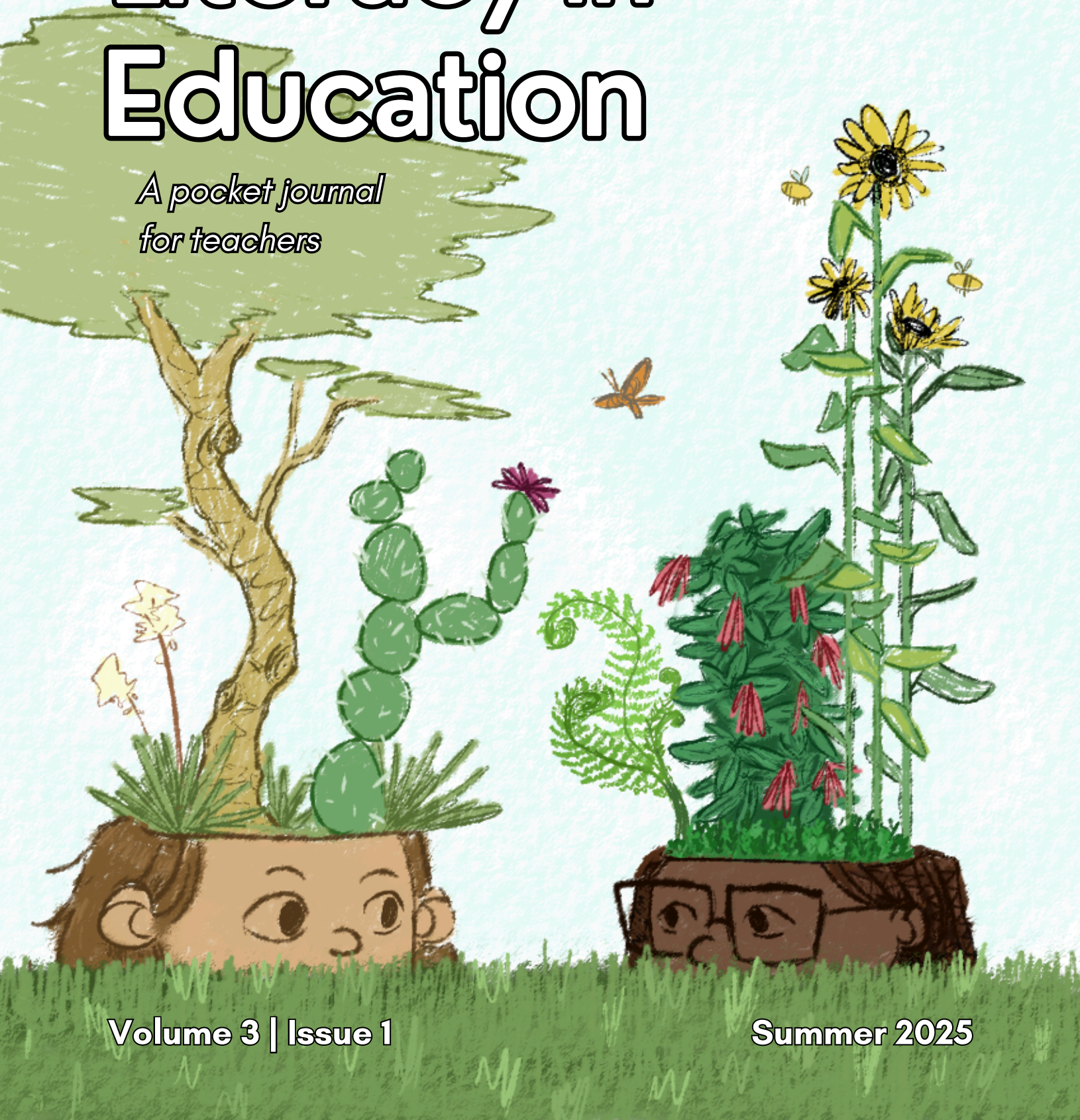


Climate Literacy in Education

*A pocket journal
for teachers*



Volume 3 | Issue 1

Summer 2025

About CLE

Climate Literacy in Education (CLE) is an open-access, double-blind, peer reviewed journal sponsored by the [Center for Climate Literacy at the University of Minnesota](#) and published through University of Minnesota Libraries. *CLE* publishes practical, teacher-oriented content on all aspects of climate literacy education at all grade levels and across all subject areas (primarily K-16 but including teacher education and professional development). We are a pocket journal focused on classroom practice which is why the articles we publish are short: 2000 words or less. Our content is written in jargon-free prose accessible to the general audience. All submissions are peer-reviewed by two anonymous readers. Authors can expect to hear results within two weeks after submission. We publish on a rolling basis.

We welcome submissions in the following categories: Curriculum, Reflections, Critical Essays, and Creative & Multimedia. For detailed submission criteria pertaining to each category, [please visit our journal website](#).

We look forward to working with you!

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ISSN: 2836-4546

Contact: Nick Kleese, Managing Editor, klees023@umn.edu.

Acknowledgements

We are grateful for the generous support of the late Dr. Pete Palmer, whose contribution allowed us to ferry our first issue from concept to publication. His generosity continues to support our work.

We are also grateful for the support of the University of Minnesota Libraries. A special note of thanks goes to Emma Molls and Laureen Boutang. They were—and continue to be—central in guiding us through this process.

August Tinklenberg provided the cover illustration.

Izzy Sheen created and generously donated rights to the logo to *Climate Literacy in Education*.

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Introduction: The Long Game

Climate Education After DOGE

Marek Oziewicz, *University of Minnesota-Twin Cities, Minneapolis, MN, USA*

Nick Kleese, *University of Minnesota-Twin Cities, Minneapolis, MN, USA*

Abstract

In this Introduction, we reflect on the state of climate education six months into the second Trump presidency. While the damage done and stakes ahead are undeniable, we envision possibilities for climate action and climate literacy education going forward. We reflect on what teachers can do to accelerate integration of climate literacy across all subject areas and how a changing understanding of climate literacy as a holistic socioscientific and cultural competence is gaining ground across the world. Ours is a long game, and we are in it through all the bumps in the transition.

Keywords

U.S. presidential election, climate erasure, climate literacy education, climate devastation, energy transition, persistence

Welcome to the first issue of CLE published since January 2025. Within a mere six months, we find ourselves in a radically new legal and ideological landscape, in which the US federal government made a 180 degree turn on anything relating to climate, environment, and education. The contours of this change are familiar, yet shocking, to most of our American readers, but a brief snapshot is helpful to remind everyone of just how profound this backlash against climate science and policies has been—and it's not over yet.

No, it's not over yet. Since the new Administration took office, a series of executive orders removed the US from the Paris Agreement, halted the Inflation Reduction Act's support for energy transition and replaced it with the [Unleashing American Energy](#) executive order, oriented at strangling renewable energy initiatives in favor of advancing fossil fuel production and expansion. This is no longer climate denial but [climate erasure](#). Federal agencies were ordered to scrub any references to climate change from their websites. The [US Department of Agriculture](#), for example, was ordered to remove information that helps farmers respond and adapt to the changing climate—a costly and destructive move that was [successfully challenged by Earthjustice on May 14](#). The National Ocean and Atmospheric Administration's 2024 guide to Climate Literacy was scrubbed from government sites (for a copy of the guide, see [this website](#)). The administration is now planning to dissolve NOAA's [Office of Oceanic and Atmospheric Research](#), which supports dozens of research institutes and programs “from earth systems modeling to ocean health to advanced weather radar” (2025, n.p.). NASA, NWS, US Forest Service, FEMA and dozens of other federal agencies were gutted, defunded, or restructured to serve purposes completely different from their original mission. No example is more poignant than rebranding of the Environmental Protection Agency, which just abandoned the twin tenets of protecting the environment and public health that had guided EPA since its founding in 1970. Lee Zeldin, the new administrator, redefined EPA's mission as centered on “lower[ing] the cost of buying a car, heating a home and running a business” ([Friedman and Tabuchi](#), 2025, np). Thousands of scientists, research personnel, conservation workers, National Park Service personnel, and other staff essential for studying and protecting the Earth system have been [laid off or placed on indefinite leaves](#). Thousands of research and education projects have been terminated. One among them was the Teaching Climate Justice with Young People's Literatures and Media summer institute for K-12 teachers to be offered by the Center for Climate Literacy this summer. Funded by the National Endowment for the Humanities, the institute was to provide twenty-four teachers with an opportunity to develop a literature-based, theory-informed, actionable understanding of climate justice for the ELA classroom. See the forthcoming special issue on why climate justice matters.

This unprecedented and intentional dismantling of American institutions and peoples' collective capacity to adapt to the climate crisis and mitigate its effects is happening against the backdrop of two larger trends. One is the inexorable [acceleration of climate-driven disasters](#), from blistering [summer heatwaves](#) and [droughts](#) to tornadoes, wildfires, and flash floods, including [the recent tragedy in Texas](#). 2025 is already shaping to be [among the warmest years in the 131-year record](#). June—the most recent month for which data is available—was [Earth's third-warmest June](#) in global weather data, right after Junes in 2024 and 2023. Both 2023 and 2024 were, consecutively, [the warmest years on record](#).

This is not a fluke. Without a concerted global effort and a [national climate action plan](#), climate devastation will continue to get more brutal, more fatal, and more widespread. The price—in lives, livelihoods, health, and assets—will be mostly borne by ordinary people, most of whom are already reeling from inflation, price hikes, and declining real purchasing power of household incomes. Thanks to federal agencies such as NOAA's National Centers for Environmental Information (NCEI), we know that the financial cost of climate-related disasters has been rising steeply, [reaching \\$182.7 billion in 2024](#). It will likely continue to rise in the foreseeable future, although the stats may no longer be available. The January 10 report by NCEI was possibly the last one we'll see in a while, since the NCEI's Billion Dollar Disasters reports have now been discontinued. As Jonathan Mingle aptly put it in an article "[An EPA without Science](#)," the current Administration is waging "a war on the future" (n.p.).

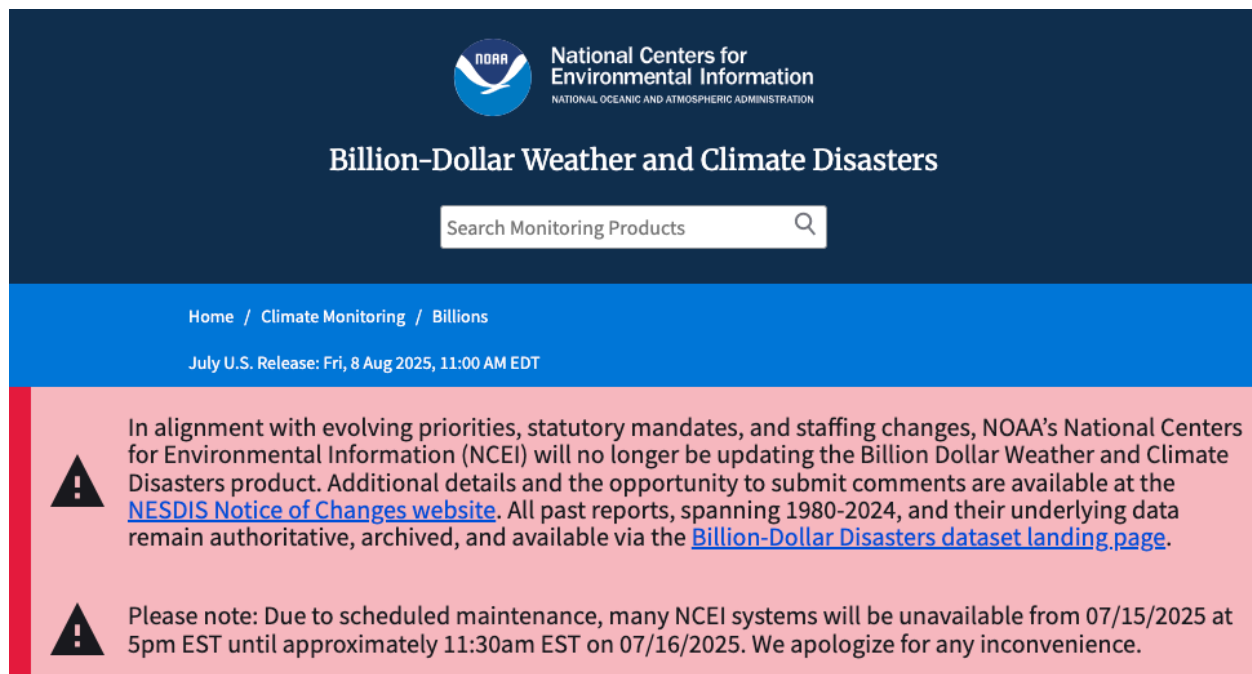


Figure 1: Screenshot of NCEI notification that they will discontinue financial reports

The other larger unstoppable trend is the widespread availability, increased efficiency, and growing affordability of [renewable energy](#). Over the past decade, the cost of solar and wind has gone down by 75 and 60 percent respectively. Batteries and energy storage have gotten better and cheaper, too. In the fall of 2024, Bill McKibben wrote that “we are on the cusp of a true explosion that could change the world. We are starting to put out the fires that humans have always relied on and replace them with the power of the sun” (McKibben, 2024, n.p.). Clean energy and transportation growth continues unabated, not just in [Europe](#), [China](#), [Africa](#) and elsewhere, but also in the US, where [investments increased by over 16 percent from 2023 to 2024](#). In April 2025, Reuters reported that, for the first time ever, [fossil fuels generated less than half of US electricity](#) and Minnesota leads the way [in experimenting on cutting red tape for climate projects](#). Both trends set the current Administration on a collision course with Earth’s biophysical reality and with the shifting economic and technological landscape. At some point in not-so-distant future, we will be both forced and incentivized to redesign human civilization for interspecies kinship, climate justice, and lives aligned with planetary limits.

No, this moment is not over yet. To play the long game means to keep this goal—an ecological world—in mind. In March, *The New York Times* launched a new series “[50 States, 50 Fixes](#)” aimed to highlight local efforts across all fifty states, in which everyday people are doing quiet, vital work to confront climate change and biodiversity loss. In April, the global journalism collaboration Covering Climate Now, *The Guardian*, *Agence France-Presse*, and dozens of other newsrooms across the world launched the [89% project](#) to help the public realize that a vast majority of world population supports decisive climate action. This shift is also visible in scholarship, with an increasing number of publications and studies centered on climate literacy and available in open access, such as the recent collection [Children’s Literatures, Cultures, and Pedagogies in the Anthropocene](#), edited by Terri Doughty, Justyna Deszcz-Tryhubczak, and Janet Grafton.

At CLE, we are part of this majority, too, advocating for integrated climate literacy instruction across all pre-K12 subject areas and grades. Starting with this issue, we have updated the journal’s style guide in accordance with [The Guardian’s guidelines](#): using “the climate crisis” or “the climate emergency” instead of “climate change” and “global heating” instead of mildly-sounding “global warming.” We remain committed to defending everyone’s right to a habitable planet and we believe teachers have a crucial role to play in this effort.

No, it is not yet over, and the contributions to this issue transform that sentiment into a rallying cry: they that would abandon our Earth have not finished; neither are we who fight for it. This tone is set clearly in the issue’s first article from Luke Gliddon, “Dispatches from the Future”, in which he reports on his work to incorporate future thinking into his secondary science classroom via engagement with *Black Panther* and other speculative tales. Jennifer Rudd, writing from her perspective as a scientist, shares how stories helped advance carbon literacy education in Wales. Betsy Maloney Leaf, Heather Delisle, and Colleen Redmond offer examples of the professional development they conducted with secondary arts educators, imbuing their learning with a sense of active hope. Cheryl Hunter and Leila Campbell’s piece on the affordances of teaching with and in local ecological systems reminds us that we have ample inspiration just on the other side of our classroom walls.

The critical essays also advance an argument for outlasting this fraught moment. Marek's article identifies a few key flashpoints of this persistence, namely by articulating the differing perspectives, emotions, and assets that individuals bring to climate literacy education. Roman Bartosch, Julia Hoydis, and Jens Martin Gurr recognize the unique assets that individuals bring in their expertise at connecting climate concepts within and across texts. Daniel Feldman, Dong Yeol Park, and Hunseok Oh enact this expertise by drawing connections between two young adult books that thematize climate refugees. Karen Hindhede offers a critical overview of the inspiration for her own ecopedagogical framework, while Jessica Fundalinski is likewise critical in her exploration of the ideological machinations involved in using pronouns to refer to more-than-human beings. Finally, Turkan Firinci Orman reports on findings from a study assessing the relationship between place-consciousness, climate education, and youth eco-literacy.

