

Book Review

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Tristan, Gleason (2021). *A Critical Ethnography of an Outdoor School: Reimagining the Relationship between Science Education and Climate Change Politics*. 254 pages. ISBN:9781000471342.
\$ 65.40

In *A Critical Ethnography of an Outdoor School: Reimagining the Relationship between Science Education and Climate Change Politics*, the author addresses educators, policymakers, and researchers committed to transforming science education into a practice rooted in ethics and responsibility—one that acknowledges and values diverse ways of being, particularly through outdoor educational experiences. He critiques the traditional model of science education, which often treats knowledge as a singular, universal truth about nature. This model promotes standardized narratives that prioritize objectivity and rationality while neglecting ethical considerations. Gleason advocates for a reimagined approach to science education inspired by Gaia theory, which recognizes the agency of more-than-human others and is capable of encouraging human collectives to engage *response-ably* with them (Haraway, 2016). He contends that science education should move beyond framing nature solely from a human-centric perspective—one that often celebrates human exceptionalism—and instead emphasize the relational dependencies between humans and more-than-human others.

This book review explores how, in Chapter 1, Gleason defines and theorizes Gaia theory, underscoring its significance for reimagining an alternative science education. He argues that Gaia theory offers a vital perspective by challenging traditional science education, which often leads students to view climate change as an objective phenomenon disconnected from ethical relationships between humans and the more-than-human world. In Chapter 3, Gleason records the lived experiences of 5th- and 6th-grade students, outdoor school staff, and more-than-human participants—such as animals, plants, soil, and water—at an outdoor school in Oregon, USA. This is documented through Gleason’s critical ethnography, which includes field notes and interviews with educators and students. My review addresses how their outdoor education, based on inquiries through “arts of noticing”

advocated by Tsing (2015), fosters in students a diverse set of ontologies and a unique sense of “response-ability” toward caring for local nature through outdoor learning (Haraway, 2016, p. 29). In Chapters 1 and 6, Gleason argues that dominant science narratives in education fail to account for a multiplicity of modes of being in the world. He suggests that science fiction storytelling could offer an alternative narrative—one that reimagines politics beyond the realm of rational human deliberation. In this space, students could engage with diverse possibilities for the future, cultivating a sense of ethical responsibility and a commitment to caring for the world in new and creative ways.

In Chapter 1, Gleason explains how Gaia became a scientific theory developed by Margulis and Lovelock (2007), stating: “The term ‘Gaia’ is from the Greek for ‘Mother Earth,’ and it implies certain aspects of Earth’s atmosphere—temperature, composition, oxidation-reduction state, and acidity—form a homeostatic system, and these properties are themselves products of evolution” (p. 159). Building on this idea, Gleason argues that Gaia challenges the concept of a harmonious unifier of the natural world, which has roots in the mononaturalism of Western science and is typically presented as a fixed noun. Instead, he contends that Gaia should be understood as a verb—representing an active multiplicity or pluriverse—a view that aligns with what de la Cadena and Blaser (2018) describe as a world of many worlds, each shaped by evolving relationships. In this context, Gaia theory reframes our understanding of Mother Earth, rejecting the view of it as a “mechanical realm of mute, stable, and ahistorical objects” (Gleason, 2022, p. 17), a portrayal often found in traditional science education’s homogenized, universal narratives. Instead, it emphasizes the specificity and dynamism of Earth’s ongoing processes.

Gleason draws on *Facing Gaia* by Latour (2017), which frames climate change as a profound mutation in our relation to the world. He argues that addressing climate change requires more than just a scientific understanding of causes and effects, as science alone cannot address the deeper ethical and relational dimensions of the crisis. Gleason critiques the philosophy of science, which often separates scientific facts from the values they carry, leading to a focus on objective truth while overlooking the speculative nature of these values (Latour, 2017). This tendency of Western modernist science is to naturalize nature, treating it as a passive backdrop rather than recognizing it as an active, dynamic participant in the

world. This value-neutral science becomes susceptible to dominant narratives that reflect the interests of those in power, often marginalizing alternative ways of knowing, living, and relating (Tsing, 2015). In doing so, it promotes mononaturalism and monohumanism, which overlook the pluriversal nature of existence and position Western science as the sole solution to the climate crisis. However, by integrating Gaia theory into science education, the focus shifts from objective epistemology to the subjective realm of experience, empowering individuals and communities to rethink their roles, responsibilities, and potential actions in addressing climate change through collaborative, community-driven efforts.

