# Navigating the Politics and Complexities of Climate Change Education

EDITORIAL

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Climate change education is at the intersection of power, policy, and pedagogy in a world increasingly defined by intensifying crises (Stevenson et al., 2017). Although climate change is a global phenomenon with widespread impacts, its effects are more pronounced in low-income countries (Gates, 2021), where poverty and limited adaptive capacity exacerbate vulnerability to climate-related risks (Ngcamu, 2023). In recent years, the world has experienced a rise in extreme weather occurrences, including storms, floods, heatwaves, and droughts, which have transformed livelihoods, communities, and learning environments (Nhamo & Chikodzi, 2021). In light of this, the Intergovernmental Panel on Climate Change (IPCC, 2021) employed the phrase "code red for humanity" to draw attention to the urgency of the climate crisis and to indicate that humanity is already living with the consequences of climate change. These realities require that climate change education transcends a dominant focus on abstract scientific knowledge about climate change, to confront questions of justice, equity, and sustainability (Lotz-Sisitka et al., 2021; Trott et al., 2023).

The issues examined in the articles in this Special Issue, underscore a critical insight that climate change is not an abstract concept only, but is also a lived reality that profoundly influences the everyday experiences of individuals and communities across the globe. Moreover, nearly all the articles appear to reinforce the framing of climate change as a predominantly anthropogenic[1] phenomenon linked to the intensification of global warming, while also recognising it as a political, social concern that requires attention to social and educational transformations. According to the IPCC (2021), rising global temperatures disrupt the balance of the Earth's climate system, causing shifts in atmospheric and oceanic circulation patterns, changing precipitation regimes, and increasing the frequency and intensity of extreme weather events. In its *Summary for Policymakers*, the IPCC (2021) aptly observes that "climate change is already affecting every inhabited region across the globe, with human influence contributing to many observed changes in weather and climate extremes" (p. 10).

Considering the foregoing discussion, this editorial invites readers to examine critically the scientific as well as political and cultural forces shaping curriculum design, pedagogical practices, and knowledge systems in the context of climate change risks. It underscores the transformative potential of climate change education to strengthen adaptive and mitigative capacities while fostering regenerative and sustainable cultural orientations (Mbah & Ezegwu, 2024). In this way, education can serve as a transformative force, empowering learners and communities to act meaningfully toward sustainable futures.

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However, as shown across the articles in the Special Issue, there is need to consider broader structural inequalities in education (Aiston & Walraven, 2024), that tend to mirror global and national power dynamics. The authors in this Special Issue demonstrate a deep understanding of these dynamics and the epistemic complexities of climate change by recognising participants as situated knowers. Through transgressive and transformative approaches, they empower participants to interrogate critically structural injustices underlying climate change such as extractive economies, colonial legacies, and systemic poverty and to contribute actively to the development of alternative solutions. Thus, the articles featured here are anchored with a transformative educational perspective that moves beyond detached, reductionist forms of understanding the world, particularly in the context of climate change education. This is important because it allows for the disruption of entrenched patterns of exclusion and silence, thereby creating spaces for justice-oriented and context-sensitive learning (Trott et al., 2023).

The ostensible parallels in the issues discussed in this Special Issue expose the urgency for a new and much anticipated paradigm of climate change education reform not only in southern Africa but across the globe. What is immediately apparent is that today's children stand to inherit climate futures made in the present, yet their perspectives are often marginalised in policy-making processes (Wall, 2010). This underscores the imperative for advancing intergenerational climate justice, with climate change education being an ethical and rights-based concern and an epistemic justice issue (Ursin et al., 2021). So, it is clear that climate change education reforms are part of a bigger education reform agenda that moves beyond technical fixes to address deeper moral responsibilities, politics, and complexities of epistemic justice. Basically, for climate change initiatives to be impactful amidst the mounting polycrises, they must go beyond mere awareness and technical instruction to foster transformative and regenerative cultures, as well as lifestyles and educational practices that restore relationships between humanity, nature, and society.

The timing of this Special Issue, and of the articles it features, is particularly significant given the growing calls for participatory, inclusive, and justice-oriented pedagogies and educational assessment strategies that enable learners to envision and enact alternative futures. Such pedagogical and assessment approaches seek to anchor climate action in both knowledge and lived experience, a priority that is especially salient in the context of the Global South (Mbah & Ezegwu, 2024). The idea behind these calls for transformation is that climate change education should address not only the science of climate change but also the inequities it perpetuates.

The authors in this Special Issue are, for the most part, open and optimistic as they strive towards integrating local and indigenous knowledge systems to advance inclusive climate action for sustainable futures, seeking out epistemic breadth and freedoms. Ndlovu-Gatsheni (2018) has insightfully observed that "epistemic freedom is fundamentally about the right to think, theorise, interpret the world, develop one's own methodologies and write from where one is located and unencumbered by Eurocentrism" (p. 3). Attending to epistemic freedom, as shown in the articles in this Special Issue calls for

creativity, integrative approaches and a re-politicisation of climate change education that foregrounds plural knowledges, challenges the hegemony of technocratic solutions, and creates dialogical spaces where diverse ontologies of sustainability can co-exist and inform action (Aiston & Walraven, 2024; Lotz-Sisitka & Rosenberg, 2021). This does not mean that authors discount quality science, rather they seek to expand from climate science to include other forms of knowledge that provide a fuller account of the world. As reflected in several of the articles, this requires giving attention to indigenous perspective and languages.

