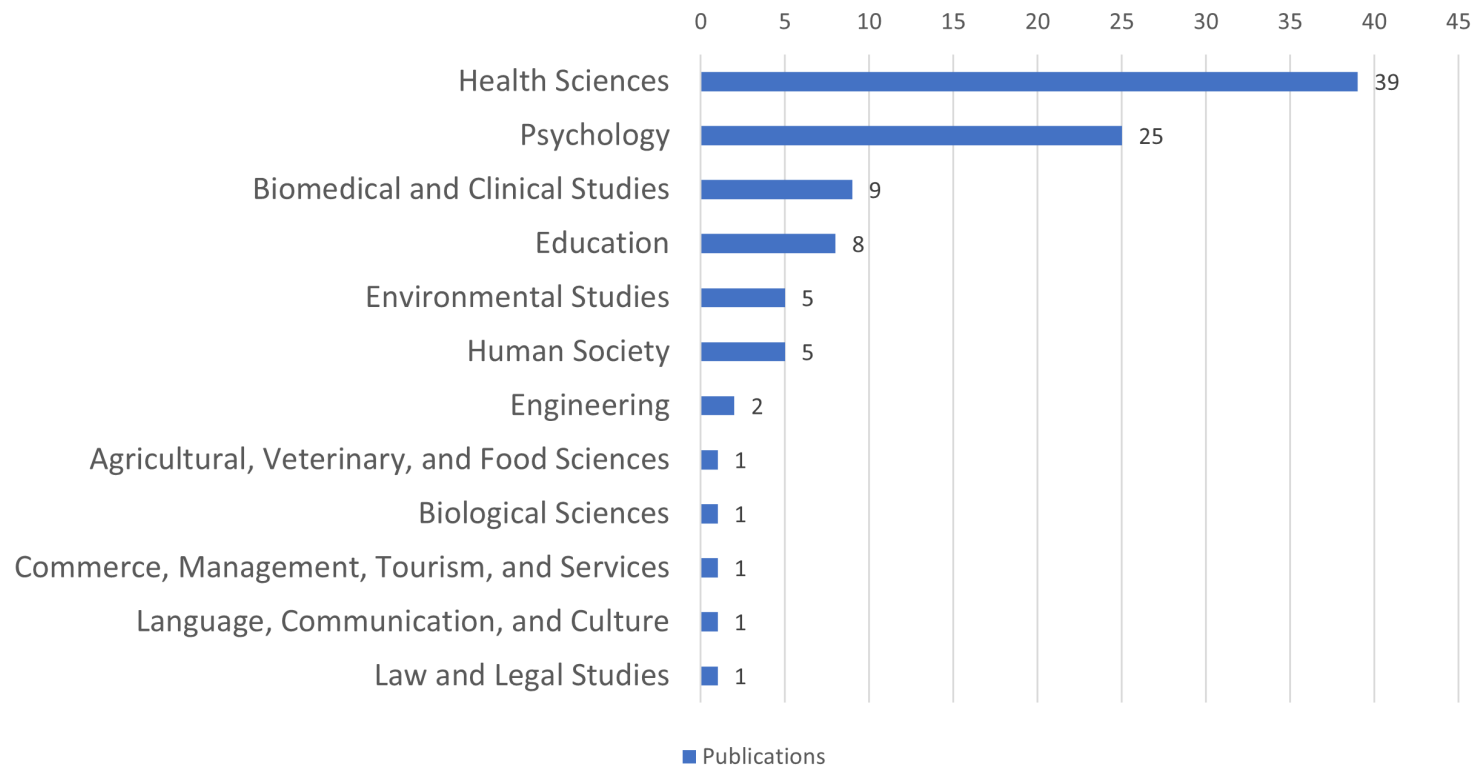
---

Research from non-dominant perspectives are often excluded or diminished. Especially as it relates to climate change education and adaptation, this pattern excludes crucial and unique perspectives from the conversation.