This issue is rounded out by two reflection pieces that each correspond to another article in this issue. Hunter refers us back to "Special Places in School," noting that cultivating a sense of place and its ecology in education enables greater awareness, knowledge, and care for our Earth. Malone Leaf, Delisle, and Redmond round out this issue, describing in more detail their hopes for the professional development articulated in "Developing Climate Literacy through Artistic Practice": namely, to support teacher and student mental health. Thus, we might conceptualize the work of climate literacy education as both a means to an ecological future and, perhaps, that future itself.

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Curriculum

Dispatches from the Future

Speculative Fiction and Climate Modeling in the Secondary Science Classroom

Luke Gliddon, Coon Rapids High School, Coon Rapids, MN, USA

Abstract

Students in traditional education settings are rarely engaged in the vital act of imagining. Instead, they are bombarded with data about the climate crisis that project a degraded and diminished future as a foregone conclusion. Here, I reflect on my experiences using published media, highly accessible climate modeling, and a mental time travel project to help students practice inhabiting better futures in a science-backed way. These activities are sequenced over at least five days. Considerations for various educational settings are included.

Keywords

computer modeling, ecological civilization, future thinking, speculative fiction, imagination

Acknowledgments

I was supported in this work with critical mentorship and support from the Center for Climate Literacy.

Some years ago, I began using the [ENROADs](#) climate simulator as a way to build systems-thinking as well as a pedagogical device for students to test assumptions regarding our climate systems. Previous research has shown that using the simulator in classrooms effects sense of urgency and hope as well as intent to take action across sociopolitical categories (Rooney-Varga et al., 2021) It required a bit of learning on my part to get comfortable using the simulator, but the resource articles, help videos, and training resources I found made it pretty painless. I was ready to bring it to my classes. It was great! Students were indeed being pushed into engaging discussions where they got to test out for themselves just what the latest scientific understandings said about their ideas. They wondered, for instance, whether we can solve the climate crisis and meet the Paris Climate Agreement goals if we just electrify our transportation. At the ends of these lessons, students left with a vague sense that, yes, it is possible to build a better world. More importantly, they had some ideas about paths to get there. Nevertheless, an abstract sense of things like PM2.5—otherwise known as particulate matter air pollution—is not too helpful in itself. It is not what drives students to make certain career choices, engage in local civics, or build sustainable businesses.

For that, I designed a six-day unit for my 11th grade biology students. After engaging with speculative fiction depicting ecological civilizations, students used computer modeling to simulate future climate scenarios. Ultimately, students drew on these [mentor texts](#) and computer modeling to design their own futures and create what I came to call a Dispatch from the Future.

Part 1: Looking Forward

To begin, I spend up to two weeks introducing students to various speculative fiction that depicts ecological futures. These mentor texts include podcast snippets, scenes from movies, [100-word stories](#), and more. One text that has proven engaging again and again is the [Black Panther](#) movie. Many students are already familiar with the Marvel Cinematic Universe and are prepared to engage in a deeper investigation of the ecological civilization envisioned in the worlds of the story. This popular movie has proven a more engaging way to dig into land use, resources, and the responsibilities of power than other texts I tried. As the class engages with these mentor texts, an activity I came to call *Looking Forward*, I ask students to use a journal and respond to these

questions following each exposure: What do you notice? What do you want? What do you wonder? These questions prompt critical observation, introspection, and discussions that students were excited to engage in.



Figure 1: Class slides used to prompt student journaling

Exposure to the *Looking Forward* mentor texts is important for two reasons. First, each experience shows students that using imagination to explore futures can be a serious business. In discussing these media, I often find students making comments like “I thought that part was really cool. But could we actually do something like that?” Second, each mentor text adds to a template of styles, modes, ideas, and themes that students can draw upon in as they create their own Dispatch from the Future. Having students keep a journal helps in this process as it may be several days before they engage with the Climate Action Simulation and begin working on their own projects that imagine actual ecological change.

Part 2: Climate Action Simulation

While the *Looking Forward* mentor texts can provide inspiration about futures in fiction, a deeper scientific understanding of climate systems can help students ground their thoughts of futures in reality. The [Climate Action Simulation \(CAS\)](#) has been developed by [Climate Interactive](#) and uses the ENROADs computer model. Other amazing [resources](#) exist, so my additional notes here are brief.

The CAS has different interest groups working together to protect their own interests as well as working toward the Paris Climate Agreement temperature goals. The interest groups include conventional energy, world governments, climate justice

hawks, agriculture and forestry, banking and finance, and more. I sort my students into teams based on their interests and skills. For instance, I have found success with placing some of my louder and more engaged students in the justice hawks group while placing quieter students with good synthesizing skills as the agriculture and forestry group.

For students who already have some background in climate science, I find it helpful to plan about two 60-minute periods for these activities. On the first day, we spend time developing team unity, helping them identify their platforms and goals, and encouraging some deal-making between groups. For instance, I may encourage the climate justice hawks to try to encourage the world governments that their primary obligations are to their citizens. The conventional energy group may work with the agriculture and forestry group to push for nature-based carbon removal. This builds excitement for the next day's activity and allows you to devote all of day two to a different format.

On day two, once your students reach their goal or time limits are near, be sure to spend a few minutes using ENROADs to examine some of the impacts of their choices (see Impacts menu of ENROADs). I highlight the PM2.5 air pollution and share that there are [approximately 8 million annual deaths](#) (Vohra et al., 2021) currently, while our future scenario drastically cuts that number. Throughout these activities, students will be engaged with various science and engineering practices while exploring different cross-cutting concepts. Because the simulations model several processes, there are opportunities to focus on multiple NGSS disciplinary core ideas. For example, middle school classes focusing on [MS-LS2-5](#) or [MS-ESS3-3](#) could highlight the ecosystem services of different nature-based mitigation strategies or the impacts of some human systems on other connected systems. High school classes may be interested in focusing on [HS-ESS3-1](#) or [HS-LS2-7](#) to explore links between human fossil fuel use and sea level or work to consider the societal impacts of different possible solutions.

Following this review of a possible future scenario, have students reflect on what they would love about living in a world that was on track to do these things. My students have written about many general things, such as having hope or not feeling guilty for simply trying to go to work. With more time given for reflecting on this,

students integrate these thoughts on a more personal level and consider specific people and places in their lives. Whatever they end up discussing and focusing on here can become perfect elements for their Dispatch from the Future.

Part 3: Dispatches from the Future

By this point in the unit, students will have collaboratively explored what the science says is possible. They will have also engaged different visions of the future and seen ways that artists and writers have packaged up those visions so that others can experience them. Now it is students' turn to imagine ecological futures! Send students to the future and have them bring some piece of it back. Consider something silly and ceremonial to help give them license to exercise their imaginations: flicker the lights with music, blow time-travel-dust, whatever fits for your setting.

I prompt my students to begin by thinking about a year (e.g. 2070), then three measures from the ENROADs modeling, a location, and characters. These prompts help students ground their imaginations in what the science says is possible and sets the pieces they need for assembling something more intimate than a ppm (or Parts Per Million) measurement of atmospheric greenhouse gas concentrations. One student created an audio recording of a dialogue between herself as an old woman recently awoken from a long coma and her granddaughter. Another student created a website from a future travel agency based on Mars, visiting locations on Earth. Another created TikTok-style interviews with various people in the future about their lives. Others have worked in written stories, performed dance, created video games, and more.

Once students have completed their projects, I have them present within the class as well as digitize their Dispatch so that it can be shared beyond the class with community members. I suggest a minimum of three days for students to work on these projects. I find that more time is always rewarding because of the levels of engagement and the pride students develop when they are working on something so personal and empowering. If time allows, I suggest at least two rounds of project presentations to allow for responses to feedback.

At a Glance

Title	Dispatches from the Future: Speculative Fiction and Climate Modeling in the Secondary Science Classroom
Unit Time	Part 1: 5-10 minutes daily and integrated with daily lessons spread over one to two weeks Part 2: Two days Part 3: Three to five days
Grade Level(s)	9-12 grade level
Core Text	Ryan Coogler's Black Panther (2018)
Supporting Texts	Mentor Texts for Dispatches
Climate Literacy Terms	computer modeling, ecological civilization , future thinking, speculative fiction, imagination
Objectives	The lesson arc builds an understanding of possible future scenarios, grounds those possibilities in the latest science, and has students envisioning ecological civilizations.
Materials and Resources	Lesson Overview Doc Resources Folder

Reflection

Ultimately, these lessons provide openings for students to use the tools of science to explore their worlds. The creative freedoms have encouraged students to open up and discuss their personal hopes and dreams for the future, along with their interpretations of the present.

After completing these lessons, students reflect on the experience. All their reflections have highlighted their appreciation that the project pushed them to envision futures that counter the common media narratives and back it with science.

- “This was a super cool project! The project topic of what we want for the future really helped me think through what is happening right now and what is possible.”
- “I think that it has made me more confident in people to save the world, and make the necessary changes. I used many of the topics in class to try to make accurate predictions. I think that everyone should imagine a better future”
- “I’m proud of what I’ve made”

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How Could I Not Have Known About the Climate Crisis?

Developing a Cross-Curricular Climate Change Education Program

Jennifer A. Rudd, Swansea University, Swansea, Wales, UK

Abstract

In this article, I reflect on the impact of learning about the climate crisis and how doing so inspired me to develop a climate change education program. The article contains details on the new program, entitled *You and CO₂*, how it has been adapted to be suitable for a range of learners and how a new curriculum aided delivery of *You and CO₂* across Wales. I share changes made in both my personal and professional life and how learning about the climate crisis ultimately led to me changing my career.

Keywords

Digital fiction, imagination, carbon footprint, cross-curricular, digital literacy, climate education

Background

In 2018, for the first time, I was shown the projections for the planet for two degrees and four degrees of global warming. I couldn't believe that nobody had told me this before. I was an academic researcher with both a master's degree and a PhD in chemistry, frequently working on next generation solar panels and hydrogen fuels. But all that time I thought I was working to make sure we had alternative power for when fossil fuels ran out. I didn't know that actually we'd already burnt so much fossil fuel that we had warmed our planet by over one degree Celsius and that the global population was already experiencing the dramatic effects of climate change.

What could I do with this knowledge? I started by cutting my family's carbon footprint. We gave up flying, adopted a vegetarian diet, installed environmentally friendly heating sources in our house and purchased solar panels. But it didn't seem like enough. I started asking how it was that, despite my significant level of education, nobody had told me about the climate crisis. Then I asked an even bigger question: 'Was it possible to teach climate change in a way that effected behavioural change?'

Answering the Question

To answer this question, I teamed up with colleagues also in academia and wanting to respond to the climate crisis in some way. As experts in creative writing, psychology, pedagogy and chemistry, we came together to devise a way of teaching climate change and then measuring the resulting behavioural change. We developed a program called You and CO₂, which combines chemistry, math, digital literacy, computer coding, English literature and creative writing in three workshops (www.youandco2.org). We have analysed the program both qualitatively and quantitatively and, so far, are able to evaluate students' attitudes towards climate action. Developing an instrument to measure subsequent behavioural change is an ongoing piece of work.

To develop the program, we drew inspiration from a number of different sources. The first was the new [Curriculum for Wales](#), which was being piloted in a number of schools. Rather than taking a siloed approach to subjects the new curriculum encouraged and promoted a transdisciplinary, cross-curricular, approach to

learning. This enabled us to design a program with several different subjects incorporated.

The new curriculum, rolled out in 2022, mandated teaching sustainability, aiming for students to become “ethical, informed citizens of Wales who understand the impact of their actions on Wales and the wider World” (Welsh Government, 2025). This meant that we could develop a program that teachers would want to use, as they would need suitable resources to help deliver the new curriculum.

We also took inspiration from our research backgrounds. As a chemist with significant experience doing scientific outreach, I adapted resources from previous outreach activities to make an engaging first workshop about carbon footprints. Another member of the team was an expert in digital fiction and used that to develop the second and third workshops.

The You and CO₂ Climate Change Education Program

The program has been trialed with students aged twelve to fifteen and can be completed within a day, as an off-timetable activity. Alternatively, it can be spread over two weeks during a specific set of lessons. All of the resources are available from www.youandco2.org/teachers-pack

Workshop 1: Math and Chemistry, 1 hour

In the first workshop, students use chemistry and mathematics to think about their personal carbon footprint. How did they get to school? What did they eat for breakfast? Using a reference document we developed, students calculate their individual carbon footprint and then combine those in groups of four to six students. Then, they discuss how to hypothetically reduce that carbon footprint by a third. This causes students to negotiate with each other; maybe one can carpool instead of riding solo? Maybe one can change the dairy milk on their breakfast to a soy alternative? Students start to think about structural issues around their carbon footprints and how that affects their decisions as well—for instance, maybe there is no bus route near them, so they’re forced to come to school in a car.

Workshop 2: English literature and digital literacy, 1-2 hours

In the second workshop, students read a custom-built digital fiction called 'No World 4 Tomorrow' (www.youandco2.org/NW4T). This is a multi-ending story, and it responds to decisions that students make. Students can personalise the story by inputting their main character and three supporting characters' names and pronouns. As students work through the story they are faced with small choices, such as how to eat and how to get around, as well as bigger choices, such as what to do when their society is threatened. In this workshop students think about the climate crisis at a societal level and move on from thinking about individual decisions.

Workshop 3: Creative writing and computer coding, 2 hours

In the third workshop students write their own digital fiction. They learn some basic coding and use a platform called 'Twine' (www.twinery.org) to develop their stories. As long as the story in some way relates to the climate crisis, and has decision points, they are free to write about whatever topic they like. Students have written about hedgehogs, the impact of make-up, fast fashion and many other things. You can see examples on our website <https://youandco2.org/play-student-games/>.

Reflections on the You and CO₂ Program

The positive: The You and CO₂ program has now been downloaded in 14 countries in three continents over the last three years. Classroom teachers and education academic experts have praised it "inspiring", "brilliant", "not something I could have come up with on my own". The program has inspired curriculum development in schools in South Wales, particularly supporting incorporation of more climate change content in arts and humanities curricula.

The negative: Students from lower socio-economic backgrounds found the first workshop hard because they didn't have the financial provision to make autonomous decisions about what they ate or how they travelled. They didn't want this to be exposed to their classmates and, therefore, disengaged. To solve this, we created characters that students could use to complete the workshop one activity, without having to rely on their personal situation. This helped students feel less exposed. Feedback from another school was that the vocabulary in the No World 4 Tomorrow

digital fiction was too complex. We provided an audio to pronounce the words and gave alternative wording when the tricky word was clicked on.

We also created a rubric for the students, for workshops two and three, so that they would know what was expected of them in terms of scientific content, spelling, punctuation, grammar, and the number of decision points etc.

Personal Reflections on Engaging with Climate Change Education

In 2018 I didn't know that my life was about to be changed. Knowing the truth about the climate crisis I couldn't continue as a chemist. Working on You and CO₂, with my interdisciplinary colleagues, showed me that the skills I had gained in research and in the labs were transferrable to other areas. I slowly made the switch from the "hard" sciences to social sciences. Changing disciplines has not been easy, thrust into a world of pedagogy literature and having to Google every second word I read! However, it has been rewarding to experience attitudes and behaviours changing as a result of my work. I have also had the privilege of supporting other climate change curriculum development both in schools (e.g. elementary school resources for teaching about fast fashion www.tinyurl.com/ClothesCycle) and with third sector organisations. I even contributed to policy advice for the Welsh Government (<https://netzero2035.wales/our-reports/what-could-education-skills-and-work-look-like-across-wales-by-2035/>)

I still fear for our collective future, but I try to focus on my sphere of influence. I find that by orienting my work at climate crisis solutions I am able to keep my climate anxiety under control and really make a difference in my country.