For readers who regard this editorial as a point of departure rather than conclusion, we encourage you to engage with the six articles featured in this Special Issue. The majority of the authors and participants whose work informs this collection are situated within the African context, from a diversity of countries including Namibia, Zimbabwe, Somalia, South Africa and India. All of these contributions offer perspectives that are both locally grounded and globally resonant. Collectively, the articles illuminate diverse perspectives and approaches to education that can help to address the complex and interrelated risks posed by climate change. The sequence in which the articles appear does not denote their relative importance; readers are encouraged to engage with them in any order that aligns with their interests and areas of focus.

The article by **Sirkka Tshiningayamwe** provides a comprehensive exploration of the integration of climate change concepts within the Namibian school curriculum. It begins by situating Namibia within the broader global context of climate vulnerability, highlighting the nation's exposure to rising temperatures, erratic rainfall, and frequent extreme weather events. Making use of systematic content analysis of curriculum documents across all phases of basic education (pre-primary to Grade 12), Tshininganyamwe reveals the extent, limitations, and unevenness of climate change integration. In doing so, she makes a strong case for embedding climate change education as a cross-cutting priority, aligning with international frameworks such as the Paris Agreement and UNESCO's Education for Sustainable Development (ESD) agenda. In addition, the article examines comparative literature from several contexts (e.g., Canada, Nigeria, Singapore, South Africa), demonstrating that Namibia's shortcomings reflect global trends of inconsistency and fragmentation in climate change education. The article highlights opportunities for curriculum developers, policymakers, and educators to advance a more systemic and transformative integration of climate change education.

Writing from Bangalore, **Tanumita Misra**, **Jay Barber**, **Gayatri Manu**, **Vasudha Malani**, **Madhushree Kamak**, **Jahnavi Phalkey** and **Paramananda Barman** weave science into creative writing. Their article makes a bold and refreshing case for breaking down the entrenched divide between science and the humanities. At a time when education systems often compartmentalise knowledge into rigid subject silos, this study demonstrates how creative writing can be a potent tool for science communication and education especially on urgent issues like climate change. The study reports on a 12-week creative writing workshop held in Bangalore, through which participants engaged with scientific concepts (particularly the role of carbon and carbon dioxide in climate change) via stories, poems,

and other creative expressions. The findings reveal that integrating creative writing with scientific learning enhances both accessibility and personal relevance, enabling participants to connect climate issues with their lived experiences, emotions, and cultural worldviews which they see as crucial for cultivating a scientifically literate and empathetic generation. While offering local insights from Banglaore, the study offers an important contribution to climate change education by highlighting imagination as an essential complement to information in developing meaningful public engagement with science.

**John Samanya, Abdikarim Adam Jama, Ahmed Shire Ahmed, Abdulkadir Hamid Mohamed** and **Abdulkadir Ahmed Warsame** from Somalia, share a study that provides an insightful account of how climate action can literally take root even in the most challenging environments. Focusing on Garowe, a drought-stricken city in Puntland State, Somalia, the research highlights both the promise and the obstacles of urban greening in semi-arid contexts. At the heart of the Green Garowe initiative is a co-production model that brought together local government, community members, and university researchers. This collaborative approach underscores a vital lesson that sustainable climate action cannot be externally imposed but must be locally driven and owned. The project's demonstration plots revealed that tree planting is not only feasible but can achieve success rates above 90%, provided trees are protected and cared for. This directly challenges the widespread assumption that urban greening is unworkable in semi-arid environments, with the authors rightly stressing that technical solutions alone will not suffice; success depends on public education, strong local leadership, supportive policies, and resource mobilisation strategies. The Garowe case offers a model of resilience for other fragile cities across Africa and beyond. Ultimately, this research delivers a hopeful message: with collaboration, care, and political will, even the driest urban landscapes can be transformed into greener, more resilient spaces for the future.

With **Caleb Mandikonza**, working in South Africa, we journey into a timely pedagogical intervention in the evolving field of climate change education. His article addresses a curricular problem where climate change, biodiversity, and the Sustainable Development Goals (SDGs) are taught in isolation, leaving students with fragmented understandings of issues that are, in reality, deeply interconnected. Mandikonza draws on a flipped classroom model that was informed by socio-cultural theory, to demonstrate how integrative teaching can help students grasp the relationships between SDG 13 (Climate Action), biodiversity (SDGs 14 and 15), and wider sustainability concerns. The use of pedagogical reflexivity, as illustrated in Mandikonza's study, has the potential to strengthen conceptual understanding for students, while also cultivating the capacity to see climate change as a 'wicked problem' needing relational and systemic thinking. This orientation directly engages with the politics and complexities of climate change education, where competing knowledge systems, values, and power relations shape how climate issues are taught, understood, and acted upon. The study highlights that effective climate change education requires not only updated content but also innovative pedagogy that prioritises connections over compartments. For teacher educators, curriculum designers and policymakers, this work serves as a reminder that

holistic, dialogical approaches are essential if students are to meaningfully engage with sustainability challenges.

