Pedagogy of Relational Inquiry in Climate Education – An Affective Learning Framework toward Conscious Living

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Abstract

This paper critiques existing frameworks of climate change education (CCE) and delves into the epistemological, political, and affective gaps within them, which is leading to redundancy and futility in bringing about meaningful change in learners' thinking and behaviour. In this paper, we propose a unique framework called as, "Pedagogy of Relational Inquiry (PRI)" to bridge the gap in understanding and implementing the CCE in its true spirit while also instilling among the learners an affective understanding about their environment and being conscious about it. The study draws its theoretical orientation from John Dewey's Philosophy of Occupations and White's Relational Tipping Points. The study strongly supports the role of learners' cultural capital and dwelling spaces in their journey towards authentic learning and in applying that learning to solving real-life problems. The paper illustrates PRI through some illustrative examples and discusses implications for science pedagogy, curriculum, and teacher education.

Keywords: *Climate change education, relational inquiry, climate pedagogy, curriculum, teacher education*

1. Introduction

The topic that should be of utmost concern in education in the present day and age of Anthropocene is Climate Change Education (CCE). NEP 2020 emphasises infusion of environmental education at each and every level of school education as well as higher education. However, school curriculum often portrays a very passive and disoriented picture of environmental damage usually signified through diagrams and pictures related to environmental degradation in the name of air pollution, water pollution and loss of resources. This is not sufficient for promoting pro-environmental behavior among learners in order to take action in curbing climate change. The deeper questions that climate education research needs to address are: (a) Can our current education system prepare future citizens to understand the root causes of environmental degradation and climate change? (b) Is the present representation of environmental content compelling enough to encourage young learners to take charge of the situation and work toward its mitigation? Does the curriculum integrate environmental values and ethics to foster a greener lifestyle and a healthier planet? CCE must respond to all such questions.

The literature on Climate Change Education (CCE) has grown considerably in the past decade (Monroe et al., 2019; Reid, 2019). There is now strong evidence of teachers' misconceptions regarding greenhouse effect, radiation effect, and ozone layer depletion, along with a strong critique

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of curricular fragmentation and the dominance of Western science in climate education (Abasto et al., 2023). The way UNESCO replaced the term “Environmental Education" (1977–2007) with "Education for Sustainable Development" brought about an end to radical and politically critical spaces: the Cocoyoc Symposium and the Global Forum, which used to challenge capitalist growth, resource inequality, and ecological exploitation (Conde, 2025; Eilam, 2024). Empirical research also reveals a significant gap between environmental knowledge and behavioral change, a phenomenon widely described as the awareness–action gap. Ardoin and co-workers (2020) found that only 4% of environmental education studies used ecological indicators and 10% documented direct behavioural change, with most focusing on behavioural antecedents. Similarly, a meta-analysis conducted by van de Wetering et al. (2022) found that environmental education outcomes were centred largely on knowledge (45.1%) and attitudes (33.4%), with far less emphasis on intentions (6.3%) and actual behaviour (15.2%). This strongly confirms the limitations of Climate Change Education (CCE) when it is grounded primarily in an information-deficit model rather than a pedagogy of relationships. An effective pedagogy should rebuild relationships between people, land, communities, and their material futures, while challenging those frameworks that treat nature as an inert resource and knowledge as separate from lived experience. What the crisis reveals is a relational breakdown. This is also referred to as the concept of the shallow ecology versus deep ecology principle (Naess, 1973).

The present paper further develops this argument by drawing on Eilam's (2024) epistemological analysis, Conde's (2025) political critique, and Stein's (2024) account of institutional complicity. We examined the structural as well as systemic conditions that have led to a climate education that is unable to match the current environmental crisis and is ineffective in preparing the learners to take some action regarding the same. Another aim of this paper is to develop a conceptual framework of what we call the "Pedagogy of Relational Inquiry" (PRI). This framework is based on drawing on Dewey’s philosophy of occupations, which emphasises learning through purposeful, meaningful activity and direct engagement with one’s environment (Dewey, 1916), Whyte's relational tipping points (Whyte, 2020), Latour's dwelling places (Latour, 2018), and the extensive literature on affective domain and climate learning (Ogunbode et al., 2022; Pihkala, 2020). The study provides an explicit account of PRI framework in education illustrated through a few case examples.

2. What Has Gone Wrong- The Epistemological, Political & Affective Gaps in CCE

There is a pedagogical gap in the existing model of CCE due to three pertinent issues: epistemological, political, and affective (Figure 1).