At a Glance

Title	You and CO ₂
Unit Time	5-7 hours + 1 homework activity
Grade Level(s)	7-9
Core Text	No World 4 Tomorrow, available www.youandco2.org/NW4T
Supporting Texts	None
Climate Literacy Terms	Carbon footprint, societal action
Objectives	• Understand where carbon dioxide comes from • Consider individual and societal actions that can be taken to tackle climate change • Create digital narratives with multiple storylines to explore climate action for themselves
Materials and Resources	All available at www.youandco2.org/teachers-pack

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Welsh Government (2025) Curriculum for Wales. Available at
<https://hwb.gov.wales/curriculum-for-wales>



Developing Climate Literacy through Artistic Practice

Betsy Maloney Leaf, University of Minnesota-Twin Cities, MN, USA

Heather Delisle, University of Minnesota-Twin Cities, MN, USA

Colleen Redmond, University of Minnesota-Twin Cities, MN, USA

Abstract

This article describes a 120-minute professional development workshop on climate literacy for a cohort of urban arts school teachers. Our goal included engaging teachers in reflective conversation and providing language to describe climate emotions—particularly those affecting today’s adolescents, such as climate grief and eco-optimism. We identified tangible ways to make climate literacy part of their classrooms, including connecting climate conversations to existing course content as well as framing learning experiences within climate discourses.

Keywords

Arts education, ecojustice, climate emotions, professional development, climate literacy, hope

Overview

Heeding the call to respond to “visible results of ecological crises all over the world” (Foster & Turkki, 2023, p 91), we developed and implemented a 120-minute professional development workshop for 25 high school educators working at an urban arts school in Minnesota. Our goal included engaging teachers in reflective conversation (and ultimately curriculum development) about climate-specific narratives that center hope and cultivate optimism through artistic expression. Knowing that youth hold deep feelings about the climate crisis, even if they don’t openly express them in school, we also encouraged participants to develop climate literacy curricula that allow students to explore a spectrum of feelings often associated with the crisis (Kelsey, 2020).

Narrative Framing

Foster & Nella (2023) write: “The human-caused climate change, mass extinction of species, and broadly polluted areas have slowly started to convince a growing number of scholars from diverse fields and the general public that a collective ecological transformation is needed” (p. 91). In our experience as arts teacher trainers, conversation about the climate crisis often connotes doom and gloom; thus, thinking about the climate crisis from a place of hope while acknowledging that climate conversations draw upon deep feelings seemed an innovative approach in our field of arts education. We set about creating a professional development experience addressing key aspects of an ecological future with the goal of exploring what educators should know in order to support their students to develop climate literacy through artistic practice. Providing language to describe climate emotions—particularly those affecting today’s adolescents, such as climate grief and eco-optimism—felt essential. Equally important was creating learning opportunities for youth to explore these feelings in school. Key aspects of this process can be found in the table below.

Professional Development at a Glance

Title	Exploring Ecojustice through Arts Education
Unit Time	120 minutes
Grade Level(s)	Secondary K-12 Teachers
Core Text	"Climate Justice Literacy: Stories-We-Live-By, Ecolinguistics, and Classroom Practices"
Supporting Texts	• A Climate Change Promise by Apple • Dead Reckoning
Climate Literacy Terms	Eco-optimism, climate grief, "stories-we-live-by"
Objectives	• Understand how the climate crisis elicits feelings that impact adolescent youth (and all of us!) • Recognize the need to shift conversation on climate crisis from only doom and gloom to stories of hope and possibility • Identify and evaluate multimodal "stories-we-live-by" that focus on the environment to use in classrooms • Support youth to create new "stories-to-live-by" through artistic practice to acknowledge their thoughts and feelings about the future of the planet—to "re-story" the future as possible and hopeful

Knowing that our meeting time would be brief, we sketched a plan for the workshop to introduce climate literacy and guide teachers to reflect on the possibilities that could occur in their own classrooms in the subsequent academic year. We asked teacher participants to:

1. Consider their own thoughts and feelings about a climate future, including finding language to describe how they experience the climate crisis
2. Explore the intersection between climate “doom and gloom” stories and students’ mental health
3. Reflect on the importance of storytelling and artistic practice to effect change around social justice topics, including eco-justice (Foster & Turkki, 2023)
4. Brainstorm ways to integrate “stories we live by” (Damico, Baildon, and Panos, 2020) and artistic practice into curriculum so students could consider the impact of discipline-specific practices on a climate future
5. Commit to developing climate literacy in the classrooms at least once during AY 2024-2025

To accomplish these objectives, we asked teacher participants to talk with a person near them using the following questions as prompts to guide conversation: how do you feel about the climate crisis—do you trend more pessimistic or more optimistic when you consider the future of our planet? How might your views be different from your students’ perspectives? How might generational differences explain this, if at all? Using their discussion response as a basis for large group conversation, we introduced concepts related to ecological grief (Comtesse, Ertl, Hengst, Rosner, Smid, 2021), eco-optimism (Oziewicz, 2022), and eco-justice, or work that addresses environmental issues to understand how “social and ecological issues have the same root in modernity” (Foster & Turkki, 2023 p. 91).

To underscore this information, we shared two resources with attending teachers from contemporary media illustrating the connection between feelings and the climate crisis with the aim of considering how narratives shape public discourse about our climate future. First, we highlighted an article from the *New York Times* (Soloski, 2024), that describes how a “doom and gloom” approach to the climate crisis has not worked

effectively to engage global citizens in climate crisis conversations. This is significant because most adults have grown accustomed to hearing alarm bells ring—a fatalistic or dystopian attitude applied writ large to climate conversation—in a questionable attempt to build motivation and momentum around our planet’s future. When seen through an ecological lens, these stories frame the climate crisis as destructive. Why does this matter? It reinforces climate despair, which research shows does not mobilize action toward a solution for our future and may be contributing to unease among adolescent youth (Comtesse et al. 2021).

We shared Apple’s climate change commitment as the second exemplar, which is a short [video](#) outlining the company’s pledge to address the climate crisis. By the end of this video, some teacher participants were visibly moved by the film’s message (including a handful who were in tears) over Apple’s message: our climate future is high stakes. Using a large group discussion format, we then deconstructed the explicit and implicit messages woven into Apple’s climate commitment and connected these factors to notions of both “doom and gloom” as well as “hope” for a climate future.

As workshop participants reflected on ways to incorporate climate conversations into their classrooms, we offered “stories to live by” (Damico, Baildon, & Panos, 2020) as a possible avenue to explore with students. Sometimes described as “mental models” (p. 684), stories we live by are large structures holding social, cultural and other norms shared across communities. We shared examples of contemporary artists whose work addresses the daily impact of environmental issues, such as “[Dead Reckoning](#)”, a dance work created by KT Nelson and performed by San Francisco-based dance company, ODC (2014). Using these examples as a starting point, participants worked in small cross-disciplinary groups to brainstorm ideas for bringing this work into their own classrooms.

By the end of the workshop, teachers identified tangible ways to make climate literacy part of their classrooms. These included the following approaches to fostering critical thinking about the climate crisis:

1. Connect to existing course content (e.g., expanding a class focusing on social justice art to include climate justice as a subject of inquiry),

2. Frame course content within climate discourses (e.g. exploring climate justice, policy, and its impact on language in a world language classroom), and
3. Design an inquiry-based learning experience to examine course materials (e.g. investigating the climate-impact of printmaking materials while proposing alternate, more climate friendly resources)

Going Forward

Our professional development workshop began by acknowledging that for most educators, supporting climate conversations in the classroom may not have felt like a pressing need. While some had considered the personal impacts of the climate crisis—perhaps even experiencing feelings of panic or anxiety—few had incorporated climate-related topics into their teaching. Moreover, none had approached these topics in a way that fostered a sense of hope or optimism about the future. Generating workshop experiences to enhance how teachers amplify students' climate literacy—especially connecting students' feelings with visions for the future through artistic practice—underscores the need to consider the place of hope in climate conversations. Engaging youth to “re/creat[e] multimodal texts in the pursuit of social justice in their local and global communities (Janks 2010, as cited in Mayes & Center, 2023 p. 525) means shepherding youth through possible solutions for a climate future that hinges upon optimism, possibility, and delight.

In the future, we will continue to develop and deliver this professional development content to area schools, perhaps even as part of an extended summer workshop. Participating teachers could gather for multiple days to not only learn more about developing students' climate literacy but work in community with other K-12 teachers to develop tangible curricular materials as part of a community of practice. Importantly, our approach avoids “the types of scare tactics sometimes used in climate outreach” because “teaching young people about climate change can empower them and help alleviate concerns about climate change” (Baker, Loxton, and Sherren, 2013, p. 136). Amplifying a sense of climate hope and its connection to adolescent mental health through artistic expression can positively prepare our students for the future.

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Special Places in School

Using Provocative Pedagogy to Teach Place-Based Environmental Education

Cheryl Hunter, University of North Dakota, Grand Forks, North Dakota, USA

Leila Campbell, University of North Dakota, Grand Forks, North Dakota, USA

Abstract

Place-based education is more than a classroom structure; it is providing outdoor experiences connecting students with their natural landscape and nurturing a deep bond with their immediate outdoor environment. Melding environmental education design principles and provocative pedagogical methods, this curricular unit prepares university students to teach environmental education across multiple educational domains. This unit begins by providing an evocative and sensory experience of place-based learning before students are introduced to specific design principles and environmental education methods, thus providing a lived experience by which to first ground students' understandings.

Keywords

Provocative pedagogy, place-based education, environmental stewardship, ecological literacy, climate literacy

It's very difficult for students to understand climate change if they never go outdoors. And even more difficult to change it, if they don't love the places right outside their doors.

Overview

Using design principles of environmental education (Sobel, 2008) and methods of Provocative Pedagogy (Hunter, 2024), this three-credit semester-based college course focused on providing direct, outdoor sensory experiences that evoked personal memories and then connecting that shared and lived experience to place-based teaching methods. While the course is education-focused, students across majors enroll as it fills a general studies core-curriculum component. Seven students met weekly for three hours in both outdoor settings as well as in the classroom. Leila Campbell was an undergraduate student in the course and Cheryl Hunter was the course instructor. The primary objective was for students to consistently leave the classroom setting, explore their local landscape in a variety of ways, and develop the methods to create similar experiences for others within their own local natural communities.

The course centered on a specific geographic feature of the campus' natural community, the English Coulee. The Coulee is a small stream that runs through the heart of campus yet is less known amongst the students and rarely used as a natural space to spend times outdoors on campus. Students explored how this place could be a natural and beautiful setting to connect with nature and one another. It subsequently led students to question what needs to be done to foster that human-nature connection.

Both Sobel and Hunter identify sensory, lived experiences and memory as fundamental to place-based education. Whenever possible, class sessions were conducted outside, providing students with uninterrupted engagement with nature by which to then engage with class materials. Students created field notes that captured their personal observations and reflections, which led to a student-developed call to action. Throughout this process students built a deep and personal bond with their local landscape before stepping into the role of educators themselves.

Narrative Framing

Provocative Pedagogy is a method I developed in which content (what we want students to know conceptually) is centered within “a space to *be in* that evokes emotion and individual experience, interactions that further build the relational experiences with the place and fosters care about that place and things,” (Hunter, 2024, p. 11). The goal of Provocative Pedagogy is to provoke action, which relies on integrating six key features across the learning unit: 1. sensory experiences directly outdoors; 2. evocation of personal memories relating to this direct outdoor experience; 3. validation of previous lived experiences; 4. relationship-building, 5. rooted in a local natural place; and 6. resulting in a call to action. You will notice that this method decenters specific content, which provides for its transferability, application, and integration across almost any content-driven curriculum. Likewise, place-based education should also de-center the classroom, not by replicating place in the classroom, but rather taking the classroom *out into* the place.

The structure of this course followed a progression of direct experience with the history and topography of the Coulee. As a class, students first walked and explored the area. They were given no specific design or purpose beyond being free to pose questions, taking notes and collecting any items they determined were meaningful to them. Free exploration is essential for a sensory experience; experiences should not be “created” or even “facilitated” by the instructor. When the instructor is de-centered, students can direct their attention to what resonates with them personally, thus evoking meaningful memories rather than contrived responses to what they think an instructor is looking for. Guided walks with the instructor and an environmental interpreter were then used to encourage deeper sensory interactions with the Coulee and provide opportunity for prolonged, focused observations.

Students then created a collaborative three-dimensional map of the Coulee, during which they were prompted for memories based on the items collected, connecting the object to their previous sensory experiences and class memories. While map-making, students were also asked about any previous lived experiences that related to walking the Coulee. Direct outdoor experiences, collaborative map making, and memory conversations became the groundwork by which students could then move into developing their own “Teach the Coulee” lesson plan.

Class sessions on lesson planning involved students thinking reflectively upon their place-based experiences and memories and then determining what they wanted their peers to gain from the experience. This was essential. Students considered lesson objectives based on their first-hand experience and engagement with the place before we entered into the course texts.

After the place-based experiences and reflections, students read and discussed Sobel's principles of place-based education, as outlined in *Childhood and Nature: Design Principles for Educators*. They considered how those could be incorporated with ideas from Williams and Browns' *Learning Gardens and Sustainability Education: Bringing Life to Schools and Schools to Life*. Each student selected three or more principles, all agreeing to incorporate "special places" as a core teaching element. Direct and prolonged experiences with the Coulee became the foundation for engaging with the course texts, not the other way around.

Since each pre-service teachers tailored their lesson plan using their own reflection on what students should learn, their own direct outdoor experience with the Coulee, and own personal memories, their lesson plans were unique and very different from the standardized lesson plan adopted by the college. Without the requirement to use any specific field of content, students chose to overlap a wide variety of disciplinary fields when creating learning objectives for teaching the Coulee: resource management, environmental sustainability, fine arts, climate studies, biology, space science, etc. They also used a variety of environmental, sustainability and climate concepts within their lesson plans.

A key aspect for students' lesson plans was the design principle of Special Places. This principle involves an individual creating a personal connection with an outdoor space, often leading to a profound and meaningful bond with the environment while also promoting personal reflection (Sobel, 2008). As students reflected on their own explorations of the Coulee, where they had time to personally connect and discover their own Special Place around the Coulee, their direct personal experiences and connections with the Coulee guided their lesson design. Students explained their own enthusiasm for and growing knowledge about this natural place on campus. They also highlighted how this newly found enthusiasm was shared with their peers during lesson implementation. Students affirmed that the excitement was only

possible after they first came to see the Coulee as a Special Place for themselves on campus.

When students presented their Teaching the Coulee lesson plans, they described how this process fostered a personal connection to local nature, evoking both nostalgia and self-reflection on lifetime natural experiences. Although each student had creative liberties, developed their own learning objectives, and literally took a multitude of different routes teaching the Coulee, they all reported back one common take-away from lesson implementation: the need for environmental stewardship and the widespread lack of awareness of how human activity disrupts natural spaces and ecosystems. When students analyzed their peers' reflections from Teaching the Coulee lessons, they found that nearly all participants felt deeply grateful for the outdoor space on campus. Student appreciation for the Coulee also showed through their concerns about litter, invasive species, and the contaminated water that expelled unnatural odor. What students described upon reflection was how developing and implementing their lesson plan evoked a sense of stewardship towards the land and its natural occupants, for themselves and their peer participants.

Students turned a late-semester class discussion toward the importance of environmental and climate education, emphasizing the impact of human activity on their own local natural spaces and newly found sense-of-place. As a result, students decided upon an action-oriented class product, the creation of the *Coulee Magazine*. This magazine consists of a collection of stories, based on students' initial direct experiences with the Coulee and then underscored by implementing their lesson plan Teaching the Coulee. The deep experience of a place, followed by the designing and practicing of place-based education methods resulted in profound and convincing arguments on why and how to integrate place-based education for sustainability.

Coulee Magazine was not a course assignment when the class was initially designed. This was the student's response to directly experiencing place, designing a place-based lesson, and shifting classroom teaching methods toward provocation. The *Coulee Magazine* became a clear call to action grounded in students' understanding of ecological literacy—a call to promote a heightened awareness of their surroundings, reinforcing their understanding of the necessity for interconnectedness with nature. Students learned outdoors, in the place, directly experiencing the natural environment.

And what they discovered was a change in themselves toward a place they had never deeply experienced yet was right outside their door.