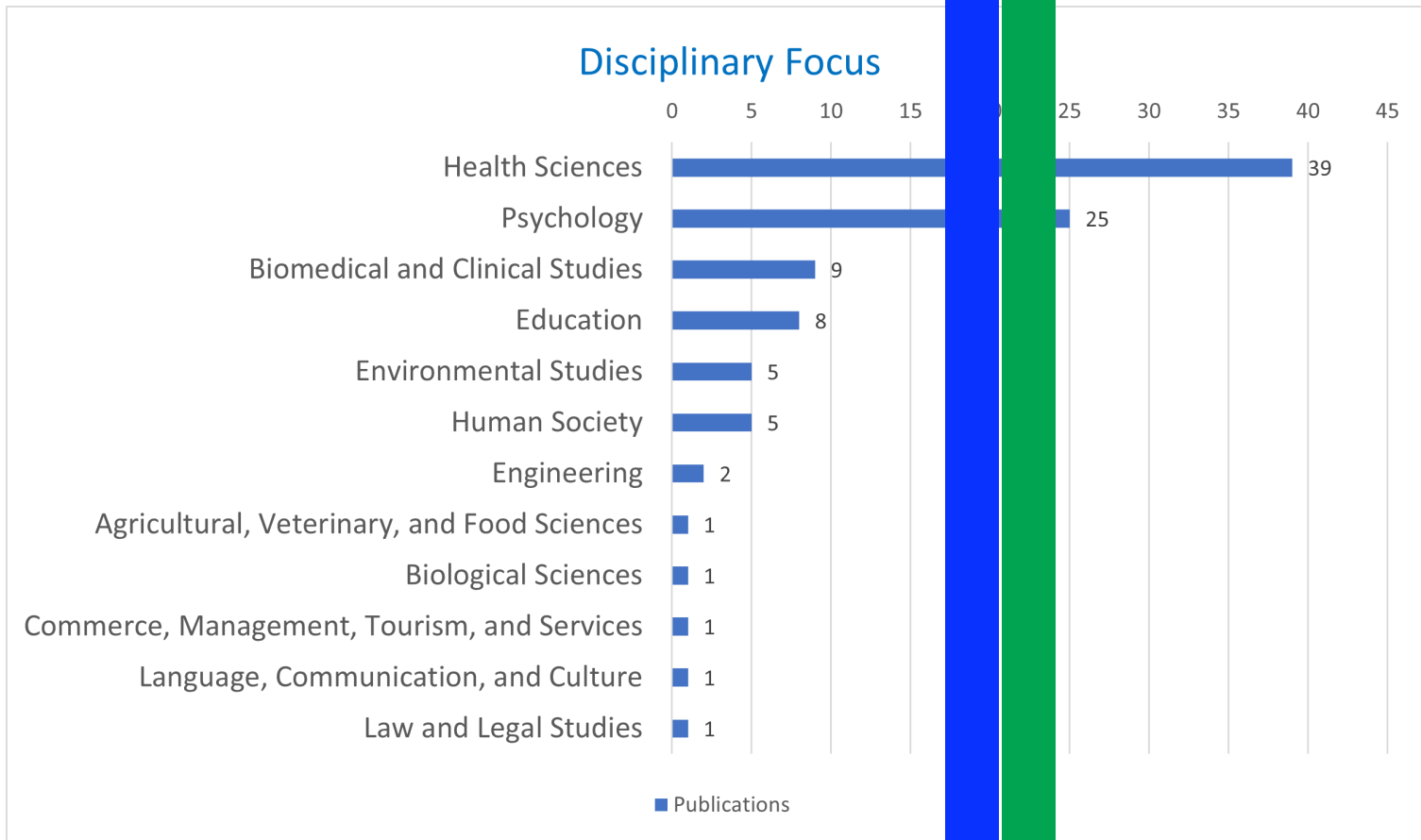


ULSE, "Disaster Preparedness: Building the Resilience of Communities"

