Climate Literacy in Education

What is Climate Literacy?

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Abstract
This article offers a work-in-progress description of the concept of climate literacy as used in *CLE*. The first part includes a working definition. This is followed by a brief historical outline and a two-fold approach to understanding climate literacy: as a narrow, disciplinary-specific competence versus a wider, interdisciplinary one.

Keywords
climate literacy, climate science literacy, NOAA, climate change education (CCE), ecocentrism, care, CLICK framework, CCESD framework, ecological design intelligence, sustainable development

First, a working definition of climate literacy. I offer it with humility, aware of my limited subjective experience as a white, male Earthling, and as a springboard to your own thinking. Climate literacy is an understanding of the climate emergency—its facts, drivers, impacts, and urgency—that centers on developing values, attitudes, and behavioral change aligned with how we should live to safeguard the Earth's integrity in the present and for future generations. Climate literacy requires harmonizing multiple ways of knowing—explicit/objective and tacit/subjective—into a lived, emotionally charged, and personally felt understanding of the planetary predicament in the Anthropocene. It demands embracing our responsibility, both individual and collective, to stand up for everyone's biospheric inheritance: for all of Earth's systems that sustain life and are currently reeling under multi-pronged assault from anthropogenic climate change. (For other definitions of climate literacy see NOAA, 2007; Miléř & Sládek, 2009; Milfont, 2012; Hiser & Lynch, 2021).

There are many ways to unpack this definition and its guiding assumptions, so I want to add three additional points. First, I take inspiration from Indigenous thinkers like Robin Kimmerer, Tyson Yunkaporta, Kyle Whyte, Vandana Shiva, Winona La Duke, Wahinkpe Topa, Grace Dillon, and others who champion the notion of knowledge as care. Accordingly, the conceptualization of climate literacy offered here is care-centric. I believe that climate literacy includes a broad range of competencies which—for pedagogical purposes—may be described as falling into four core domains: Earth Care, People Care, Kinship Care, and Systems Care (see "The CLICK Framework," forthcoming in issue 2).

Second, developing climate literacy requires looking past the upbeat, progressivist self-image projected by the global neoliberal civilization into its darkest and most oppressive design features: racism, colonialism, extractivism, ecocide, greed, materialist reductionism, short-termism, anthropocentrism, speciesism, and others. Climate literacy is the knowledge of the implicated, involving and connecting the worst perpetrators and the most innocent victims. In all its forms, it is difficult, uncomfortable knowledge. It demands that we choose truth over convenience, that we acknowledge the ecocidal nature of the neoliberal global system in which we live (Klein, 2014; 2019; 2021; Mann, 2021). No matter who you are, how privileged or underprivileged, becoming climate literate is challenging on a personal level. Teaching climate literacy is also challenging on the interpersonal and institutional levels, not least because today's education is a subsystem of an unsustainable civilization and was designed to support the needs of the ecocidal market economy. It can be transformed from within, but it comes at a cost too.

Third, climate literacy is a narrative capacity. It involves creating ecocentric ways of thinking, being, and acting, all of which require developing the language and conceptual framing to articulate our goals, identify models, and build coalitions. It is well established that human cognitive architecture evolved for narrative understanding. Given that the primary means by which we navigate reality is culturally-dominant narratives—sometimes referred to as "stories-we-live-by" (Stibbe, 2015, p. 6) or "intersubjective imagined orders" (Harari, 2015, p. 117)—the shape of our future will be determined by the stories we choose to tell and by our courage to imagine what it takes to transition to an ecological civilization (Oziewicz, 2022). Accordingly, a climate literate person is not merely able to grasp the urgency of the climate emergency. They are also able to articulate this understanding as stories that engage anticipatory imagination and mobilize action. This is why stories are the primary tool for building universal climate literacy.

I now want to offer a brief history of climate literacy as a concept and of two alternative terms: ecological design intelligence and climate change education.

The term "climate literacy" was originally coined at a workshop organized by NOAA and AAAS in 2007. The purpose was to establish a common set of curriculum guidelines for climate education—guidelines that became "7 Essential Principles" and were published in a brochure *Climate Literacy: The Essential Principles of Climate Science* (2007, revised 2009). Given the organizational profiles of NOAA and AAAS, climate literacy was from the start framed as a synonym for "climate science literacy": learning about the science behind climate research and the science behind how the Earth system works. Or, in NOAA-AAAS wording, "an understanding of your influence on climate and climate's influence on you and society" (NOAA). A large body of research continues to view climate literacy as a science competence. This line of thought is also reflected in the Next Generation Science Standards, or NGSS (since 2013).