At a Glance

Title	<i>Special Places in School</i>
Unit Time	Integrated across one 15-week semester
Grade Level(s)	College level environmental education methods course
Core Text	Sobel, D. (2008). <i>Childhood and nature: Design principles for educators</i> . http://ci.nii.ac.jp/ncid/BA87964550 Williams, D., & Brown, J. (2013). <i>Learning gardens and sustainability education</i> . Routledge eBooks. https://doi.org/10.4324/9780203156810
Supporting Texts	Resources from Center for Climate Literacy https://climateliteracy.umn.edu/what-we-do/resources
Climate Literacy Terms	Place-Based Education, Environmental Stewardship, Ecological Literacy, Climate Literacy,
Objectives	• Develop a personal connection to nature through local landscapes • Understand and apply principles of Place Based Education in both objectives and design of lesson planning • Implement a lesson plan teaching peers about a natural space on campus based on what students have learned about that place • Experience the teaching methods of Provocative Pedagogy, understand how it compares to traditional methods and apply to lesson planning
Materials and Resources	Provocative Pedagogy Overview (see figure 1)

Hunter, C. (2024) Provocative Pedagogy: What Interpretive Methods Offer in Traditional Education Spaces. National Association of Interpretation, *Legacy Magazine* 35(4)



Figure 1: Provocative Pedagogy handout

Going Forward

By directly engaging with a natural landscape on campus and honing a deeper connection to local nature first, students built upon personal experience to design and implement environmental education methods. Importantly, students' experiences ended in creating a call for advocacy.

The students' creation of the *Coulee Magazine* showed that students on campus may feel disconnected from nature, specifically from their local natural community. In describing their engagement with the English Coulee, students were able establish a deeper relationship to nature that was right outside their door, as well use that connection to prepare others with the tools to form similar associations. The final product revealed *how* students became ecologically literate and *why* their subsequent

interest in stewardship, the goal of ecological literacy, matters to them. Students explained *the how* as based in the direct and immediate experiencing of their ecosystem, which did not arise in the classroom setting. They explained *the why* as based in emotional connection to a specific place and subsequent interest in their influence on the ecological world and its influence on them.

We hope that by continuing to use design principles that require direct place-based experiences and pedagogical principles that evoke action we begin to address what Charles Saylan identified as one of the great failures of environmental education- its inability to provoke action by directly connecting to the daily lives of students (Nijhuis, 2011). Connection to local landscapes has been lost to the walls of a classroom but with a simple shift to place-based learning and provocative pedagogy methods, education and its students could benefit greatly.

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Critical Essays



Facts, Fictions, Doom, and Gloom

Three Principles of Climate Literacy Communication and Pedagogies

Marek Oziewicz, University of Minnesota, Minnesota, USA

Abstract

This article confronts the notion that engaging with climate crisis facts fosters doom and gloom. It outlines three principles of climate literacy pedagogies, suggesting that facts are especially useful when contextualized and appropriately balanced with inspiration, curiosity, or anger that motivates action.

Keywords

climate literacy pedagogy, Six Americas, climate facts, climate politics, doom & gloom, climate emotions, climate literacy

In April 2024, I presented at a colleague's undergraduate class at the University of Minnesota, introducing students to climate literacy. I shared a few sobering facts about the climate emergency, and then we read *The Fate of Fausto*. I thought I was making a call to action, but one of the students raised objections. This is all doom and gloom, she said, you're not telling us what to do. Although I cast [The Fate of Fausto](#) as a parable and warning about the consequences of human expansionism, the student interpreted the story to mean that humanity is doomed.

While other students spoke up in support or against the objection, we did not have enough time for discussion. I left the class disconcerted about my response. Is bringing up facts automatically doom and gloom? How else do we talk about the emergency as an emergency? A year later, I believe that educators need to be more intentional about framing our message and more strategic about preparing to engage with audiences that may not see things the way we do. This article outlines three principles related to practical applications of this notion.

Principle One

The goal of climate literacy pedagogy is to help move audiences toward the “Alarmed” position on the [Six Americas scale](#) proposed by the Yale Program on Climate Change Communication (2024). The six positions refer to sets of beliefs, opinions, and attitudes that make a person less vs. more likely to support climate policies, demand change, and take action. The positions include the following:

- The Alarmed (28% of Americans): people convinced that global heating is happening, that it is caused by human activities, especially the emission of greenhouse gasses, and that it poses an existential threat to humanity. The Alarmed strongly support climate policies even if most “do not know what they or others can do to solve the problem” (Yale, 2024, n.p.).
- The Concerned (29% of Americans): people who share deep concerns of the Alarmed yet who also believe that “climate impacts are still distant in time and space” (Yale, 2024, n.p.) or that global heating can be contained even while the world continues to use fossil fuels. This speciously “common-sense position” (Guenther, 2024, p. 3)—created by decades of fossil fuel propaganda—is extremely dangerous as it is shared by many of the Alarmed, the Concerned, and people representing other positions except the Dismissive.
- The Cautious (15% of Americans): people who are unsure and haven’t made up their minds yet: “Is global warming happening? Is it human-caused? Is it serious?” (Yale, 2024, n.p.).
- The Disengaged (6% of Americans): people who are not interested in the topic at all.

- The Doubtful (11% of Americans): people who either dismiss the climate emergency completely or “they believe it is just a natural cycle. They do not think much about the issue or consider it a serious risk” (Yale, 2024, n.p.).
- The Dismissive (11% Americans): people who deny the reality of the climate crisis, seeing it as a hoax or ideological manipulation. The Dismissive is a polite term for climate deniers.

Even though teachers don’t know where students stand on this scale—or may not be able to ask ([Six Americas quiz](#))—this framework is helpful to bear in mind as most classrooms will likely include students representing a range of positions.

Principle Two

Once teachers learn to pay attention to feelings and beliefs expressed in students’ questions, they are better positioned to right-dial messaging based on where the student may be in the Six Americas scale. In my experience, three tips are especially important here:

Tip One

When faced with the Dismissive, do not engage. One exception is when you believe that other students would benefit from hearing the conversation.

In confronting denial, one good strategy for a teacher is to ask what professional organization or (inter)governmental bodies students or parents trust. This may mean inviting them to check the websites of leading organizations across domains: for economy, this could be [World Economic Forum](#) or [World Bank](#); for space exploration, it could be [NASA](#) or [ESA](#); for the military, it could be [the Pentagon](#), [NATO](#), [U.S. Army](#), [Navy](#) or [Air Force](#); for international bodies, it could be [United Nations](#), [UNESCO](#), or [World Health Organization](#); for science, it could be [EPA](#), [NOAA](#), or [IPCC](#). One of the best sources for specific tips to confront climate misinformation is [the Skeptical Science website](#). In general, however, trying to convince the Dismissive is a waste of time.

Tip Two

When addressing questions from the Alarmed or the Cautious, the double goal is to boost their engagement and sense of agency and to help them better cope with negative climate emotions: especially fatalism, despondency, and other varieties of anti-democratic doomerism that are widely prevalent today.

Both the Alarmed and the Cautious already know about the climate emergency. They know that defeating the fossil-fuel interests will require a systems change approach in which the governments' regulatory power and international cooperation are the main forces to catalyze transformation toward an ecological civilization. What they likely struggle with is helplessness (what can we do in the face of such massive forces?) and fear (what if it's too late?). The best response to helplessness and fear is collective empowerment: building a broad civil society movement of people who stand up for the planet. Such a movement is the only power to force states, nations, and elected officials to break from ecocidal bondage of fossil fuels. In these conversations, mobilization can be achieved through sharing specific examples of how students can fight for what they love (school projects, volunteering, civic engagement, community-oriented research projects, etc.) and through funneling outrage at the [destruction of the planet by the few at the cost of the many](#). Countering despondency with visions of action is crucial because anti-democratic doomerism plays into the manipulative narrative of the fossil fuel lobby.

Tip Three

When engaging with concerns raised by the Disengaged or the Doubtful, the goal is to plant a seed or spark interest.

This can be done by rising a question about [recent weather events that threatened people and property](#) or about [cheaper, healthier or more efficient solutions](#) that are becoming widely available. The point is to keep it light: making someone feel like they lost an argument will only disengage them even more. The goal with these audiences is to leave them intrigued rather than convince them. Specific facts from our own experience are especially helpful. For example, I now drive a hybrid, and I appreciate

the difference between its 37-mpg fuel efficiency versus the 14-mpg which was the case for my last vehicle.

Principle Three

Facts are essential except when they're not. While teachers need to know facts about the climate emergency, the challenge is to calibrate using these facts based on the audience, circumstances, and other contexts. Operationalizing this principle is hard. It requires teachers to stay with two seemingly contradictory truths at the same time.

On the one hand, facts are important. All climate misinformation is based on distorting or denying facts in order to replace them with doubt or convenient fictions. Likewise, all calls to urgent climate action are based on the geophysical, scientific facts of [rising emissions](#), [rising median temperatures of the planet](#), [collapsing biodiversity and ecosystems health](#), more frequent and intense [extreme weather events](#), and other intra-systemic impacts of the climate emergency—impacts that have been measured and tracked for several decades by numerous organizations and with a variety of tools, including [the planetary boundaries framework](#). Most of these facts are scary and demonstrate an unmistakable trend.

The other truth is that facts don't speak for themselves. Facts are not enough to mobilize action. Action arises from inspiration and commitment, from personal engagement, from beliefs and dreams we have for ourselves and our loved ones. Facts are helpful to envision solutions, but if they make one give up, they are not helpful at all. Like powerful spices, facts should be part of the conversation only in the right proportion to other ingredients, especially the belief that change is possible.

In the current stage of the fight for the planet's future, this belief is a far more important goal than communicating the facts. Facts are there for anyone who cares to look them up. But the belief that change is possible, a precondition for change, is where we have so far failed. More precisely, this is where the decades of fossil fuel misinformation have created a false "common-sense" narrative embraced by many people across the Six Americas spectrum. This false narrative—the subject of Genevieve Guenther's 2024 book [The Language of Climate Politics: Fossil Fuel Propaganda and How to Fight It](#)—is built around "six key terms that dominate the language of climate politics" (p. 2) and goes as follows:

Yes, climate change is real but calling it an existential threat is just *alarmist*—and anyway phasing out coal, oil, and gas would cost us too much. Human flourishing relies on the economic *growth* enabled by fossil fuels, so we need to keep using them and deal with climate change by fostering technological *innovation* and increasing our *resilience*. Besides, America should not act unilaterally on the climate crisis while emissions are rising in *India and China* (Guenther, 2024, pp. 2-3, italics for key terms in the original).

As Guenther sums it, this narrative fosters a scientifically incorrect belief that there are no alternatives to fossil fuels or that the climate crisis is will not be too bad. Our job as climate literacy educators is to counter this falsehood with a narrative that envisions real solutions and a transition to an ecological civilization—a narrative that is unambiguous about the urgency to phaseout fossil fuels and unambiguous about the role everyone has to play in accelerating the transition.

Going Forward

We are all a bit afraid, but that's fine. Fear is a natural reaction to unnatural circumstances—to what the world is becoming with each year of the unaddressed climate emergency. The student who raised objections was probably the Alarmed, overwhelmed by fear and urgently needing positive messaging. What I should have shared was an empowering message that we are in the middle of an epochal transition to an ecological civilization: a transition in which we are reimagining our energy, technology, financial, educational, and other systems and in which we each have a role to play.

This is exciting yet scary too. The fear we feel thinking about what may happen if we fail to act is not alarmism: "It's a sign that you're willing to look at the danger head-on and not look away. It's a sign of *courage*" (Guenther, 2024, p. 44). In this framing, facts, in and of themselves, are not "doom and gloom." The "doom and gloom" is an attitude. As teachers, when we feel tempted to let it take over us, let's ask ourselves whom it benefits. If *The Fate of Fausto* is read through a fear lens, it may be interpreted as predicting humanity's end. But if it is read through an action lens, it

communicates that humanity can change its course if we choose to fight for what we love.

This is a time to fight, not a time to give up. As Guenther puts it, “talking about the dangers of global heating and the people who are still committed to promoting fossil fuels is a very effective way to disrupt systems of denial and complacency, which depend on codes of silence to seem normal” (2024, p. 187). These conversations—in every classroom, family and community—are urgently needed. They build our [climate literacy capabilities](#): “practical ways of being and doing we can achieve as climate literate Earthlings” (Oziewicz 2023, p. 45). This is how education will make a difference for the Earth’s future.

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Introducing the 3T-Approach

Using Literary Fiction to Enhance Climate Change Literacy

Roman Bartosch, University of Cologne, Germany

Julia Hoydis, University of Graz, Austria

Jens Martin Gurr, University of Duisburg Essen, Germany

Abstract

This essay summarizes key findings from an interdisciplinary project on the role of literary fiction in fostering climate literacy. It discusses prevalent conceptions of the cognitive and emotional impact of reading and suggests the beneficial potential of fiction through the lens of discourse awareness, critical empathy, and systems thinking. Moving from theoretical insight to practical implementation, we describe discourse awareness, critical empathy, and systems thinking in our own “3T-Approach to Climate Change Literacy”: an approach in which teachers draw on a combination of texts, textures, and tasks when planning and conducting pedagogical interventions for climate literacy.

Keywords

climate change literacy, environmental humanities, literature pedagogy, fallacies, 3T-approach

As researchers and educators in the literary humanities and in literature pedagogy, we welcome the understanding of climate literacy as primarily a “narrative capacity” that complements, enriches, and even supplants the still dominant notion that literacy in the context of ecological and climate emergencies is synonymous with climate science literacy (Oziewicz, 2023, p. 35). Despite the growing recognition that “[l]iterature, film, games, and art forms for young people are not additional but the most important avenues for raising climate awareness and mobilizing action” (Oziewicz et al., 2023, p. 2), we, like many others concerned with literacy development and research in the environmental humanities, are eager to explore the unique ways of these avenues. In this essay, we summarize main findings of a recent research project. In the hope of inspiring teachers from primary to tertiary educational contexts, we share a proposal for a pedagogical model we call the “3T-Approach to Climate Change Literacy” (for details, see [Hoydis et al., 2023](#)).

More than Facts and Feelings

While we welcome the ever-growing number of publications and educational resources insightfully crafting arguments for literary and cultural climate education (e.g., Dolan, 2022; Beach et al., 2017; Siperstein et al., 2017), the ongoing debate might benefit from a more general case for the centrality of humanities perspectives on climate literacy. In particular, we encourage scholars and practitioners to use the humanities’ analytical and critical toolkit to re-assess to practice of climate education in light of its proposed objectives. Specifically, to what end do we teach climate change narratives in literature classrooms?

With this larger question in mind, we set out to investigate what popular climate change fiction does—how it is narrated; what it allows readers to see, understand, and feel; and which patterns and plots are especially popular—and what can be done with this knowledge in education. We felt that this research requires insights from literary studies as well as from literacy pedagogies. As such, we reviewed education research and curricular policy, as well as a corpus of the most popular cli-fi texts to date compiled and analyzed by Schneider-Mayerson (2018). The corpus allowed us to learn more about actual readers’ choices of literary texts and indicated what literary analyses can tell us about the potential of using these narratives for classroom practices. This

research was integral to our probing into what might be the most pressing question in climate literacy education: How does reading lead to action?

After an in-depth review of psychological research on the ‘mind-behavior gap’ (e.g., Kollmus et al., 2002), we found that a significant number of practice-oriented scholarship—publications that attempt to chart direct routes from reading fiction to making a difference in the world—seems to operate on a particular assumption. That reading literature can change attitudes and behavior is well documented. However, this does not mean that educators can and should aim (only) at such attitudinal and behavioral change when teaching fiction. In our survey of relevant studies and policy, we came across this unacknowledged yet empirically unsupported assumption so frequently we decided to describe them as “cognitive” and “sentimental” fallacies (see Hoydis et al., 2023, 15-19). These fallacies imply that readers eventually change their ways because of the information they retrieve from a work of fiction, or that they do so because of the emotional appeal, or even manipulation, inherent in literary writing. Facts and feelings, however, are not enough when it comes to lasting behavioral change. Behavioral change might not be the primary objective of literary learning, after all.

There are three areas in which literary fiction excels and thus exerts its greatest influence. These areas are well known to educators in language arts classrooms and an in-depth narratological analysis of Schneider-Mayerson’s (2018) corpus supports our hypothesis that popular cli-fi caters to them in unique ways. The areas are discourse awareness, critical empathy, and systems thinking (see figure 1). In combination, they can contribute to shifting readerly perception, which is the relevant factor for attitudinal and behavioral change.

Cli-fi supports the acquisition of knowledge about the linguistic framing of natural and scientific issues, the role of genre and style, questions of literary form and rhetorical appeal, and suchlike. It is equally true that literary fiction has emotional effects, but these effects should not be conceived of as an emotional primer for sympathy and for taking fictional characters as role models. Rather, by allowing insights into the complexity of human minds and motives, fiction engages an understanding of human interiority that goes beyond the simplistic dualism of environmental heroes and villains—and are we not all more complicated than that dualism suggests? Last, every

narrative we studied connects climate change and other environmental topics to numerous social and cultural issues—growing up, gender roles, power and powerlessness, and so forth—in a way that no scientific account or science literacy is able to do. Cli-fi, in other words, provides crucial insights into the heavily cultured, emotionally charged, and intricately interconnected nature of social and environmental harms. We could describe this capacity of fiction as the rendition of “climate change plus x.”