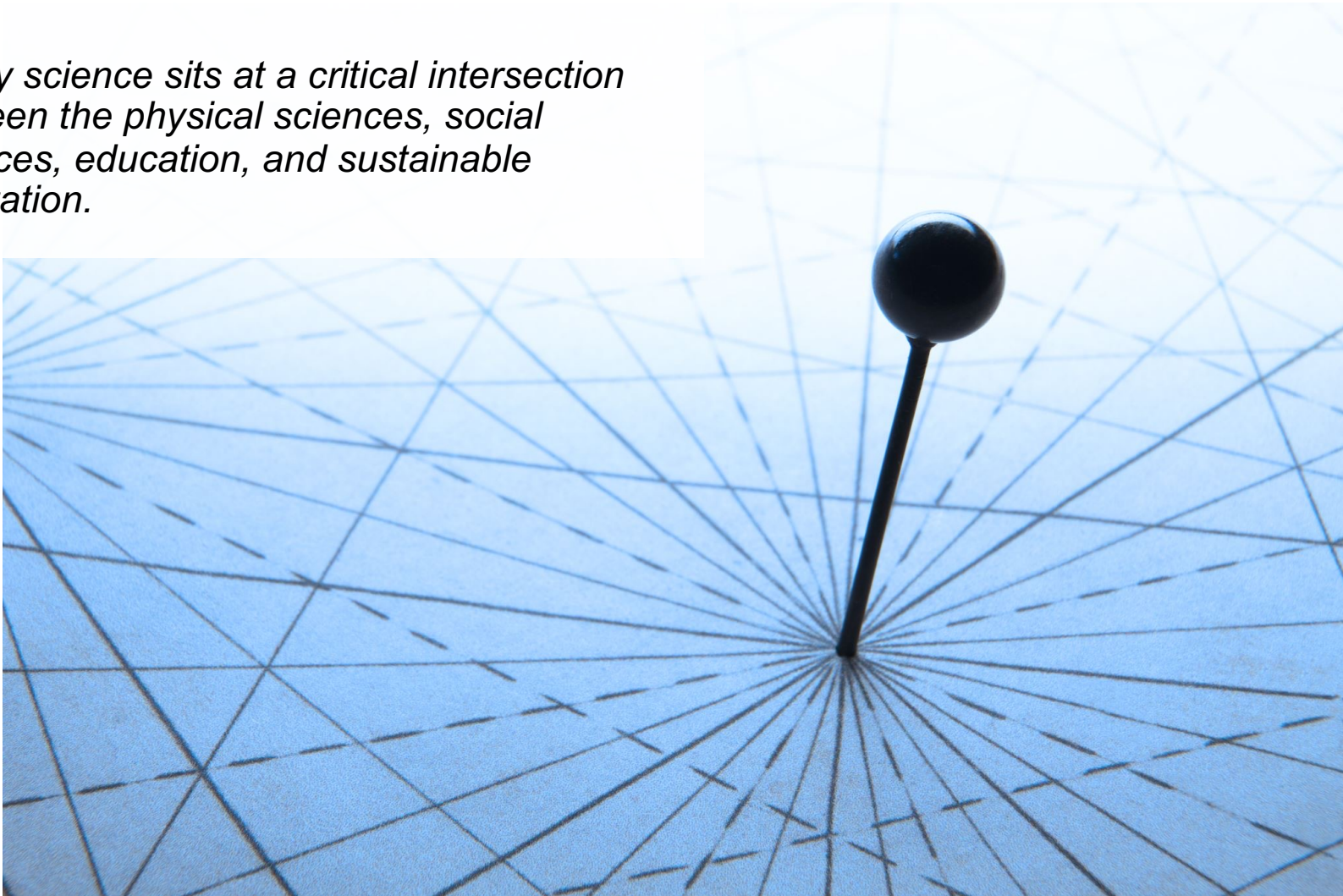
## Disciplinary Focus



## Disciplinary Focus

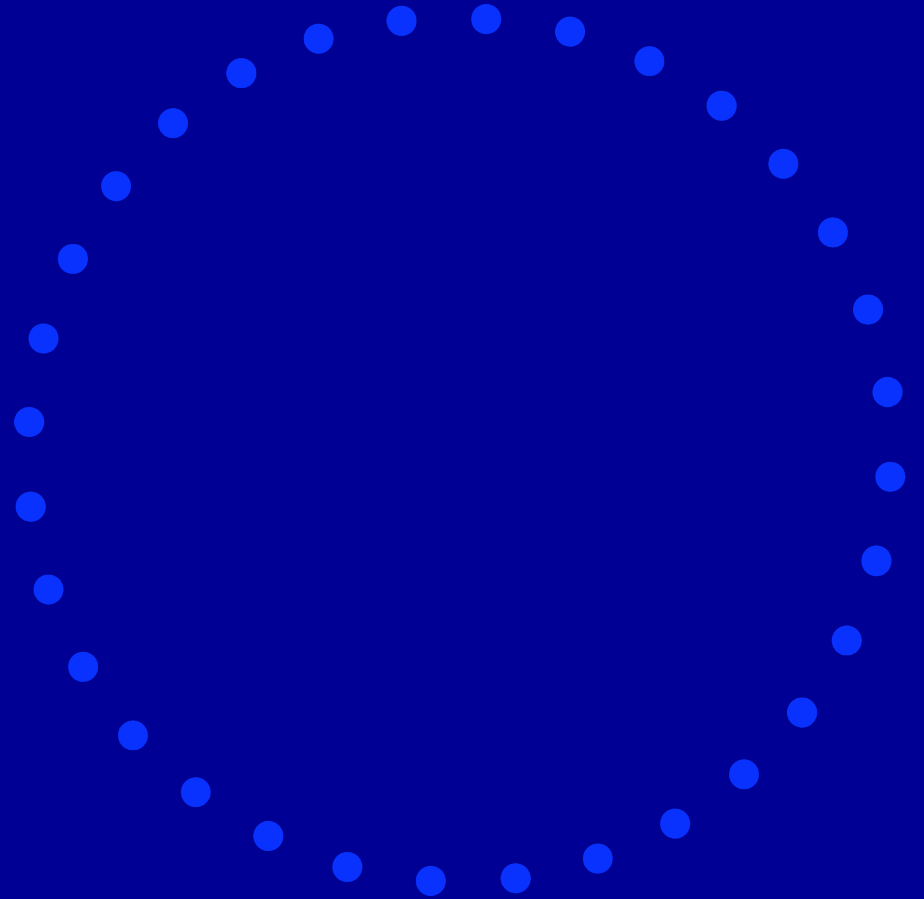


*Safety science sits at a critical intersection between the physical sciences, social sciences, education, and sustainable adaptation.*