Of course, we need to learn about climate science. But is this the only role education can play? The answer is no. A deeper challenge here is the technocratic framing, with its information-deficit model, that narrows the scope of climate literacy to a mere knowledge of scientific facts (Taylor, 2013; Siegner & Stapert, 2020). This framing promotes detached ways of knowing that leave no space for learning about, let alone learning to critique, the dominant paradigm of carbon-

intense perpetual growth that is known to be the key driver of climate change. The NGSS framework works, but it works for a narrow band of learning. It is not designed to consider the entanglements of climate change with our food systems, legal systems, consumption habits, market practices, dominant ideologies, and other non-science spaces of human activity that drive climate change far more than the lack of familiarity with climate science.

The realization that learning about the climate emergency should go beyond science has been around at least since the 1990s. One good example is David W. Orr's *Earth in Mind* (1994). Orr opens up by saying that the crisis we face is not one of science or technology but "a crisis within the minds," originating with our "inability to think about ecological patterns, systems of causation, and the long-term effects of human actions." To counter this "disorder in thought," Orr believes we need education in what he calls *ecological design intelligence*: "the capacity to understand the ecological context in which humans live, to recognize limits, and to get the scale of things right." Such education, he says, is the only way to "calibrate human purposes and natural constraints" to shape both the technologies we use and "our ideas and philosophies relative to the earth" (p. 2).

Orr's education in ecological design intelligence is probably the earliest version of today's holistic notion of climate literacy as a wider, multidisciplinary, socio-cultural competence. Although the technocratic tilt continues—with 99.88% of all funding available for climate-related research between 1990 and 2018 going to the natural and technical sciences (Overland & Sovacool, 2020)—the vast majority of scholars today lean toward a position that "climate change is about *more than* science"; it "must be understood as a socioscientific topic cutting across academic disciplines and their political, civic, geographic, economic, social, cultural, psychological, and historical dimensions …, as well as across traditions in environmentalism, activism, economics, politics, religion, and art" (Panos & Damico, 2021, p. 3). Put otherwise, climate change is not a STEM issue. It's a worldview issue, entangled with our values, perceptions, beliefs, and lifestyles.

This integrative thinking gave rise to another term that emerged as an alternative to climate (science) literacy: climate change education (CCE). CCE was first proposed in the *Climate Change Education for Sustainable Development* Program launched by UNESCO in 2010. Based on the premise that "addressing global climate change takes more than science alone" (p. 1), the CCESD framework consists of four core areas, in which climate science education is just one. Unlike the NGSS, which limit learning about climate change only to science and only to grades 6-12, CCESD posits that climate change education should be accessible to all ages. Moreover, it should be culturally-relevant—"oriented according to the local context and prioritize passing traditional knowledge and practices to learners"(p. 5)—and should aim "to bring a holistic understanding of climate change, its underlying causes, driving forces and impacts, as well as options to mitigate and adapt to them" (p. 4).

This broader thinking about climate literacy also informs a number of ground-breaking books that appeared in the 2010s, say, Rebecca A. Martusewicz, John Lupinacci, and Jeff Edmundson's *EcoJustice Education* (2011), Bill Bigelow and Tim Swinehart's *A People's Curriculum for the Earth* (2014), and Richard Beach, Jeff Share, and Allen Webb's *Teaching Climate Change to Adolescents* (2017). One result of these and other publications in the U.S. is that in 2019 both the

National Council for Social Studies (NCSS) and the National Council of Teachers of English (NCTE) passed resolutions calling for climate change to be included in social sciences and English language arts classrooms. I wish I knew about the developments in other countries too.

Where does it all leave us today? As of 2023, we live in a world where the need for climate literacy education—or climate change education—is urgent and widely recognized. The vast majority of parents, teachers, and students want schools to offer comprehensive climate literacy instruction, not just in science, but across all subject areas. The vast majority of schools do not meet this demand. This gap can be breached. As stated in 2021 UNESCO report, *Reimagining Our Futures Together: A New Social Contract for Education*: "Research on the effectiveness of climate change education finds that much of it focuses exclusively on scientific teaching, without cultivating the full breadth of competencies necessary to engage students in effective action" (p. 34). Our opportunity today is to design climate literacy curricula that engage all these competencies: intellectual, emotional, and creative. Our challenge is to make climate literacy education available to all students in all schools everywhere.

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