This “more factor” is at the heart of the unique significance of literary and cultural learning in climate education. It also underlines the importance of the already existing expertise of teachers in the language arts classrooms who know how to deal with the discursive framing of cultural issues, the emotional contagion of literary fiction, and the complexity of individuals and societies in their daily practice. To illustrate the link of this professional concern with concerns of climate literacy, consider one example from our corpus. Saci Lloyd’s hugely popular young adult novel *The Carbon Diaries* 2015 (Lloyd, 2008) obviously engages with climate change; its key value, however, is the way it connects climate and education, in multimodal ways of varying rhetorical registers, with the pains of growing up, the rejections of first love, the embarrassment of having parents, and the glory of being in a rock band. Climate science education has little to offer when it comes to factoring these concerns into climate change models and impacts—but who would disagree that these aspects are paramount for children and adolescents?

The 3T-Approach to Climate Change Literacy

What can be said about *The Carbon Diaries* also applies to all kinds of “[l]iterature, film, games, and art forms” (Oziewicz et al., 2023, p. 2). This is the first, and foundational, insight into what we came to call the 3T-Approach to Climate Change Literacy (see figure 1).

The first T stands for *texts*. Because every text is different—and therefore affords different ways of understanding climate change in its socioecological complexity—it has different appeal for proficient and emerging readers. This means that teachers need to consider each text in light of its specific aesthetic, epistemic, emotional, and

multimodal affordances for individual learners. It is thus crucial that we stop thinking about *the* literary text for a classroom: every text is different and so is every reader.

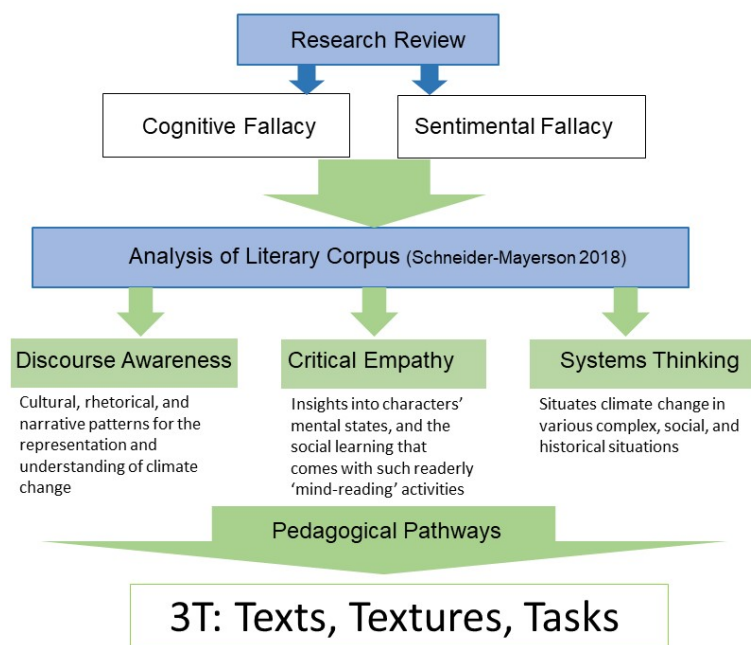


Figure 1: The 3T-Approach: Fallacies and Pedagogical Pathways.

The second T is *textures*. Teachers' knowledge of what an individual text offers allows to create more dynamic and exciting ensembles of texts (that we call "textures") to cater to diverse groups of learners. This strategy allows teachers to make sure the immensely complex topic of climate change is represented in appropriate ways. If we combine song lyrics, films, and games with picture books, graphic novels and short stories, we are not only able to support individual learner needs better. We create a richer tapestry of literary and cultural forms of making sense of the climate emergency—and thus support children and young adults in finding their way through this maze of meanings.

This begs the question: whether teachers are actually able to read and watch and listen so much, and on so different levels and with so many different avenues for learning. For us, the answer to this question is the collective group of learners, not the single child. So here comes our last T: for *task design*. It is up to teachers—and well within the purview of their professional expertise—to come up with a learning scenario

or task in which these different texts are on offer and brought together in meaningful communicative learning. It is, of course, no small matter to design such tasks. This is where resources for such planning and design in educational literature—handbooks, introductions and companions (e.g., Ellis, 2003; Willis et al., 2007), this journal or the [Climate Lit database](#)—are of crucial importance.

The Road Ahead: Aesthetic Affordances and Teacher Education and Training

Confident of the ability of educators to design rewarding tasks for rewarding pedagogical practice, we feel that the key challenge is not in the planning of tasks but in the steps preceding it: what can a specific literary text, film, or media artifact do? How and to what end do we combine them into richer textures for learning? There are clear implications for curriculum and policy development based on academic research that can fruitfully support teachers in their professional development, provide inspirations, and explore best practices. Most important, we see a clear indication that curricula in tertiary education pay better attention to the link of literary studies and literature pedagogy: this enables pre- and in-service teachers to confidently and knowledgably consider each of our three Ts with the necessary expertise.

This will help them to ask, as we have been doing here, what we are teaching for when we employ fiction for climate literacy pedagogy. Although behavioral change is important, discourse awareness, critical empathy, and systems thinking are the more immediate forms of learning with stories. This awareness allows for the integration of other, even seemingly contradictory, educational objectives, for instance, in the discussion of whether it is better to support hope (Redmond, 2024; Römhild and Weik von Mossner, 2024) or prepare students to “stay[...] with the trouble” (Haraway, 2016; Bartosch, 2021; Zimmerman, 2023). “How do we decide?” might be another ill-posed question: If “[c]limate literacy requires harmonizing multiple ways of knowing [...] into a lived, emotionally charged, and personally felt understanding of the planetary predicament [...]” (Oziewicz, 2023, p. 34), then the emotional, cognitive, medial, and communicative diversity of literary textures is key, and reading, feeling, writing, and talking with one another the indispensable educational moment. Research and educational practice will benefit from exploring these ideas in more depth now and in future.

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Orphans of the Earth

Climate Refugees in Young Adult Science Fiction

Daniel Feldman, Bar-Ilan University, Israel, and

The Center for Educational Research, Seoul National University, South Korea

Hunseok Oh, Seoul National University, South Korea

Dong Yeol Park, Seoul National University, South Korea

Abstract

The climate crisis is emerging as a major driver of migration. Climate refugees — those displaced by climate disasters or gradual ecological degradation — are likely to play a significant role in global migration patterns as climate impacts intensify. This evolving crisis presents challenges for educators and remains underexplored in critical scholarship, yet it is already influencing literary narratives. In contemporary young adult (YA) fiction, climate refugees take on the archetypal role of the orphan, a destabilizing figure that disrupts social structures. This essay examines *War Girls* (2019) by Tochi Onyebuchi and *The Marrow Thieves* (2017) by Cherie Dimaline to highlight how these novels depict climate refugees as both vulnerable and transformative figures.

Keywords

[climate crisis](#), [environmental destruction](#), migration, orphans, climate refugee

Climate change has always played a crucial role in shaping patterns of human migration. Early human migrations out of Africa, beginning around 100,000 years ago, were closely linked to climatic shifts driven by Earth's orbital changes (Timmermann et al., 2022). These shifts created "green corridors" of vegetation between Africa and the Arabian Peninsula, enabling *Homo sapiens* to move slowly into Eurasia and beyond in waves roughly every 20,000 years (ibid.). Ice Age climate fluctuations, including warming and cooling periods, also influenced population expansions, contractions, and movements in prehistoric Europe and northern Asia (Saltr , 2024). In the past millennium, climatic stress, particularly drought, likely prompted migrations in the twelfth and thirteen centuries among the Anasazi people from their settlements in Chaco Canyon and Mesa Verde (Benson, 2007).

Despite the longstanding relationship between human mobility and climate, the effect of climate change on displacement and migration in the twenty-first century is of an entirely different order (Cattaneo, 2019). Ominous potential for systemic instability in global migration is emerging due to the rapid rate of the climate crisis. This change is occurring over decades, not centuries. Likewise, its scale is unprecedented. Estimates vary widely, but many scholars agree that global impacts of rapidly changing climate will play an increasingly dominant role in shaping migration patterns in the coming decades (Nawyn, 2024).

The term "climate refugees" refers to people driven from their homes by the violent disasters fueled by climate change or through persistent "slow violence" of environmental degradation such as desertification, toxic pollution, or flooding from rising seas. The complex relationship between migration and the climate crisis, two topics of intense political sensitivity, can make it pedagogically difficult for teachers to address the ways in which climate and environmental factors are rapidly becoming drivers of involuntary migrations (Daoust, 2024). While scholarship is still developing, the emerging phenomenon of climate refugees is already influencing literary narratives, particularly in science fiction cli-fi for young audiences. In some works of contemporary young adult (YA) fiction, climate refugees inherit the archetypal cultural role of the juvenile orphan as a destabilizing figure who disrupts fixed identities and social structures. This essay examines two such texts by showing how young climate refugees are depicted in Tochi Onyebuchi's *War Girls* (2019) and Cherie Dimaline's *The Marrow*

Thieves (2017). Both novels reimagine the role of orphaned protagonists in a world in which adolescent experience is defined by ecocide, climate-induced displacement, and migration.

These novels are valuable resources for educators looking to teach students about the influence of the climate crisis on migration. Three aspects distinguish these texts. First, they focus on indigenous populations doubly displaced by ethnic persecution and environmental collapse, whose histories of displacement from ancestral lands are projected in these novels onto climate-altered futures. Second, they portray orphan characters whose loss of family and home has a destabilizing effect on social structures, galvanizing the potential for broader transformations. Third, the novels demonstrate how traditional literary archetypes, and narrative tropes can be recycled to imagine the speculative landscape of a world devastated by the climate catastrophe. The explicit connections in *War Girls* and *The Marrow Thieves* between indigenous peoples, orphan narratives, and the predicament of climate refugees makes these works especially useful for helping students understand the complex relationships between the climate crisis, migration, and histories of ethnic persecution.

Although these novels depict young people displaced by climate events, the term “climate refugee” remains politically and legally contested (Tubi and Israeli, 2024). Unlike refugees fleeing war or political persecution, people displaced by weather-related disasters or incremental environmental degradation do not satisfy legal criteria for asylum or protection. While international law has yet to recognize climate refugees, the movement of such people is already reshaping patterns of mobility, particularly in countries most vulnerable to climate impacts. Most climate-induced migration takes place domestically, the scenario portrayed in both novels (Ferris, 2024). Even as scholars and policymakers struggle to determine how to address the needs of such populations, youth literature has already begun to imagine this scenario. In particular, YA cli-fi novels demonstrate how education augmented by climate literacy can open up creative possibilities for engaging the complex topic of climate-induced global migration in ways that contemporary academic discourse struggles to articulate. The following analysis can help teachers grasp how the climate crisis informs debates about migration and displacement while broadening pedagogical approaches to these related yet politically disputed fields.

In particular, we propose a conceptual model for understanding the figure of the climate refugee as a modern reframing of the traditional orphan archetype in contemporary context. In English fiction—where the influence of Charles Dickens has been significant—the orphan figure has served as a symbol of disruption and reinvention (Peters, 2000; Sanders, 2011). Stripped of familial ties and social belonging, orphans in narratives from *Oliver Twist* to *Harry Potter* challenge existing power structures while navigating their own uncertain futures. In the context of climate fiction, the orphan figure takes on new yet familiar dimensions, representing not only the loss of family but also the loss of homeland. While classic literary orphans are separated from family and social belonging, YA cli-fi reimagines the orphan as a climate refugee, severed from ancestral geography and ecological heritage as they are plunged into precarious survival and perilous search for home. This transformation of “functional orphans” (Nikolajeva, 2002, p. 172) is particularly vivid in Onyebuchi’s *War Girls* and Dimaline’s *The Marrow Thieves*, in which young orphan protagonists navigate a world shaped by both ecocide and displacement (see Curtis, 2015, p. 356).

Case Study 1: War Girls

War Girls is an Africanfuturist novel by an American author of Nigerian heritage. Set in Nigeria in the late twenty-second century, it imagines a future that seems to repeat the past. In the novel’s post-apocalyptic world ravaged by nuclear radiation and global warming, a brutal war of attrition rages between groups that resemble the belligerent parties from the historical 1967-1970 Nigerian Civil War. Also known as the Biafran War, it was waged by the newly independent Nigerian government against the Igbo-separatist Republic of Biafra, a short-lived entity whose failed bid to secede challenged the Yoruba, Hausa, and Fulani majorities that dominated the early government of Nigeria. The novel depicts a future caught between technological sophistication and environmental devastation. More affluent populations, such as the states of Europe and America, have abandoned Earth in order to reestablish their societies in massive space colonies orbiting the blasted planet. Those too poor to flee the planet are displaced from their homes. Among those who remain on Earth are armies of the displaced, who engage in fierce battle for terrestrial control of the scant parts of the world still fit for human habitation. Further reflecting history projected onto the imagined future, battle

lines are drawn according to ethnic differences. In Nigeria, the Igbo once again suffer at the hands of their rivals, but they all contend with the toxic consequences of a ruined natural world.

The protagonists of *War Girls* are two orphaned Igbo sisters, Onyii and Ify. They serve as girl warriors—part cyborg, part adolescent superhero—and upset the balance of power in the military stalemate. Displaced from their ancestral home, they fight for a safe haven free from the aggression of the Nigerian majority or the fallout of environmental collapse. They confront a bleak scenario in which wanton natural destruction dovetails with violent racial persecution as two sides of the same coin of alienation, estrangement, and displacement:

For so long, they have visited violence upon us. It never starts with machetes. It starts with shutting the Igbo out of government. Then it becomes giving all the good jobs to the Hausa and the Fulani and the Yoruba. Then we are accused of crimes we do not commit. Called animals. They say we infest this country. Then we become the reason the Sahara grows larger and more and more of Nigeria turns to desert. We are blamed for the drought. We are blamed for the radiation. Then we are thrown in jail. Then we are murdered. (Onyebuchi, 2019, p. 19)

Where does environmental destruction end and racial persecution begin? The answer lies in a chain of violence that begins with exclusion and progresses to political and economic disenfranchisement, scapegoating and, ultimately, violent persecution. Forced migration and loss of land are overdetermined: a steady assault on the environment results in an assault on the persecuted minority, reinforcing how loss of identity goes hand in hand with loss of home.

The novel extends the human dynamic of displacement and persecution to the climate crisis, as the Igbo are not only dispossessed of political and social agency but also falsely blamed for environmental degradation. Accusations that they are responsible for drought, radiation, and desertification highlight how the climate crisis becomes weaponized for ethnic oppression. This intersection of ecocide and genocide

reflects how climate refugees are not merely displaced by environmental catastrophe but are also stripped of their cultural identity and collective history.

Case Study 2: *The Marrow Thieves*

The *Marrow Thieves*, another cli-fi dystopia, adopts a similar line of reasoning in representing Frenchie, an orphan climate refugee on the run from genocidal enemies in the ecocidal future. Written by a Canadian indigenous author of the Métis people, the novel is set at a time when climate disaster altered the geographies of civilization by engendering the collapse of coastal cities into the sea. In the wake of war, social upheaval, and constant rains, disease and toxic ruin ravage humanity such that people lose the ability to dream. Without the capacity to dream, the surviving remnant of humanity has no future. If humans are to have a future, they must be able to imagine it in dreams, a capacity retained only by indigenous peoples like Frenchie. For this they are hunted and abducted as a means of harvesting a serum out of their blood and the marrow of their bones, hardly idle metaphors in the history of North American indigenous people, in light of a history of discrimination based on allegations of native blood quotient.

Evoking the fate of the majority of climate migrants displaced within domestic borders, Frenchie and his fellow First Nations survivors flee into the wilds of the Canadian hinterland to avoid capture by government agents seeking indigenous bone marrow. Their band of orphans cling together in a dystopian reversion to their nomadic heritage. They take to the road, learning to survive in search of their uncontaminated ancestral lands beyond the sway of the government marrow thieves and toxic ruin. Their migration is doubly resonant as it is motivated by a desire to survive but also to maintain their cultural heritage in a world hostile to their existence. Frenchie relates the erosion of the environment to the erasure of his ethnic ancestry:

I came from a long line of hunters, trappers, and voyageurs. But now, with most of the rivers cut into pieces and lakes left as grey sludge puckers on the landscape, my own history seemed like a myth along the lines of dragons.
(Dimaline, 2017, p. 41)

This destruction of the natural world imperils indigenous identity. Loyal to their past, these orphans of the land retain a unique ability to dream of a future.