In Chapter 3, Gleason argues that outdoor school provides an ideal setting for integrating Gaia theory into science education. Unlike traditional indoor classrooms, where teachers present scientific knowledge, theories, and experiments within a predetermined cause-and-effect framework defined by mainstream science, outdoor learning encourages students to develop their own ecological values and ethical care through hands-on, embodied inquiry. This type of learning allows students to engage with both knowledge and the natural world in ways that feel personally meaningful, shaped by their unique natural contexts and experiences, thereby helping to cultivate diverse, personalized ontologies and fostering the development of students' own ecological ethics. To support this process, Gleason emphasizes the importance of students practicing Anna Tsing's (2015) "arts of noticing". This involves learning to observe carefully and notice things they might overlook in a world "dominated by laws of averages and general uniformity, a place where differences do not make a difference" (Gleason, 2022, p. 201). Gleason provides an example of the "arts of noticing" during a forest walk focused on plants.

The emergence of mushrooms from the ground is hardly an accident. Their stalks, caps, gills, and spores all serve a purpose. Like flowers' relationship to plants, the mushroom is the reproductive unit of fungi, intentionally showy, both to attract eaters and to warn of their poison. Notice me! they seem to shout to the careful observer who has learned their wily ways. This learning to notice, to take into account, is one of the central tenets of the science taught at Outdoor School. (Gleason, 2022, p. 94)

Gleason underscores that the "arts of noticing" begin with students' curiosity in the forest. When they encounter brightly colored mushrooms, they question whether these colors are meant to attract creatures or warn of toxicity. Thus, the arts of noticing go beyond merely identifying unusual plants during forest walks; they involve exploring the deeper meaning behind the mushrooms' colors and biology through curiosity-driven inquiries. Students, either individually or collectively, investigate and generate feedback loops to speculate on how their observations of mushrooms relate to broader interactions within the local fauna and flora (for example, how mushrooms are different from flowering plants), guided by scientific knowledge from educators. As a result, different student groups exploring mushrooms in various forest locations experience unique learning opportunities based on their observations and the specific contexts they engage with. Gleason refers to this as "the multiple manifestations of Outdoor School's curriculum" (Gleason, 2022, p. 187), which contrasts sharply with the universal and homogenized narratives of traditional science education. In other words, the multiplicity of ways of being in the world, as appreciated by Gaia theory, can emerge in education when values and ethics, shaped by specific contexts, are shared among students, peers, and educators through collective action.

In Chapters 1 and 6, while reconceptualizing science education, Gleason draws on philosopher Alfred North Whitehead's idea that speculation—imagining what could be—can lead to new ways of critically engaging with the world (Stengers, 2017). Since scientific certainty, which categorizes propositions as either true or false, is no longer a reliable guide for deliberation, he argues that speculation opens up possibilities for envisioning alternative futures, challenging established norms, and reimagining our relationships with both humans and more-than-human others. In this context, science fiction plays a key role by integrating complex scientific ideas into narratives that resonate with human experience. It explores the realm of possibles, presenting diverse worlds, societies, and ways of interacting that could exist, thus expanding our imagination of what might be (Stengers, 2017). This approach aligns with Tsing's call to challenge the "West-is-all" mindset by encouraging scientists to view Western approaches as neither universal nor superior, and instead to recognize and include non-Western and Indigenous perspectives (Tsing, 2015, p. 315).

This book goes beyond simply critiquing the nature of scientific knowledge, demonstrating that the cognitive aspects of science

learning can lead to profound emotional and ethical outcomes. By encouraging students to integrate scientific understanding through the practice of noticing, it shows how scientific knowledge enhances their ability to observe and engage with the complexities of natural systems in meaningful ways. For instance, learning how mushroom scents attract small insects not only sparks knowledge-driven curiosity about nature but also fosters emotional connections, evoking moments of wonder, “elation, and surprise” (Gleason, 2022, p. 94).

In conclusion, the book argues that the challenges in science education arise not only from the philosophy of science but also from pedagogical practices that often exclude students from politically engaging with scientific facts or the more-than-human others. To address this, Gleason advocates for replacing the conventional, disembodied scientific narrative with a more dynamic, fiction-based storytelling approach. This approach aligns with Gaia theory by embracing diverse lived experiences and engaging all modes of perception, feeling, and imagination to reveal the interconnectedness of the world and the self. In doing so, it fosters a relational way of being—one that de-centers the human as an isolated subject and promotes a co-relational existence.

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