Back in Somalia, **Eric Herring**, **Jama Adam** and **Amal Ali** offer insight into the intersections of climate change, pastoralist livelihoods and sustainable land management. At its core, the study highlights a critical dilemma: although livestock enclosures are essential for safeguarding herds, the practice of clearing bushes and trees for their construction is contributing to environmental degradation and compromising long-term ecological resilience. The authors utilised qualitative research methods to explore factors to be considered "in moving towards more sustainable practices that contribute to effective climate action". The authors argue that engagement with communities on environmental and climate action needs to be compatible with evolving community cultural traditions and address immediate economic needs. This highlights the importance of developing policy frameworks that enable and sustain community-driven innovations. Given the politics of climate education, which is the focus of this editorial, Herring, Jama and Ali's research emphasises the importance of recognising and legitimising local knowledge systems within policy and educational frameworks. It underscores that knowledge co-production and community agency challenge top-down, externally imposed approaches, calling for participatory and context-sensitive pedagogies.

Shifting continents to India, we join **Chhavi Mathur** and **Joy Merwin Monteiro** who suggest an innovative approach to environmental education through the Water Classrooms initiative. Adopting a place-based and systems-oriented pedagogy, the authors demonstrate how students can engage critically with complex socio-environmental challenges, moving beyond technical solutions to consider cultural, social, and ecological dimensions of water management. Utilising a curriculum that is multidisciplinary in design that allows students to think systematically, they link water issues to broader environmental and societal contexts. This article exemplifies how place-based and systems approaches to curriculum design can empower students to act as informed, environmentally aware citizens. Moreover, the study offers a practical, adaptable model for educators and policymakers seeking to integrate systems thinking, experiential learning and social relevance into environmental education. Water Classrooms stands out as a replicable example of how schools can cultivate critical ecological literacy, preparing students not only to understand water challenges but to contribute actively to sustainable solutions.

And undertaking his research in Zimbabwe with communities, **Arorisoe Sibanda** explores how local climate action strategies foster social learning in southern African communities. His study highlights the region's heightened vulnerability due to limited adaptive and mitigation resources. Employing case study design in two sites, the findings reveal four key social learning elements that shed light on social learning as it relates to and emerges from tangible local climate action initiatives, including cooperative gardening and conservation farming. This study offers perspective on the politics of climate change education by demonstrating how localised, community-driven learning processes challenge the dominance of top-down, technocratic techniques that are frequently supported in

global climate policy. The study suggests that social learning processes can strengthen adaptive capacity and foster the adoption of sustainable practices. By foregrounding social learning within local initiatives, the study demonstrates that meaningful climate education is inherently political as it redistributes knowledge production and decision-making power to communities traditionally marginalised in climate discourse. In this way, the research underscores the need for climate change education that not only builds adaptive capacity but also advances epistemic justice and participatory governance.

In conclusion, the collection of articles featured in this Special Issue offers a timely and thought-provoking contribution to the evolving discourse on climate change education, which complements an earlier Special Issues on Climate Change Education edited for NORRAG by Lotz-Sisitka and Rosenberg (2022), and the double volume *Special Issue on Transforming Education for Sustainable Futures* edited recently for the SAJEE by Lotz-Sisitka and colleagues (SAJEE, Volume 40 no. 1 and 2). Collectively, the studies in this Special Issue and the related volumes referred to here, illuminate how pedagogical innovation, epistemic plurality, and community engagement can reframe climate education as both a site of transformative learning and a site of justice. By foregrounding locally grounded knowledge systems, dialogical pedagogies, and transformative practices, the authors demonstrate that effective climate education must move beyond transmission models of teaching to embrace participatory, relational, interdisciplinary, creative and decolonial approaches that empower learners, teachers and communities alike. Together, these studies underscore a shared imperative that the pursuit of sustainable futures requires reimagining education as a space for cultivating ecological consciousness, epistemic freedom, and collective responsibility. Ultimately, this Special Issue advances the argument that addressing the climate crisis is not only a scientific or technical challenge, but also an educational, ethical, and political project that demands critical reflexivity, contextual relevance, good science, and sustained commitment to the regeneration of both people and planet in more holistic and relational formations.

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## Endnotes

1 The term 'anthropogenic climate change' refers to the influence of human activities on global climatic trends, in contrast to variations arising from natural climate cycles (Matthews et al., 2004).

2 Collaborators from the Transforming Education for Sustainable Futures, and the Fundisa for Change Keep it Cool Projects, including Professor Keri Facer, Mr Garry Rosenberg, Dr Rhona Brown, Dr Rafael Mitchell, Professor Leon Tikly, Dr Caleb Mandikonza, Distinguished Professor Coleen Vogel.