Conclusion

Both *War Girls* and *The Marrow Thieves* depict young climate refugees as orphans whose displacement accompanies ethnic persecution. The texts share a crucial connection in imagining how environmental destruction can cause displacement, leading to cultural erasure. The orphan figure embodies personal and collective loss — of family, homeland, and identity. This reimagining of the traditional literary orphan for the climate crisis era allows YA cli-fi to engage with complex themes of environmental justice and cultural survival while contributing to broader discourses about climate-related migration. Other texts, especially Nicky Singer's *The Survival Game* (2018), similarly imagine a near-future world ravaged by climate disasters and mass migration, although Singer does not foreground indigenous histories.

Our analysis suggests that YA cli-fi can reinvigorate orphan narratives for an age of climate crisis. Protagonists who are both literal orphans and climate refugees anchor bleak portrayals of the human impact of environmental collapse. By illustrating how climate-induced displacement can affect identity, these works provide opportunities for educators to help students envision the human dimensions of the climate crisis.

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Creating An Ecopedagogical Teaching Framework

Karen M. Hindhede, Central Arizona College, Coolidge, AZ, USA

Abstract

This article demonstrates the author's ecopedagogical teaching model through text and image. I explain how I created a teaching framework based on culturally relevant and sustaining pedagogy but felt that the framework fell short in not including an earth-inclusive focus and ecojustice ethic. Through revision and re-envisioning, I arrived at a place-based ecopedagogical model of a saguaro cactus where multiple arms and the base represent eco-inclusive facets of this framework. I encourage other educators to consider how they, too, might create ecopedagogical frameworks for their own teaching.

Keywords

Ecopedagogy, ecojustice, culturally relevant and sustaining pedagogy, climate literacy

Acknowledgments

I am grateful to Marti Sullan for creating the artwork that brings my pedagogical framework to life.

Undergraduate teacher education courses typically include discussions and assignments for pre-service teachers to develop their teaching philosophy. Graduate education courses often include similar assignments and may even expand on the idea of students creating their own pedagogical framework, a multi-modal visual, to aid their vision as educators. In a graduate class several years ago, I created my own culturally responsive sustaining pedagogical framework by asking an artistic family member to draw and label a saguaro according to my educational practices. Living in the Sonoran Desert in Arizona, I decided the giant saguaro embodied my experiential, place-based educational philosophy.

Creating a visual representation of my eco-pedagogical philosophy cemented my praxis. Engaging in such a reflective approach and then visualizing and committing my strategies through an image conveyed my ideas more intuitively and holistically than any written statement could. I had to hone the essentials of what I wanted to provide students; I had to think organically and in harmony with the environment. The framework now hangs in my office, and I regularly share the intentionality behind it with others who comment on my picture. Additionally, looking at my saguaro reminds me and re-commits me to my daily goals.

Initial Framework

My saguaro framework has six arms emerging from the “Ecojustice Pedagogy & Ethic” base. The base supports all curriculum, inclusive of and adapting to the needs of students and the more-than-human world. These arms include “Welcoming & Supportive Environment”; “Academically Challenging”; “Student Centric, Relevant & Applied Engagement”; “Inclusive, Anti-biased Curriculum”; “Eco Engagement & Curriculum”; and one unlabeled arm. While the original framework was initially focused on my children’s literature course, in time it morphed into my personal commitment to providing all students, no matter the discipline, a holistic and culturally responsive experience of climate literacy education. In an earlier draft, the framework heavily focused on the arm I labeled as “Inclusive, Anti-biased Curriculum.” The teaching goals under this area include incorporating culturally responsive and sustaining pedagogy, ideas of equity not equality, and Universal Design for Learning (UDL) principles to support all students (CAST, 2024; Gay, 2020; hooks, 2003; Kendi, 2019; Ladson-

Billings, 1995, 2017; Paris & Alim, 2014). Over time, I began to question how I might include and foster a larger awareness of environmental issues, ecojustice education, and climate literacy through literature. When re-envisioning the framework, the intentional practices under this arm primarily stated the same, though other areas shifted and expanded.

For example, one arm of the pedagogical framework that I originally conceived and is now the central arm stemming from the “Ecojustice Pedagogy & Ethic” base is “Welcoming & Supportive Environment”. This arm incorporates relational pedagogy, where relationships and meaningful connections between students and teachers and between students and students are central (Bovill, 2020). Students need to feel respected, valued, and engaged with the material, with the teacher, and with their peers to thrive. To foster more connections to each other and the natural world and to be more inclusive of my “EcoJustice Pedagogy & Ethic” base, I start the term by asking students to share where they are from, a remembered outdoor, natural world experience, and what gift they can share with their peers. Similarly, regardless of discipline, teachers can provide opportunities for students to co-create eco-focused course/class assignments.

“Academically Challenging” is another arm of my Saguaro Pedagogical Framework. This arm emphasizes rigor, accountability, and high expectations, along with authentic assessment and high-impact educational practices (Bovill, 2020; Freire, 1970). Applicable practices include introducing students to eco-inclusive resources, websites, and ideas they have likely not been introduced to before and will likely challenge their worldviews. For example, I incorporate ecocritical vocabulary and critical questions examining human relationships to the earth along with the [United Nations Sustainable Development Goals](#), the [Yale Program on Climate Change](#), and [ClimateLit.org](#).

A More Eco-Inclusive Framework

In revisioning my framework to be more eco-inclusive, I renamed one of the arms—originally called “Relevant & Real-world Engagement”—into “Student Centric, Relevant & Applied Engagement.” This change reflects my emphasis on incorporating student needs and interests throughout the course and applicable assignments (Bovill,

2020; Perin, 2011). I have adjusted exercises so students may gear their writing assignments to specific audiences, and I have framed reading assignments as a goal that I want students to work toward. For example, instead of asking my college pre-service teachers to explain the value of reading a novel focused on climate literacy, the revised assignment now requires them to explain the value and need for such a novel to students in a particular grade level of their choice and then to write a similar explanation to a parent or an administrator. The revision of the assignment reflects the revision of my framework. "Student Centric, Relevant & Applied Engagement" better represents work done in the classroom to help prepare students outside the classroom—which includes an awareness and understanding of environmental issues, environmental justice, and climate literacy and how to frame these topics to others.

Another eco-pedagogical shift occurred when I added an arm labeled "Eco Engagement & Curriculum." The goal here was to recognize the methods designed to be responsive and adaptive not just to humans but to the more-than-human world. This arm incorporates the humility for the unknown and includes an ecopedagogical examination of the curriculum and the larger world. Applicable practices include having eco-inclusive reading options (and allowing students reading choices), asking students critical questions about who benefits from decisions and structures, challenging ecocidal practices, and helping students reimagine options that include humans and the natural world. I have included assignments that promote more emotional engagement and connection to nature with more emphasis on hope and change-making. For example, in one course students have to spend time outside observing, reflecting, and then answering questions; in another course, students evaluate picturebooks using climate literacy criteria to determine books they would like to see in their classrooms.

The other major, and most important, re-envisioning of my framework is that of the trunk itself, which I eventually labeled as "Ecojustice Pedagogy & Ethic". By naming the base of my saguaro framework, which provides stability for all my teaching, I recognize the intertwining aspects of social and environmental justice, a pedagogy that questions the status quo and investigates the use of social/cultural assumptions to address and redress social-ecological oppression (Lupinacci et al., 2018; Martusewicz et al., 2021). A saguaro's inside pith and outside accordion pleats expand to hold

water, swelling up to two and half times the cactus' original size, thus sustaining and nourishing the cactus. Again, I think of Ecojustice Pedagogy and an Ecojustice Ethic as being my base, nourishing all curriculum.

Figure 1 (below) is the re-envisioning of my pedagogical framework into an ecopedagogical one that may inspire others to infuse an eco-inclusive focus and ecojustice ethic in their classes and for their students.

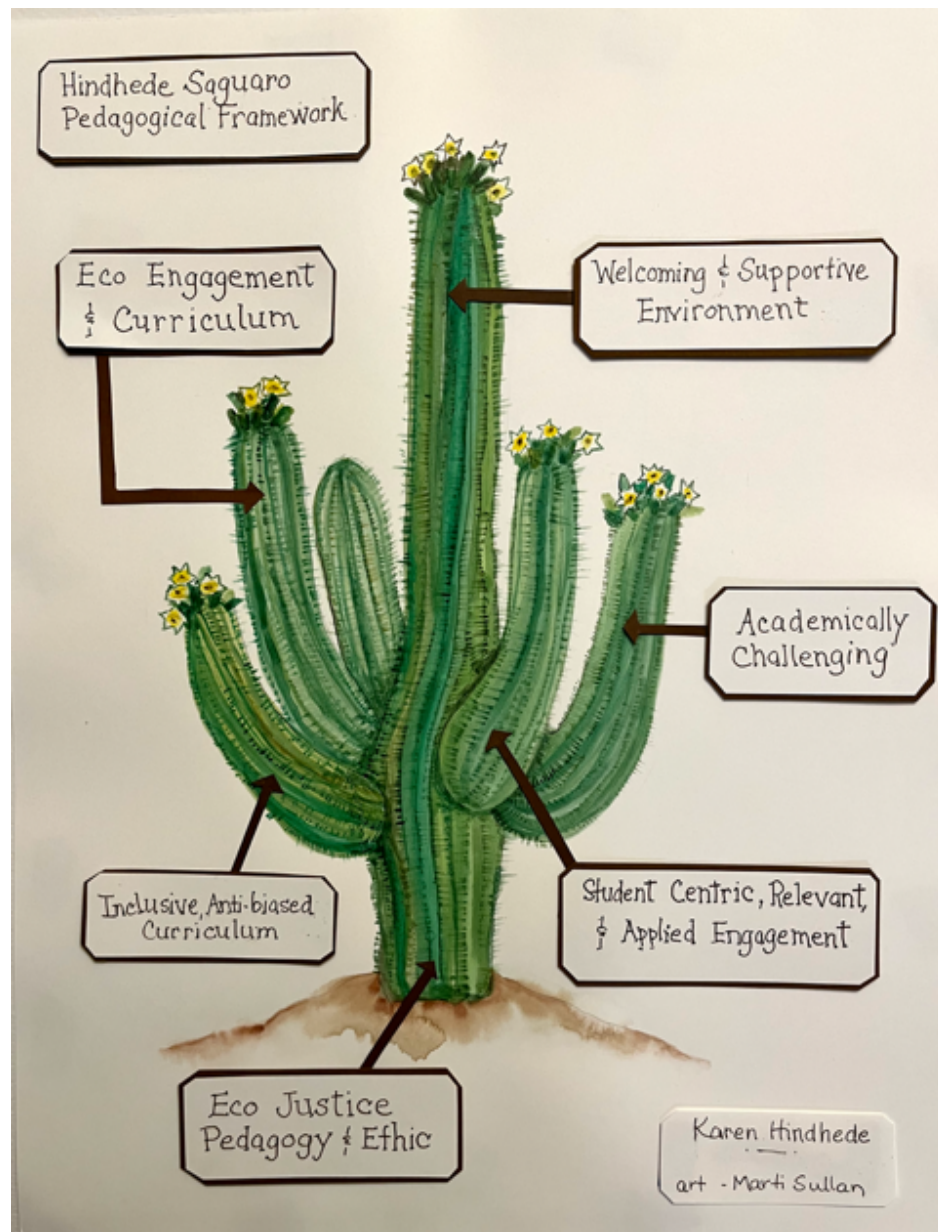


Figure 2: Hindhede Saguaro Pedagogical Framework

Final thoughts

Saguaros can grow new arms at any time. There is no limit, though conditions must be right. For example, extreme heat or drought limits these desert tree-like cacti in their growth and ability to thrive. To reflect on my continuing journey as an educator, I intentionally left one branch unlabeled. This communicates an understanding that as I continue to grow as an educator, my saguaro framework needs to be able to grow with me—and that it must adapt to new conditions.

For young saguaros to survive, a nurse plant is needed to shelter the seedlings as they grow and develop. I do not always know what kind of supportive soil is available and what difficult conditions may impact students, fellow teachers, educational systems, and our planet. What I do know is that I continue to provide and advocate for as much support as possible for myself, other educators, and students in developing the right conditions to continue learning and growing and creating meaningful change for people and the more-than-human world. The Saguaro Ecopedagogical Framework communicates the intentionality of our work as climate literacy teachers and the need to provide learning environments that are more adaptable, creative, compassionate, equitable, earth-inclusive, and ecologically just.

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Rethinking English Language Teaching for the More-Than-Human World

Jessica Fundalinski, Syracuse University, Syracuse, NY, USA

Abstract

This essay examines a grammar lesson conducted within an English language teaching (ELT) classroom, in which a student teacher urged the class to refer to a pet bird using the pronoun "it" rather than "she." This seemingly minor event reveals deeper implications about how language shapes our relationships with the more-than-human world, reinforcing settler-colonial ideologies. Reducing non-human beings to "it" perpetuates human exceptionalism and enables environmental exploitation. This essay advocates for reimagining ELT through decolonial and critical pedagogies, like translanguaging and ecolinguistics-informed awareness, to recognize the agency of the more-than-human world. It suggests that altering our linguistic practices in the classroom language can transform our values and relationships with nature, fostering ecocentrism and sustainable ecological consciousness.

Keywords

English Language Teaching, settler-colonialism, ecolinguistics, translanguaging, ecocentrism

Rethinking English Language Teaching for the More-Than-Human World

“Remember when Zohal told us about her pet bird?” Olivia excitedly asked her small English Language Teaching (ELT) class. A picture of a blue bird appeared on the SmartBoard. A few students nodded their heads. I looked over at Zohal, who looked down and cracked a slight smile. Olivia continued. “Here is our next question for review: Zohal has a pet bird. ____ is blue. What is the correct pronoun for Zohal’s bird?” Four answer choices appeared after the question: she, he, they, and it. The students in the class, including Zohal, emphatically shouted “She!” in unison, apparently knowing the bird was female. After the students had quieted down, Olivia gently told them their answer was incorrect. “No, the bird is an *it*. *It* is blue.” The next review question appeared.

I looked over at Zohal, who seemed confused. I looked at Olivia, an undergraduate student teacher, and I imagined my own pet, just as much a family member as my human kinfolk, being reduced to an *it*: *I need to buy food for it. It needs water.* It felt so impersonal to think about my pet this way. Unsurprisingly, this observation and lesson on grammar has since lingered with me. What does it mean to teach English about the more-than-human world in a way that reduces anything other than humans to an *it*? What values do we impose through language when we describe Zohal’s pet bird as an object, in the same category as a pencil or a piece of trash? This seemingly simple grammar lesson was not just about language; it demonstrated how deeper anthropocentric entanglements embedded within language shape how we discuss and engage with the more-than-human world. Further, it reveals what we might need to rethink English in English Language Teaching (ELT). In the following sections, I explore how ELT is entangled in colonial ideologies that shape anthropocentric ways of using language, and end by offering ecocentric possibilities for reimagining the teaching of English to account for our relationships with the natural world.

English and Its Colonial Entanglements

I first read *Braiding Sweetgrass* by Robin Wall Kimmerer (2013) during the COVID-19 pandemic. This beautiful text, which combines lenses from traditional science and Indigenous ways of knowing, offers ways to rethink humanity’s relationship to the more-than-human world. Perhaps it was due to spending more time outdoors during

that period, or because both Kimmerer and I reside on ancestral homelands of the Onondaga Nation—references that become evident in the text—but I felt a deep connection with this read. As an ELT professional, I found her chapter on the animacy grammar to be profoundly impactful. Specifically, I began to consider what language we use to describe the more-than-human world—the rocks, the pines, the water, the land, and, yes, Zohal’s bird. This engaged reading, which first helped me consider the *iting* of non-human life forms, stayed with me as I sat in the back of Olivia’s classroom and imagined something different. It has also been an important text in my doctoral studies, helping me to link critical decolonial theories to teacher preparation, specifically for the field of ELT.