The first problem is an ***epistemological*** one as in the present framework, CCE is restricted to specific sub-areas, often restricted to ecology within science, meteorology within geography, policy within social studies, and citizenship within civic education.

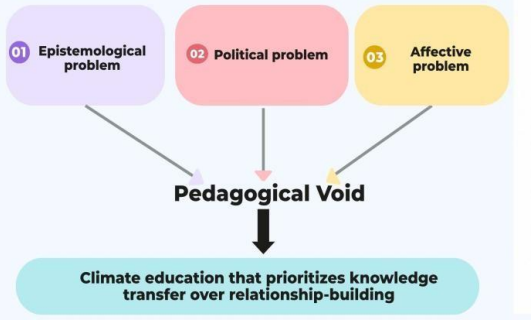

Figure 1: Gaps in CCE model

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This leads to a loss of its interdisciplinary and holistic character, which is also the mandate of NEP 2020. Efrat Eilam's (2024) critique on CCE epistemology observes that various terms have been used to characterise climate change, including discipline, concept, topic, process, and sometimes even aspiration, theme. Each of these descriptions carries different implications for CCE's integration in curriculum, its assessment, and its pedagogical responsibility. Applying all of them simultaneously can lead to conceptual dilution and make climate education so broad that it loses its pedagogical rigour.

Alongside the epistemological problem sits another problem: the ***political*** one. Júlio Conde's (2025) historical tracing argues that the displacement of Environmental Education (EE) by UNESCO's Education for Sustainable Development (ESD) was not merely terminological but ideological. EE, in its earlier and more critical forms, placed ecological crisis within an analysis of production, consumption, colonialism, and the logic of capitalist accumulation. ESD, in contrast, has largely operated within a framework that assumes the compatibility of ecological protection with continued economic growth and assumes that "infinite growth is possible on a finite planet." Conde characterises this framework as a 'discursive trap'.

The effect of this trap is systematic. After the announcement of UNESCO's Decade of Environmental Education (DEE), schools adopted ESD frameworks enthusiastically by framing climate action through individual lifestyle adjustments, but they simultaneously avoided the harder pedagogical question: What are the structural conditions that produce these problems?. If climate education fails to address such questions, it is neither grounded in effective pedagogy nor in an appropriate framework. It is something closer to ecological self-help. It may be useful, but it is inadequate to the scale of what is required.

The third structural problem is ***affective*** and may be the most pedagogically urgent. Jones and Davison's (2021) qualitative study of young adults' memories of climate education is particularly concerning. Participants did not describe being ignorant of climate change; rather, they felt emotionally abandoned by education that exposed them to catastrophic futures without providing the relational, political, or affective resources to respond (Ojala, 2012, 2016; Pihkala, 2020). Their three themes—"stripped of power", "stranded by the generational gap", and "daunted by the future", point not primarily to cognitive failures. They describe what happens when an institution's structures rely on information transmission while treating emotional responses as private, irrational, and educationally irrelevant (Hamilton, 2020; Verlie, 2019). These three major gaps need to be addressed through different routes, such as curricular, institutional, and pedagogical. However, when the goal is to transform the thinking and behaviour of individuals (Monroe et al., 2019), pedagogy is the most empowering route. Learners in this position may also carry a quieter form of cognitive dissonance: when their everyday habits and lifestyle don't correspond with their individual scientific understanding and awareness of global warming (Kagawa, 2007; Gifford et al., 2011). Fasbender and Wachten (2017) also observed this gap between knowledge and everyday practice among children in climate education contexts. Rather than resolving this inconsistency, such dissonance may further compound disengagement (Stoknes, 2015).

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3. Toward a Pedagogy of Relational Inquiry – Identifying Relational Tipping Points in Climate Pedagogy

Ecological tipping points such as global warming and visible waste and pollution have traditionally dominated climate science, and they are genuinely alarming and important to discuss. Nevertheless, as Whyte (2020) points out, they are the outward manifestation of a relational collapse that has been going on for centuries. Long before the emergence of ecological tipping points, colonial settlement disrupted Indigenous relationships with land, industrialisation alienated human communities from their material environments, and nature was progressively reduced to a resource (Whyte, 2018). These were the relational tipping points that preceded and have enabled the present ecological tipping points.

This is where John Dewey's philosophy becomes unexpectedly contemporary. Dewey's argument in his book The School and Society (1899) was about the fragmentation of experience and how industrial modernity has disrupted the organic connections among labour, community, knowledge, and the natural world. which had previously made up the fabric of meaningful human life. Similarly, this relational orientation resonates with Tagore's vision of education as a living relationship among learner, community, and nature (Tagore, 1953).