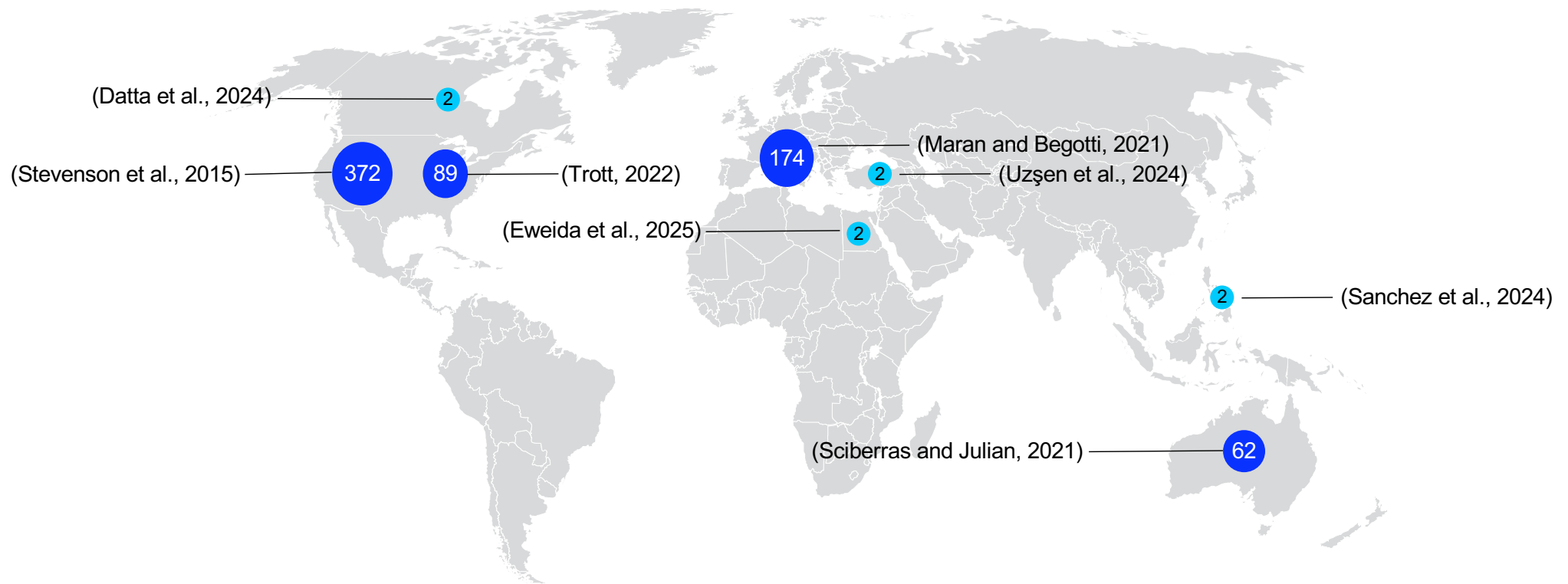




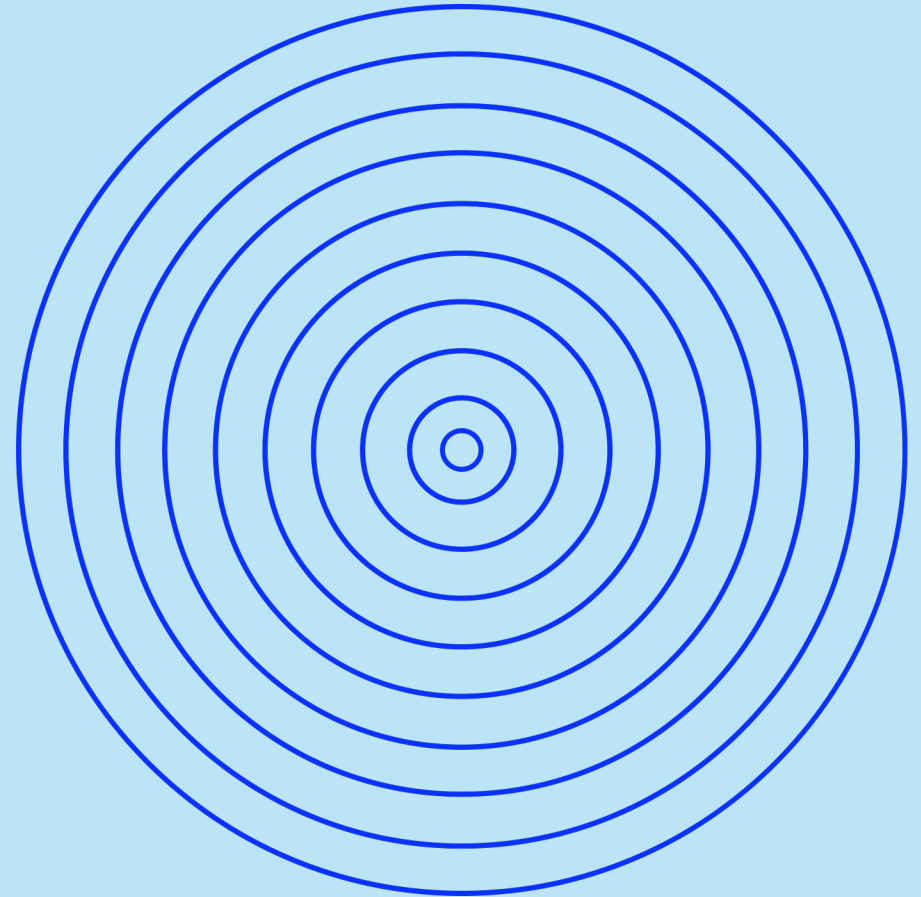
# Literature Review and Analysis

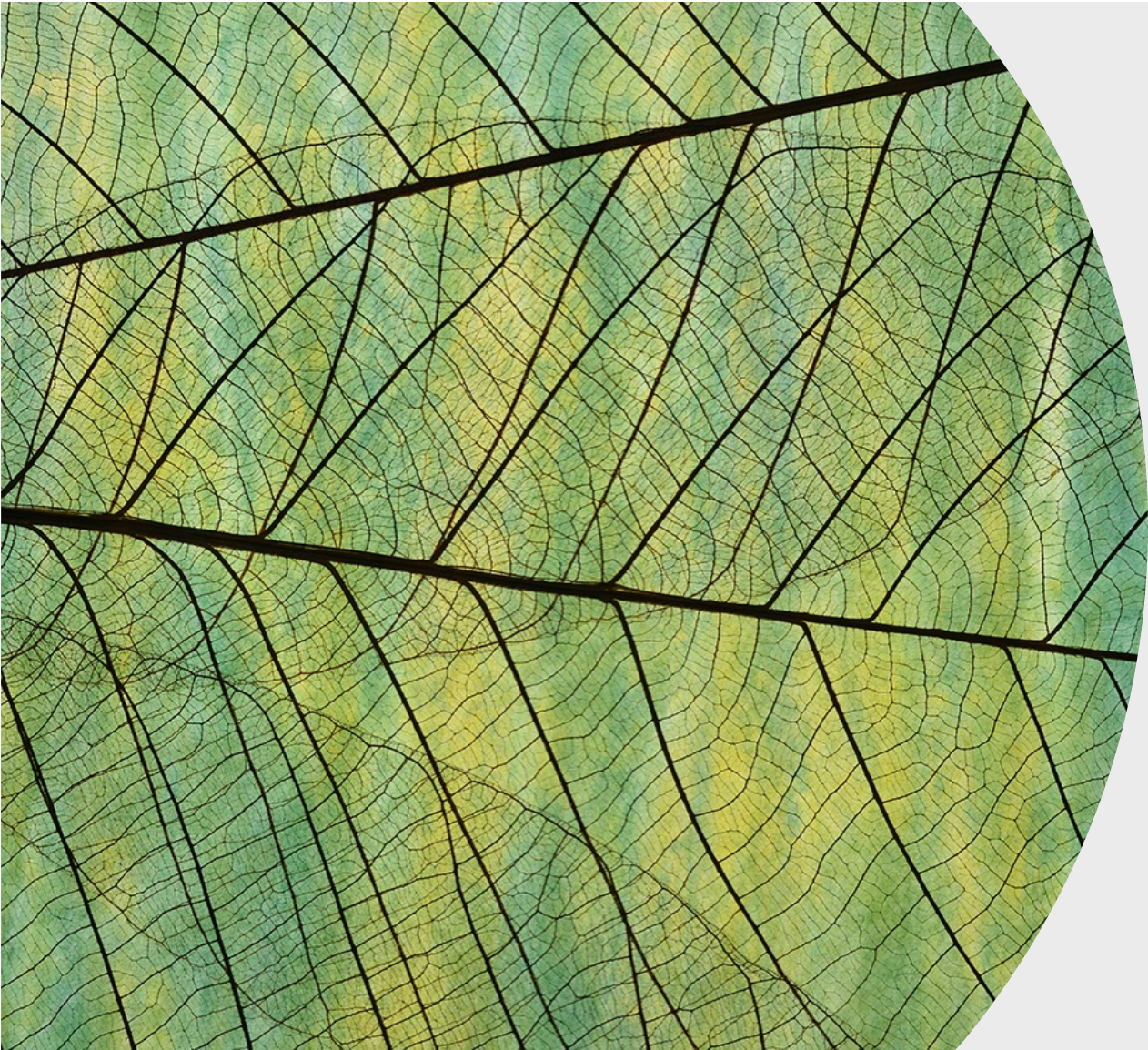


# Literature Subset: Dominant and Non-Dominant Voices



# Implications and Best Practices





# Emotion-Conscious Climate Change Education Integrates....

---

- 1** A community-oriented approach.

---

- 2** Land-based pedagogies.

---

- 3** Consideration for cultural and traditional values.

---

- 4** "Critical reflection, dialogue, and action" (Trott, 2022).

# Community-Oriented, Land-Based, and Culturally-Conscious Pedagogies



Photos by Kelly Keena

- Community orientation is consistent across dominant and non-dominant perspectives.
- Intergenerational learning and knowledge exchange.
- Instills responsibility and feelings of competence.