ELT, through a colonial apparatus of erasure, continues to reify and shape anthropocentric ways of using language, at the expense of the more-than-human world. Arvin et al. (2013) assert that anyone living in the United States has a relationship with settler-colonialism, or the “persistent social and political formation in which newcomers/colonizers/settlers come to a place, claim it as their own, and do whatever it takes to disappear the Indigenous peoples that are there” (p. 12). The disappearing is partly rooted in formal education *and* the language policies that have reinforced the hegemony of English, a form of linguistic imperialism that “has always been a tool of colonization, meant to obliterate history and the visibility of the people who were displaced along with their languages” (Kimmerer, 2017). In addition to Indigenous communities in the United States, linguistic erasure has often affected anyone perceived as “other” within educational systems. Language policies and teaching programs in the United States uphold English monolingualism and monoculturalism while constructing linguistically diverse students as “other,” “inferior,” and “deficient” (Motha, 2006). Ultimately, these policies erase and replace the languages of minority and immigrant students with the norms and perspectives of white English speakers (ibid).

In replacing home languages with English-speaking norms, ELT may also replace ecocentric ways of thinking about the world with dominant anthropocentric Western values, perspectives, and epistemological orientations. As Wa Thiong’o (1986) writes, “Language is... inseparable from ourselves as a community of human beings with a specific form and character, a specific history, a specific relationship to the world” (p.

15). In other words, language is deeply connected to culture and community, shaping and reflecting relationships to the world. Kimmerer (2017) illustrates how the grammar of all living beings, in her ancestral language, Potawatomi, is extended subject status and personhood—reflecting the deep kinship ties and reverence to land. As Kimmerer describes, Potawatomi challenges human exceptionalism and anthropocentrism embedded in Western ideologies and conveyed through English. Indeed, the legacy of colonialism through language indirectly reinforces the anthropocentric notion that humans are separate from and superior to nature (Meighan, 2023). Kimmerer (2017) writes, “Because we speak and live with [English] every day, our minds have also been colonized by this notion that the nonhuman living world and the world of inanimate objects have equal status” (n.p.). Thus, in teaching language, ELT may reinscribe dominant cultural values and perspectives embedded within English—including our values and perspectives towards the land and the more-than-human world. Rather than operating from the belief that language is neutral, practitioners in ELT should consider how language is “a lens through which people view themselves and their relations with other people and the more-than-human world” (McCarty et al., 2021, p. 345).

More simply teaching English, the values embedded in English manifest as tangible actions. Words matter: they both shape how we perceive and act upon the more-than-human world. Although not specific to pronouns, an excellent example is described by Meighan (2021), who highlights and challenges readers to consider the ideas behind uncountable nouns in the English language, like oil and water. In the colonial mind, these “limitless” nouns become limitless for exploitation and extraction. This insight into how we use language provides us reasons to “search for new stories to live by and decolonize our thought processes” (Meighan, 2021, p. 4). If we move from speaking of water as tasteless and odorless to life-giving and sustaining, we begin to unravel and unlearn anthropocentric and colonial extractivist worldviews. Indeed, what would it mean to teach about Zohal’s bird not just as an *it* but as part of the world deserving respect? If, instead, we use the pronoun “she,” what might we be willing to learn from her as a subject? Thus, in rethinking how we teach language about the more-than-human world, we begin to resist the ecologically destructive values embedded within Western knowledge systems while simultaneously opening windows

to decolonize (McCarty et al., 2021). As Kimmerer (2017) asks us to consider: “Can we unlearn the language of objectification and throw off colonized thought?” (n.p.).

Ways Forward

In rethinking ELT for the more-than-human world, I have found both decolonial and critical frameworks helpful for imagining what our pedagogy and practice could look like in the classroom—a practice of unlearning colonial thinking. These frameworks seek to decenter and disrupt dominant values and perspectives, making room for alternative ways of knowing and thinking and ultimately transforming dominant ways of engaging with and thinking about the natural world.

Hsu (2017) suggests translanguaging as a space for acceptance of language beyond monolingual terms. Translanguaging presents a holistic view of language use, where “users of a language select and deploy particular features from a unitary linguistic repertoire to make meaning and to negotiate particular communicative contexts” (Vogel & García, 2017, p. 1). In other words, students utilize all available language resources—whether in a named language like English or Spanish, or through multimodal means—to make meaning of their learning. Translanguaging postures students as agentic as they produce and use language that supports their meaning making and may push back against hierarchical language arrangements (de los Ríos & Seltzer, 2017; Vogel & García, 2017). By offering students the chance to use their entire linguistic repertoire, translanguaging “foster[s] a new way of listening in the classroom” (Hsu, 2017, p. 122). As teachers support students in writing, journaling, or discussing with peers using their full linguistic repertoire, translanguaging legitimizes students’ language, values, and perspectives, including how they perceive the more-than-human world. As we saw in the narrative, Zohal and the other students insisted on using “she” for the bird, a small affront to the objectification of this bird as an it. Allowing students to trans language their world in their own terms opens up new perspectives and values about how to engage with the more-than-human world.

Other possibilities in ELT to resist “*coloniallingual* processes” include teaching from earth-centered perspectives, decolonizing our mental models in English (i.e., metaphors describing water), and collectively shifting instruction to embrace more sustaining and holistic worldviews (Meighan, 2023). This approach aligns with Micalay-

Hurtado and Poole (2022), who offer an ecolinguistics-informed critical language awareness approach (eco-CLA) in English language classrooms. Specifically, the authors describe the goals of eco-CLA in “identifying and promoting language use which contributes to ecological sustainability, justice, and wellbeing” (p. 374). Eco-CLA also aims to help learners identify language that, like the *it-ing* of animals, may perpetuate environmental harm. Using these earth-centered, critical approaches, Zohal’s bird would not be the *object* of a lesson in pronouns within an ELT classroom. Rather, Zohal’s bird might be the *subject*. An ELT teacher might design lessons that center the importance of birds in our local ecosystems—helping students develop the language skills to read, discuss, and write about how they support community ecology, including their roles in pollination or managing insect populations. Students might spend one afternoon mindfully watching birds outside of the school, making observations and considering how and where birds assert agency in the local environment. The unit might end with a critical discussion and debate around using pronouns such as “it” to describe the bird and highlight ecocentric alternatives that may be more suitable.

Finally, I want to end considerations for teaching for the more-than-human world by connecting back to where this all began with Kimmerer’s (2013, 2017) grammar of animacy. The grammar of animacy describes the ways in which we use language to describe the more-than-human world, including the particular pronouns, like “it” for nouns like birds. Kimmerer (2017) suggests that we use a “new language to help us honor and be open to the beings who will teach us... and that invite us into an inclusive worldview of personhood for all beings” (n.p). For this, she draws on Potawatomi to offer emergent pronouns that describe singular beings, *ki*, and plural beings, *kin*. In this lesson on pronouns, Olivia might teach standardized forms—like she, he, they, and it—while also teaching a grammar of animacy embedded in respect and empathy for the more-than-human world. Perhaps, we might see “ki” as an additional choice for Zohal to describe her blue bird.

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Significance of Lived Experiences in Developing Eco-Literacy

Pedagogical Insights for Climate Education

Turkan Firinci Orman, Independent Researcher, Tampere, Finland

Abstract

This article examines the eco-literacy of early youth, focusing on their consumption practices, everyday climate change activism, and performances of critical agency. By analyzing geosocial data from a recent study (Firinci Orman, 2024a), this piece underscores the significance of local contexts and relational understanding in climate education. It advocates for a pedagogical framework that emphasizes collective learning, creative expression, and place-based approaches to enhance climate literacy among young people. The findings support a participatory approach that empowers students to navigate the complexities of environmental challenges and cultivate eco-literate citizenship.

Keywords

Ecoliteracy, climate education, early youth, place-based pedagogies, participatory learning

Introduction

As climate crises escalate, fostering universal climate literacy among youth is urgent. Informed, active global citizens are vital, especially as young people take on key roles in environmental advocacy. Consider a study participant who made deliberate lifestyle changes (see Firinci Orman, 2024a): reducing meat consumption despite limited vegan options and encouraging friends to follow suit. They also forwent products like deodorant, believing small changes could collectively drive significant environmental benefits. This example highlights how eco-literacy shapes personal choices, linking everyday actions to broader environmental concerns.

Eco-literacy, as a broader term in this essay, encompasses the knowledge and skills necessary to engage with environmental issues and foster agency in addressing them (Rousell & Cutter-Mackenzie-Knowles, 2020). It refers to understanding the underlying principles that govern ecosystems and responsibly applying this knowledge to build sustainable communities and societies (Capra, 1997), while climate literacy specifically involves understanding the climate system, climate change science, and solutions to inform decision-making and action. Together, they equip individuals with the awareness and expertise needed to contribute to global sustainability and tackle the climate crisis.

In this essay, I reflect on my research practice in studying the eco-literacy of early youth (ages 13–17), focusing on their subjectivities, consumption, and climate activism (see Firinci Orman, 2024a, 2025). This work is part of a broader interdisciplinary, and multi-site research project on youth environmental citizenship, involving young people from Bulgaria, Turkey, Finland, and the UK (see Firinci Orman, 2024b). My study on eco-literacy included an online mapping activity, in-depth interviews, and free-style writing, through which participants reflected explored their everyday activism performances as well as their environmental identity formation. Framing these findings within critical eco-pedagogical frameworks such as place-based education, climate change education, and global citizenship education, I offer insights for educators fostering climate literacy through innovative, context-sensitive teaching—empowering students to engage with local environments, understand global interdependencies, and actively participate in sustainable practices.

Understanding Eco-Literacy in Context

Understanding eco-literacy in context requires a nuanced exploration of how young people internalize and act on their awareness of environmental issues in their daily lives. This practice-oriented reflection builds on my recent study (Firinci Orman, 2024a, 2025), which highlights the role of lived experiences in shaping early youth's eco-literacy performances. These performances demonstrate the ability to connect consumerist culture with the larger climate crisis, translating awareness into actionable everyday behaviors.

For instance, one participant from the study reevaluated their clothing choices after learning about the environmental and ethical implications of fast fashion. This individual began purchasing second-hand clothing online, despite recognizing the limited options available. Their decision was deeply influenced by an emotional response to visual media such as Instagram and YouTube, depicting the destructive impacts of fast fashion, which provoked a shift in their ethical perspective.

I further draw on previous research showing that while early youth are increasingly aware of the climate crisis, their eco-literacy is shaped by local contexts and experiences (Firinci Orman, 2023, 2025). The depth of their ecological understanding is strongly influenced by their surroundings (Pitman & Daniels, 2020). Local environmental experiences—material, social, and political—play a crucial role in shaping eco-literacy (Börner et al., 2021).

Pedagogical insights for teaching climate literacy

Developing Tools for Collective Learning

Studying eco-literacy of young people, I used an online mapping exercise with Padlet as part of the methods. In this exercise, I asked participants to mark places that are important to them across various scales (neighborhood, city, country, region, and global). Using sticky notes, participants reflected on their climate and consumption-related experiences. This mapping, grounded in Kallio's (2021) topological approach, is useful for exploring young people's subjectivity, spatial attachments, and the political dimensions of climate experiences (see Firinci Orman, 2025).

The platform supported both synchronous and asynchronous participation, enhancing accessibility for diverse participants in remote or hybrid settings. It included

youth from Turkey, Bulgaria, and, more recently, Finland. Participants represented rural and urban backgrounds with varying cultural and socio-economic contexts, all shaped by their society's welfare system. I asked participants to also color-code their emotional responses: green for hope or positive change, red for concern or anxiety, and yellow for uncertainty or mixed feelings. This approach allowed students to visually track their emotional reactions, fostering a deeper understanding of the emotional impact of climate change. The exercise not only mapped locations but also created a semi-public space to express and discuss climate-related issues on multiple scales (see Figure 1).

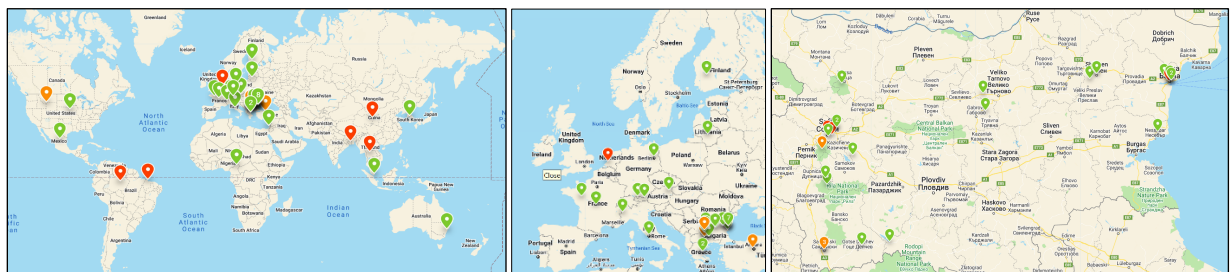


Figure 1: Padlet map where participants from Bulgaria pinned notes reflecting their lived experiences on different scales (World, Europe, and Bulgaria maps, respectively).

I analyzed the mapping data through three dimensions of geo-socialization: intersubjective (intergenerational dynamics), spatial (topological—sociality embedded in all spatial relations), and political (politicization—what matters in people's lived worlds) (Kallio, 2018). Participants reflected on places they had lived, currently reside, visited for family or friends, traveled to or moved to as internal or external migrants. They marked places learned about or discovered online, often tied to personal interests, as well as envisioned future destinations or potential homes.

After the activity, participants were interviewed to discuss, compare, and evaluate these places from an environmental perspective, revealing their eco-literate worldviews. Some identified countries as major polluters or associated them with unsustainable policies. Others reflected on environmental injustices and colonial legacies. One participant, for example, marked a resort village with a dam, where they regularly collected garbage—an experience they described as meaningful and rewarding (Firinci Orman, 2025). Further discussion revealed their involvement in a grassroots environmental movement, where they and their friends conducted clean-ups

using boats, integrating water sports with environmental activism. This example illustrates how personal experiences, and social interactions shape young people's eco-literate worldviews.

Similar mapping activities in climate literacy education can validate young people's lived experiences, fostering deeper discussions on the climate crisis and decision-making. These activities incorporate learners' cultural and social knowledge, reflecting diverse participation beyond formal or adult-led learning, including their everyday climate engagement.

Educators can encourage students to reflect on their choices and emotional responses to different places, exploring why certain locations evoke strong feelings and how they relate to broader environmental and social issues. Since learning is inherently social, educators should create opportunities for students to share experiences and collaborate on climate initiatives. From this angle, creating a collective map on Padlet (see Figure 1) could enable young people to learn from others' experiences and foster a sense of collective agency on issues that matter to them.

The Role of Local Contexts

The findings highlighted the importance of local contexts in shaping young people's understanding of climate issues. Participants began their learning journeys based on their environments, connecting local challenges to global concerns (Beckwith et al., 2022). For example, young people in grades 8 to 11 from diverse regions in Turkey and Bulgaria shared experiences of marine ecosystem degradation, wildfires, rising temperatures, drought, and urban issues such as pollution and waste management. Discussing these local challenges within the broader climate crisis helps students recognize their relevance and urgency, linking their immediate environment to global concerns. This approach is key for effective climate literacy education, encouraging critical reflections on their role in addressing global challenges (Häggström & Schmidt, 2020).

Place-based pedagogies, bringing the local context into focus, significantly enhance climate literacy. They connect students to local ecological and social issues, fostering a deeper understanding of their environments (Häggström & Schmidt, 2020). Dunkley (2018) emphasized the importance of space-time-aware learning experiences

in eco-pedagogy, highlighting how these encounters are key to developing an understanding the interrelation of nature and culture. This was evident through my data as many young participants reflected on school-led garbage collection projects where they practiced firsthand care to their local environments (Firinci Orman, 2024a; 2025).

Emphasizing Relational Understanding

Individuals with eco-literacy skills usually connect causes and effects, particularly between consumerist culture and the climate crisis. I explored how young people's daily actions reflect their critical awareness, demonstrating the intersection of local behaviors with global environmental issues. These insights are reflected in everyday decisions and practices that show a deeper understanding of climate challenges.

For instance, one participant reflected on how seemingly small, local actions—like purchasing a pair of jeans—can have far-reaching consequences (see Firinci Orman, 2024a). They described how consumption choices contribute to larger issues, such as the exploitation of child labor in South Asia or the environmental costs associated with the production and transportation of flowers. This example underscores the relational understanding of how local actions are interconnected with global environmental concerns.