The pedagogical framework- Four dimensions of relational inquiry

The Pedagogy of Relational Inquiry (PRI) is a framework organised around four constitutive dimensions. PRI functions as a conceptual orientation rather than a lesson-planning framework, curriculum model, or set of instructional techniques. Its classroom enactment remains largely local and contextual. It is a conceptual way of asking difficult but pertinent questions such as *'What is climate education for?', 'What should it feel like*?' and *'What kinds of learning should it make possible*?'. The translation of this orientation into specific educational practices has to be inherently local and contextual so that students develop a sense of relationality with their own environment and feel towards its preservation.

The first dimension, called as, ***Situated Ecological Dwelling,*** argues that climate learning should begin with students' immediate environments rather than distant planetary statistics. Drawing on thinkers such as Dewey (1938) and Latour (2004), this approach emphasizes environmental understanding that develops through lived relationships with specific places, communities, and ecosystems. Ardoin and team (2020), in their review of 119 K–12 environmental education studies, found that learners are more likely to develop meaningful environmental understanding when educational experiences allow them to engage with environmental issues in local and everyday contexts. Fu and Komatsu (2024) found that students who participated in a river-based environmental education programme developed stronger emotional and cognitive connections with the river, particularly those learners who had no prior experience of the site. Similarly, Mancilla Rodríguez and Pascuas Rengifo (2026) reported an increase in the pro-environmental values, emotional well-being, care for nature, and territorial belonging among the participants. This body of work has argued that grounding curricula in students' own communities and ecosystems overcomes the disconnect between school and lived experience (Smith, 2002) and provides a distinctly socio-ecological, place-conscious substitute to abstract, decontextualised environmental education (Gruenewald, 2003).

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The second dimension, ***Inquiry as a Mechanism for Reconstruction,*** reconceptualises inquiry not merely as a process of generating scientific knowledge but as a response to relational disruption. Traditional scientific inquiry focuses on observation, data collection, and explanation, whereas PRI begins with experiences of ecological loss, uncertainty, or degradation. Climate learning, therefore, starts with questions grounded in lived experiences, such as declining local fish populations, rather than abstract global concerns. Studies such as Borba et al. (2024) illustrate how drama-based and participatory approaches can make climate realities experientially meaningful through the use of personal artefacts and storytelling. As discussed in the earlier sections, an overemphasis on catastrophic climate narratives can produce eco-anxiety, helplessness, and reduced self-efficacy, thus may undermine CCE (Ogunbode et al., 2022; Pihkala, 2020). PRI addresses this concern by grounding inquiry in students' observed local losses, making climate affect proximate and actionable, merging emotional acknowledgement with relational and collective avenues for response.

The third dimension, calling for ***Epistemic Plurality***, critiques the dominance of Eurocentric and scientistic perspectives in mainstream climate education. While scientific knowledge is essential, PRI argues that climate understanding must also include Indigenous, local, and community-based knowledge systems. Research shows that communities directly engaged with changing ecologies often possess valuable environmental insights that scientific models may overlook. Drawing on Miranda Fricker's (2007) concept of testimonial injustice, PRI highlights how curriculum frameworks frequently marginalise non-scientific forms of climate knowledge. Educational approaches grounded in storytelling, oral traditions, dance, and collective ecological memory demonstrate alternative ways of understanding climate relationships.

The fourth dimension, ***Agential Literacy*** for Collective Futures, addresses the gap between environmental knowledge and meaningful action. Research consistently shows that awareness alone does not lead to environmentally responsible behavior (Kollmuss & Agyeman, 2002; van de Wetering et al., 2022). Many learners understand the structural causes of climate change but feel powerless to effect change, leading to limited individual lifestyle adjustments. Instead of asking what individuals can do about climate change, it asks how relationships among institutions, communities, ecosystems, and generations can be repaired or reimagined. PRI reframes agency as relational rather than purely individual or collective. This perspective shifts attention from personal carbon footprints to systems of obligation, exploitation, and dependency. Building on the concept of "agential literacy," PRI emphasises helping students understand institutional structures, connect local and global processes, and imagine alternative ecological and social futures.

4. PRI in Practice – Case Studies from Science Classrooms

A few studies have highlighted the application and role of the PRI framework in nurturing authentic climate learning, such as Prada da Silva et al. (2025), who demonstrate this through their "Healthy Waters" programme in Portugal, where secondary students investigated local water conditions, interviewed community members, reviewed scientific literature, and presented their findings in civic discussions on water governance. Students thus acted simultaneously as researchers and citizens, creating a transformative communication experience beyond standard classroom-based CCE. This study demonstrates how PRI's dimension of Situated Ecological Dwelling can be

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operationalised by anchoring inquiry into the students' own local concerns and introduces agential literacy by having them move between the roles of researcher and civic participant in local governance rather than treating the issue as a distant policy debate.