# Reflection & Dialogue with Peers and Teachers

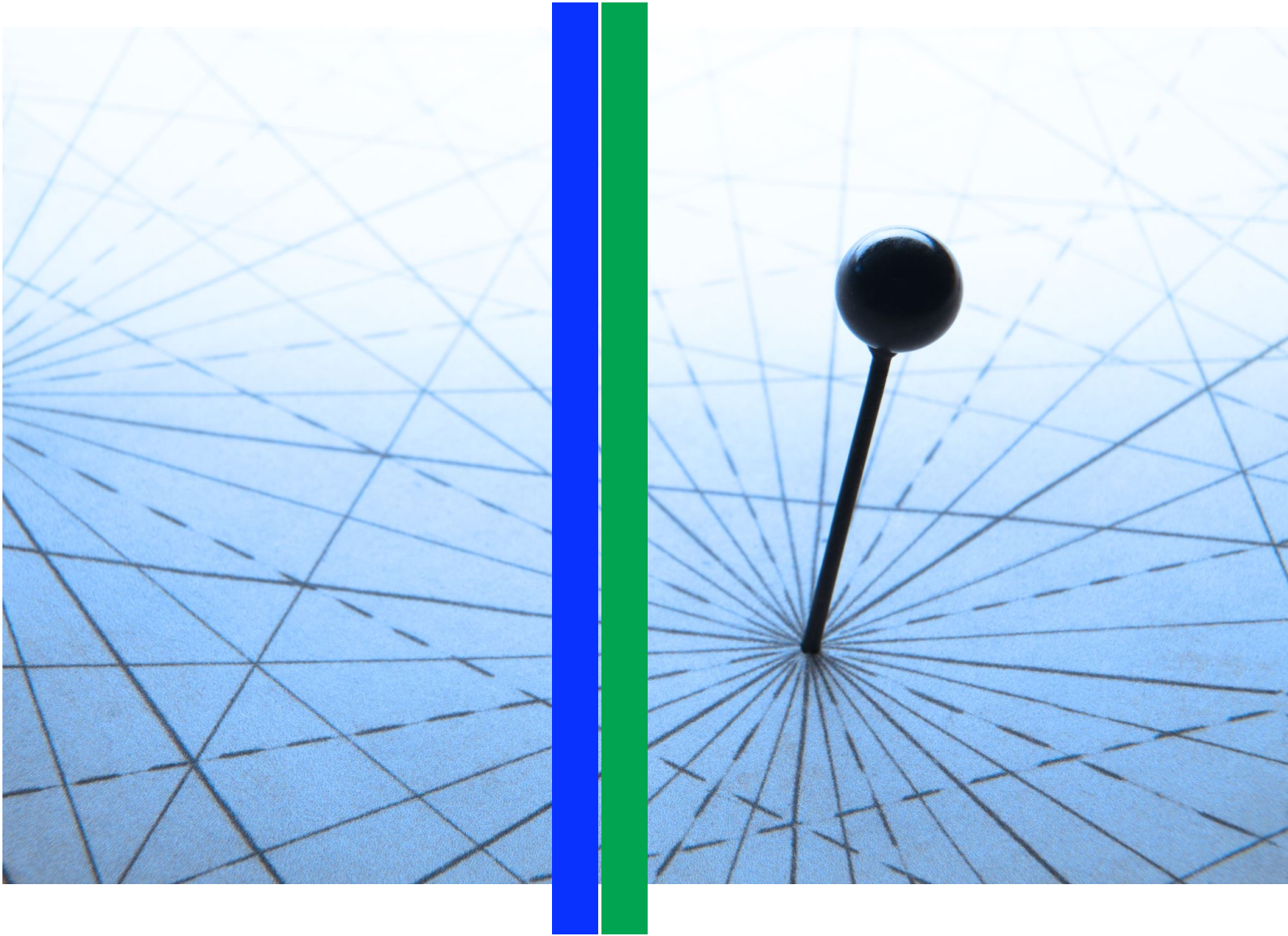
- Discussion and reflection inform students' worldview development.
- Several studies note a connection between discussion about climate worries with peers or trusted adults and adaptive coping strategies.
- Encourages students to critically reflect on their own reality and engage in meaningful dialogue rooted in mutual understanding and respect (Freire).



# Self-Efficacy Impacts

- Nearly all analyzed publications reported an improvement in student self-efficacy after learning about climate change.
- Situating education in **solutions** encourages self-efficacy, which mitigates feelings of anxiety and overwhelm.
- When students see the relationship between climate change adaptation and their own life, they are more likely to feel empowered to act.









# Web-based Climate Education through Interactives on Xporlabs

Dr. Jamie Herring

Discoveries in Safety™

© 2025 Underwriters Laboratories Inc.



## **Educational Challenge:**

**Climate is a global phenomena needing global level solutions (needs scale).**

**Climate is a local phenomena, needing local level solutions (needs localization).**

## **Educational Challenge:**

**How can we translate research findings for generating on-line materials that can scale while also be relevant locally?**

**Localization: Community-Oriented, Land-Based, and Culturally-Conscious Pedagogies**

**Reflection & Dialogue: Discussion and reflection with peers and teachers that help inform students' worldview development w**

**Self-Efficacy: Situating education in solutions**

# X marks the science

Xplorlabs is an immersive hub of educational pathways, resources and real-world experiments that explore safety science (all at no cost).



Scroll to discover

## XPLORLABS TOPICS AT A GLANCE



The Science of  
**[FIRE FORENSICS]**

How do fire investigators use science to uncover how a fire started?

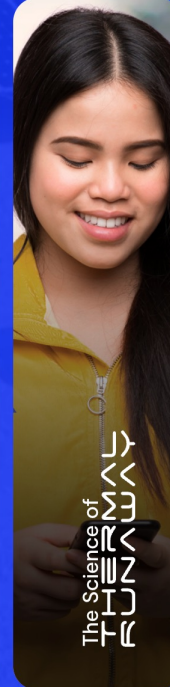
[➤ JUMP TO TOPIC](#)



The Science of  
**FIRE SAFETY**



The Science of  
**EXTRACTION TO ES WASTE**



The Science of  
**THERMAL TREATMENT**

Brought to you by:



## **Our Approach:**

**Focus on developing foundational science concepts and provide teachers with materials they can adapt to their local conditions.**

**Our motto: Trust the teacher!**

## Key Climate Concepts:

- 1) We have an atmosphere that traps GHGs and moderates global temperatures.
- 2) We have evolved to live within a stable atmosphere and temperature regime.
- 3) Adding GHGs increases global temperatures.
- 4) Increasing global temperatures changes climate patterns increasing.
- 5) We have the tools to do something about it.