Teaching climate literacy requires linking personal experiences to broader environmental contexts. For example, encouraging students to analyze their consumption habits fosters critical thinking and reflection (Keto & Foster, 2021). My findings show participants critically examining consumerism's role in the climate crisis, underscoring the need for education that connects local, global, and planetary perspectives (Firinci Orman, 2024a, 2025; Crouzé et al., 2024). Educators can deepen such discussions by prompting students to relate everyday choices—food, fashion, or transport—to larger environmental challenges.

Empowerment through Participation

Fostering responsive subjectivities in young people starts with their lived experiences and local contexts. (Häggström & Schmidt, 2020). Recognizing their agency across formal, informal, and non-formal participation is crucial. This includes institutional activities (e.g., school projects), peer-led initiatives (e.g., campaigns), and self-initiated actions reflecting environmental identity (e.g., vegetarianism, reducing consumption, signing petitions). The latter, or interpretive agency, links consumption habits to broader environmental issues, embedding climate activism in daily life. One participant highlighted low environmental awareness in their community, stressing the need for public education, especially among local authorities, to address green space shortages and urban challenges (Firinci Orman, 2024a). They argued that traditional classroom education is ineffective, advocating for popular media and social platforms to engage young people in environmental messaging.

Social media plays a key role in youth climate activism, especially where formal participation opportunities are limited (Firinci Orman, 2024a). Young people eagerly engage in everyday activism, influencing their communities in diverse ways (Firinci Orman, 2025). This highlights the need for educational frameworks that empower students beyond adult-directed initiatives, fostering self-organization and advocacy. Educators should create spaces for students to voice concerns, collaborate with their community, and push for sustainability, reinforcing that climate education must be transformative, not just informative (Rousell & Cutter-Mackenzie-Knowles, 2020).

Teaching climate literacy through artistic expression fosters critical agency (Misiaszek, 2022), with participatory projects like visual or digital climate narratives enabling students to share experiences and engage others through media, presentations, or art workshops (Beach & Smith, 2023).

Conclusions

My research on youth environmental citizenship highlights systemic barriers to eco-literacy in climate activism (Firinci Orman, 2024b), especially within traditional education (see Firinci Orman, 2024a, 2025). In some countries youth participation in environmental movements faces barriers, while activism takes diverse forms, from protests to ethical consumerism and everyday resistance (Firinci Orman, 2022, 2023,

2024a). Educators must address these constraints by fostering resilience and critical thinking through collective learning, digital tools, and context-sensitive approaches. Eco-literacy promotes systemic, sustainable solutions through place-based learning, participation, and critical reflection (Dunkley, 2016). Early youth eco-literacy integrates awareness, emotion, and agency, linking personal actions to broader climate issues. Participatory approaches nurture both individual agency and collective sustainability commitments.

As climate crises escalate, inclusive, dialogical practices are vital. Centering youth voices helps shape sustainable solutions that bridge local and global challenges. Equipping young people with critical, action-oriented skills empowers them to lead in building a resilient, sustainable future (Crouzé et al., 2024).

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Reflections

Reflections on Teaching Provocatively

Cheryl Hunter, University of North Dakota, Grand Forks, North Dakota, United States

Abstract

Moving beyond a facts and figures approach requires a pedagogy that specifically attends to the development of students' values, attitudes and behavioral changes needed to address the climate crisis. This reflection identifies key themes from students and the instructor of a place-based environmental methods education course.

Keywords

Nature-based design principles, provocative pedagogy, ecological literacy, place-based education

In preparing a new place-based environmental methods education course for pre-service teachers, my focus was engaging in the local, natural world right at students' fingertips. Place-based approaches also advance the belief "school can be about getting smarter and making the community a better place and protecting nature," (Sobel, 2008 p. 8). After all, if we want teachers and students to be able to address the climate emergency, we need to move beyond a facts-and-figures approach to climate pedagogy attends to the development of teachers and students' values, attitudes, and behaviors.

I approached the curriculum through the lens of "provocative pedagogy," grounded in the methods of interpretation (Hunter, 2024). The methods evoke emotions, encourage the relationship between learner and nature, and validate

personal experience. As described in my other article in this issue of *CLE*, activities are experiential, emotive, and prioritize building behaviors before introducing or building content knowledge.

I chose a natural feature of campus, the Coulee, a stream that winds through the heart of campus with bridge crossings, benches for sitting, wood duck houses, and diverse flora and fauna native to northern prairies, as well as trash, debris and unpleasant smells. Taking up a charge to create “real projects connecting core curriculum to real places and real problem-solving in the community” (Sobel, 2008 p. 3), the Coulee offered a place to explore the concept of stewardship and a natural mechanism to embed concepts of ecological and climate literacy.

Using three of Sobel’s (2008) design principles (Adventure, Maps and Paths, and Special Places), I developed a series of guided walks and individual explorations of the Coulee. Students began by making a series of sketches of different sections, walking off the paved path to capture details not immediately evident, prompted by the following:

- how does the water flow?
- describe sounds and smells
- find different plant, animal and human communities
- describe in detail one specific element (tree, animal, leaf)
- describe your emotions and what happened that prompted those

Collecting items (or images) was required from each section for the map-making process.

Next, students designed their own curriculum to “teach the Coulee” to non-classroom peers, based on what they learned and deemed important for their peers to learn. Students presented their lessons and learning outcomes. They developed a student magazine that highlighted the Coulee and focused upon stewardship.

Reflecting upon the course experience, there are several key takeaways from students as well as the instructor. These are explained below.

Day One

I asked students in how many classes they went outside in some capacity. I was surprised to hear that no student had participated in a single class session outside. Likewise, none had heard the term “the Coulee” and only a few knew we had a stream running through campus. “Oh, that’s the place that smells, right?” one student responded.

While we started at a deficit for place-based knowledge of campus, we ended with not just knowledge about the Coulee but also with students expressing a deep desire to engage more and advocate for attention to its care—precisely the goal of using the methods of provocative pedagogy.

In the final collaborative project presentation, one student identified a common theme across all the students’ teaching lessons. She explained, “[a] common theme that was always brought up, either during or after these walks, was how much [our peers] never took in nature. A recurring point was they took the scenery for granted and never took the time to appreciate what was truly around them.” Other students explained, “[w]e saw a family of ducks here and a turtle! I didn’t realize the Coulee was home to *actual* (emphasis theirs) animals,” and “I’ve been on campus for two years now, and I’ve never realized this was here.”

Getting students outside was more difficult than imagined but worth the effort

After walking and exploring the Coulee together as a class, students mapping the Coulee on their own, and creating a class mural, we dove into their assignment to Teach the Coulee. As we were reviewing the assignment components, students were enthusiastic about all aspects except one. “What if I can’t get enough peers to participate?” or “What if I can’t find anyone at all?” I gave lots of reassurance that if their peers were only a few they could adapt the lesson and provided ways to encourage peers to get outside (such as mental and physical wellbeing).

All students included the Adventure design element (Sobel, 2008) when teaching their lessons to peers. They recognized the importance of kinesthetics to learning and the need for their peers to not know what was going to happen when they started. However, this required quite a bit of creativity from students. “I had to bribe my peers with ice cream, to get them outside and ‘take a walk’ with me to the

Coulee,” described one student. Another explained that she parked her car on the opposite side of the campus and told a group of her friends they were going on an adventure to help her get things from her car, which is how she managed to get peers to participate in her teaching lesson.

Even though every student noted that their peers have been initially reluctant, they were pleasantly surprised at how much their peers enjoyed their time outside and the overall opportunity to experience the Coulee. Students reported that their peers responded in overwhelmingly positive ways. One peer said, “the Coulee is a place where you can step away from the stress of college life and reconnect with nature.” Another student shared, “[w]hile my peers thought the Coulee was a stinky stream for a first impression, they learned that this Coulee actually has an impact on our environment here!”

Special Places don’t need to be big, but we all need them

The initial class activities got students to experience and engage with the Coulee, which provided them time in nature that they had never experienced before. Students described in their final projects how their own activities “aimed to deepen students’ appreciation for the Coulee, encouraging them to see it as a vital, living space that enriches our university experience.” The Coulee—a “natural place” running right through campus—became the metaphor for breaking down notions that somehow we are distinct from nature. The Coulee, like all of elements of the natural world, runs directly through our daily lives. As future teachers, learning that right outside their doors are places filled with life that intersects with their own personal experiences and memories dissolves the false distinction between “human” and “natural world,” establishing interconnectivity and a springboard for stewardship.

The purpose of using the Special Places design element for college students is no different than using it for children. “There is a universal tendency for children to create or find their own private places,” Sobel wrote, “[and] these places serve as bonding with the natural world, allowing children to feel comfortable in that landscape, connected to it, and eventually committed to acting as stewards of it” (2008, p. 39).

One student explained why she had each peer photograph places that held personal significance:

[My peers] described quiet bends in the water or places where the sunlight filtered through the leaves of a dogwood tree. These places reminded them of home. The exercise helped discover what drew them to these spots and deepened their connection to the land. Through this creative tool, the Coulee transformed from just a stream into a place where memories and emotions are drawn out with nature's beauty, sparking a deeper sense of environmental stewardship for campus and the world around them.

Developing ecological literacy using nature-based design principles and the methods of provocative pedagogy, students accomplished the most important goal, behaviors that demonstrate stewardship for the green spaces that sustain us.

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A Reason for Hope

Situating Arts Education within Eco-Justice Approaches to Climate Literacy

Betsy Maloney Leaf, University of Minnesota-Twin Cities, MN, USA

Heather Delisle, University of Minnesota-Twin Cities, MN, USA

Colleen Redmond, University of Minnesota-Twin Cities, MN, USA

Abstract

Student mental health concerns in a post-Covid world have drawn attention in the field of educational research. The following article theorizes an experience of implementing a professional development workshop in April 2024 to support high school educators as they guide young people toward climate literacy and connect it to student mental health. Feedback from the workshop confirmed that many participants had not intentionally explored the curricular possibilities of addressing climate studies in their classrooms, many were ready to build tangible next steps to cultivating climate literacy in their classrooms.

Keywords

Climate literacy, arts education, student mental health

Introduction

In April 2024, Minnesota Public Radio reported on the results of a study conducted by the University of Minnesota suggesting many K12 principals in the state face challenges with adolescent mental health: 94% of school administrators report “student mental health challenges are a significant barrier to student learning” (Shockman, 2024). Student mental health concerns in a post-Covid world have drawn attention internationally, especially as a challenging issue steeped in political implications, like reduced federal funding for school support systems (ibid). As former Minnesota K12 teachers now working in teacher education, we found the study's results alarming. This prompted us to consider how our expertise in arts education and climate literacy could contribute to addressing student mental health challenges. In response, we designed a professional development (PD) workshop exploring the intersection of artistic practice, adolescent mental health, and our shared climate future.

The following article theorizes our experience of implementing this PD workshop with high school educators in April 2024; our experiences confirm that when educators consider how to provide opportunities for young people to develop climate literacy while expressing their feelings about climate change, it has the potential to connect to broader conversations around youth mental health. Below, we provide an overview of our project, highlight takeaways from the experience, and end the article by identifying next steps for this project.

Workshop Design

Guided by research in education highlighting climate literacy and adolescent youth, we partnered with high school educators to explore the following question: what do K12 educators need to know about climate change in order to support their students as they develop climate literacy? Additionally, what would happen if we introduced K12 teachers to stories of hope about a climate future, and gave them tools to develop curricular experiences that stoke a sense of possibility and optimism amongst youth about a climate future? We developed a 120-minute professional development workshop focusing on hope for the climate future. Our goals included getting teachers to think about their own beliefs and feelings about the climate emergency, consider

the impact of “doom and gloom” stories and how they might contribute to emotional stress for adolescent youth, support youth to think about the climate by integrating storytelling and artistic practice into the classroom, and add opportunities to develop climate literacy during the academic year 2024-2025.

Considering Our Climate Future

Using the adage, “[t]here’s room for screaming... and there’s room for dreaming” (Soloski, 2024), we grounded the workshop with an important reminder: in order for teachers to support youth in exploring their feelings about the climate crisis, educators must first understand how they feel about a climate future. As they considered what these ideas meant to their own experiences, we emphasized the multi-dimensionality of climate discourse by highlighting issues beyond “sustainability.” Topics included: challenging human exceptionalism, addressing speculative futures as sustainable futures, questioning the permanence of individualism at the expense of collectivism, valuing the power of regeneration, imagining and experimenting with cohabitation and interdependence between species. We wanted teachers to understand that feelings about a climate future are valid, while also an important part of one’s personal and professional life.

From Gloom to Glee: Exploring Students’ Thoughts on a Climate Future

A goal of the professional development workshop was to give language to feelings associated with the climate emergency, particularly those most impacting today’s adolescent youth, like climate grief and eco-optimism. Providing learning opportunities to explore emotions as part of arts education experiences allows youth to ponder where they fit into climate conversations, especially since youth understand the world through their thoughts, dreams, and emotions: “Having the ability to think long term and dream toward a future is fundamental to youth’s participation in broader community spaces” (Lee, Currie, Saied, & Wright, 2020, p. 5). According to Hickman et al. (2021), when asked for their opinions on the future, over half of more than ten thousand young people surveyed felt that humanity was doomed. This makes sense, given that “[g]lobally, young people increasingly experience eco-anxiety and mental ill-health in response to climate change.” Equally important, “[s]ocietal inequality further

contributes to eco-anxiety in young people” (Woodland, Hassall, Kennedy-Borissow, 2023, p. 5) because young people often feel a lack of agency to address their “heightened awareness of these issues” (ibid). If “a person’s capacity to cope with feelings the [climate] crisis evokes can affect their ability to contribute to much-needed activism” (Diffey, 2022, p. 499), then understanding places around the globe where ecosystems thrive despite significant stressors may be a productive way to approach climate conversation and contribute to a sense of hope about the future.

Storytelling, Artistic Practice, and the Promise of Hope

One way to address climate feelings might be to “help students pose and pursue questions about topics and texts” (Damico, Baildon, & Panos, 2020 p. 685) focusing on the climate through the arts. Leveraging visual and performing arts means youth can experience re-storying their lives to generate new understandings of a planetary future. During the workshop, we asked teachers to consider what youth should know about the climate crisis and connect it to relevant questions about the materiality of artistic practice. Some participants wondered how discipline-specific resource materials unintentionally contribute to climate instability. Dance education scholar Melanie Kloetzel (2023) writes, “we must examine our relationship to both land and other beings and offer an honest accounting of how our daily choices and activities impact both the local and global” (p. 3). Diving into the materiality of a subject matter offers a granular approach to climate literacy, one that is both needed and necessary.

We challenged teachers to think broadly about situating artistic practice in climate conversations. For example, what nearby landmarks hold significant environmental implications, and how can these implications be rendered artistically? What can students learn by examining how local issues, such as transportation or access to health care, can promote climate justice while also disproportionately harming marginalized communities? How can artistic practice support critical thinking about climate justice and its impact on youth’s personal lives?

Discussion and Implications

Investing in a climate future remains paramount in a world pummeled by fractious discourse and misinformation about climate change. Current climate discourse

highlights the urgency for youth to consider ethical and speculative futures as members of a global society facing climate change. And K12 teachers may just hold the answer for how to engage youth in developing their climate literacy. Curricular initiatives that get kids thinking about climate change can be an effective strategy to build their overall climate literacy (Kolenatý, Kroufek, & Čincera, 2022). Yet, “[t]eachers often lack adequate teacher preparation in knowledge and practices for engaging their students to address the climate crisis” (Beach, 2023, p. 507). Thus, we developed an arts-focused professional development workshop for high school teachers ([included in this issue](#) of *Climate Literacy in Education*). The goal was to bring awareness to climate literacy as a curricular pursuit in arts-specific contexts because “[t]he potential of art lies in its ability to generate awakenings to the new world” (Foster and Turkki, 2023, p. 93). Our work introduced arts-specific approaches to climate literacy and strategies youth can take up when creating narratives that confront climate change as part of eco-justice. By taking an arts-focused approach to climate conversation, youth can disrupt dystopic views of climate futures and promote genuine optimism as a viable approach to a balanced ecological future.

Feedback from the workshop confirmed that while some participants understood how the climate emergency impacted their personal lives, many had not intentionally explored the curricular possibilities of addressing climate studies in their classrooms. By the end of the workshop, several educators could identify tangible next steps to cultivating climate literacy in their classrooms, starting in the fall of 2024. One theater teacher committed to developing a “page to stage” production of *Old Enough to Save the Planet* (2021) by Loll Kirby for local elementary school students to highlight how feelings function in climate advocacy. In collaboration with the article authors, this project premiered in May 2025.

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