Another case is by Nxumalo and Montes's (2023) Summer Encounter program in Texas, where children participated in five days of activities organised around building Indigenous relationships with the specific water systems of their region. The intervention used Indigenous songs, dances, creation stories, and collective environmental memory. They were not used as a complement to science education but as a constituent of a form of ecological understanding. Developing an understanding of the river based on relationships of obligation and reciprocity rather than as a definition of its chemical and biological processes. This approach is not an alternative to scientific literacy but an educational context that helps scientific literacy connect the abstract and the real world. The above case operationalizes epistemic plurality by treating Indigenous songs, dances, and creation stories not only as cultural illustrations but as legitimate knowledge, equivalent to the scientific, chemical, and biological descriptions.

Another illustration comes from Borba et al.'s (2024) participatory theatre work with adult learners in Brazil. Facilitators introduced real artifacts (family photographs, damaged letters, seeds, and water bottles) from climate-damaged communities as the opening pretext of the inquiry. Participants were asked to imagine the lives attached to it before analysing the material scientifically. From this emotionally charged starting point, the group moved towards “participatory theatre," where the audience could interrupt scenes, replace characters, and reshape decisions. Drama made the abstraction of climate data emotionally inhabitable before its information processing. The inquiry was driven by a felt relationship and emotions, which served as an engine for inquiry and engagement rather than as by-products of learning. This serves as an example of how inquiry as a mechanism for reconstruction can be operationalised in a classroom setting. Here, the process of inquiry is driven by the felt relationship itself (damaged artifacts, disrupted lives), rather than by a definitive or settled question.

These examples do not constitute a curriculum. They show us a pedagogical direction toward designs that emphasise local context, generate artifacts of inquiry, and seek to develop relational accountability rather than just individual awareness through multidisciplinary systems of knowledge. They clearly imply that PRI is not an ideological construct but rather is deeply embedded in science education, its curriculum, and its pedagogy. PRI differs from similar traditions like *“Socio-Scientific Issues”* (SSI) and *"funds of knowledge"* by centring relationality and relational repair as its core objective and goes beyond engagement with socio-scientific issues or the incorporation of the culturally situated knowledge, skills, and experiences of learners and their communities.

5. Implications for Science Classrooms in India

The pedagogy of relational inquiry offers a meaningful and transformative teaching-learning experience as it addresses climate and environmental issues through a relational but rational lens. The multidisciplinary nature of ecological crisis, diverse cultural traditions, and learners’ affect and cognition call for a conscious, stepwise integration of PRI within the curriculum to build a strong foundation for climate education.

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Teachers, as well as curriculum developers, need to consider the diverse cultural backgrounds of the learners and their lived realities while designing the curriculum. Textbooks should not alienate the learners rather blend their lived experiences so as to make learning more meaningful and compelling enough to take action for climate change. For instance, the whole world is experiencing significant climate impacts, such as irregular monsoon patterns, extreme heat events, and disrupted agricultural seasons. But the impact and severity of these environmental and climatic changes differ across groups of people based on their socio-economic status, gender, geographical region, etc. For India's rural school children, these are not distant threats. The ecological conditions that climate education shows through films and data visualisations are closely experienced by Indian school students. They do not need an information-intensive curriculum or pedagogy, but what they may need is a framework that treats and helps them sail through and adapt to the change that has been slapped onto them. At the same time, also help them take informed action, which is both contextually & rationally viable for them and their communities.

This is where PRI's emphasis on dwelling knowledge becomes relevant. The children of a farmer in rural India are likely to already know from lived experiences that the kharif sowing calendar has shifted, and the wells that used to hold water through October now dry up before July. They may already possess knowledge that no IPCC report can produce because it is based on experiential knowledge passed down through years of family observation and intergenerational conversations. Therefore, a curriculum centered around PRI may be more effective for these learners than one based on the information deficit model, as it provides situations where knowledge becomes an object of structured inquiry.

6. Declarations

Responsible Use of AI

No AI was used in the writing of this paper.

Authors' Contributions

Author 1 conceptualised the study, developed the methodology, and prepared the original draft.
Author 2 contributed to conceptualisation, reviewed and edited the drafts, and supervised the study.
Author 3 reviewed and edited the drafts and supervised the study.

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