How we implement key concepts:

### **Localization:**

Provide flexibility in materials for teachers to make content relevant to students

### **Reflection and Dialogue:**

Provide in-class activities for students and teachers to discuss the topics

### **Self Efficacy:**

Create easy to follow interactive elements to teach students these basic science concepts



# Green by Design

Case-Based Learning for Climate-Conscious Innovation

Dr. Denice Durrant  
UL Standards & Engagement

**Safety Science in Action™**

© 2022 ULSE Inc.



# Case Study Format and Adaptive Learning



## **Interrupted Case Study Format**

Begins with a real-world problem leading to development of standards via technical committees.

## **Reflection and Critical Thinking**

Students reflect on equity, sustainability, and stakeholder impacts through guided points.

## **Adaptive Governance Insights**

Simulating standards development reveals adaptive governance and climate resilience roles.

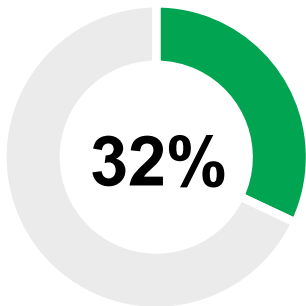
## **Systems Thinking Empowerment**

Fosters systems thinking to engage students in solving complex environmental challenges.

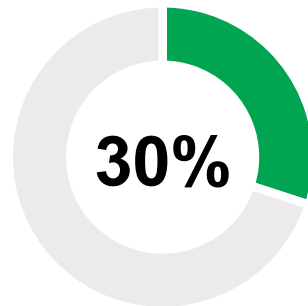




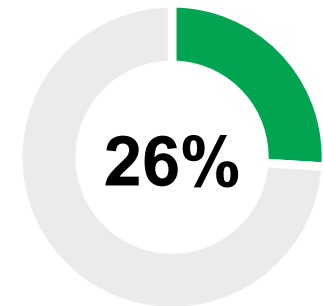
## 61% agree it's important to increase resilience to climate change impacts



consider the environment in decision-making





are willing to be inconvenienced to take more environmentally friendly action



say their purchase habits are influenced by environmental concern

# Material Efficiency and Circular Economy

PRACTICE	IMPACT ON RESOURCE SCARCITY	ADAPTATION BENEFIT
Material Efficiency	Reduces use of rare earth materials	Promotes sustainable manufacturing
Circular Economy 	Encourages reuse and recycling	Minimizes environmental footprint
Design Standards 	Improves product lifecycle	Supports resilient infrastructure

# Using Standards as Solutions

*UL 3600 empowers organizations to report on circularity*



## Combating greenwashing

UL 3600 includes quantifiable metrics for to see through misleading claims and evaluating inflow and outflow, and provides tools to analyze these measurements to create clear communication about real sustainability and circularity efforts. This transparency allows stakeholders and consumers support organizations that have a real commitment to sustainability causes.

## Shifting mindsets

UL 3600 has accessible language and measurements that provide tools for discussing circularity, lowering the barrier for consumers to engage with sustainability-minded organizations.

## Empowering engineers and stakeholders

UL 3600 equips those involved in organizations with hands-on tools and knowledge to consider circularity from the onset in designing products or organizations. Utilizing these tools incorporates the standards metrics into all aspects of their work, creating clear contributions toward sustainable and regenerative futures.

**Design standards are making products safer by addressing resource scarcity**



## **Safety Standards in Climate Adaptation**

**UL 3650: Product-level Climate Risk Assessment and Adaptation Management –**

Provides a structured approach to model extreme climate scenarios and guidelines for interpreting the results

## **Adaptive Governance Through Standards**

**UL 110: Sustainability of Mobile Phones**

Helps reduce electronic waste, or e-waste, from mobile phones by providing manufacturers with guidelines for sustainable practices that can be applied throughout a device's life cycle

Standards as adaptive governance mechanisms shape how societies respond to environmental stressors



# Thank you

[UL.org](https://www.ul.org)

© 2025 Underwriters Laboratories Inc.