Received: 11 August 2023 | Accepted: 5 February 2024

DOI: 10.1111/chso.12846

Children & Society WILEY

ORIGINAL ARTICLE

Envisioning action-oriented and justice-driven climate change education: Insights from youth climate justice activists

Carlie D. Trott

Department of Psychology, University of Cincinnati, Cincinnati, USA

Correspondence
Carlie D. Trott, Department of Psychology, University of Cincinnati, Cincinnati 45221-0037, USA.
Email: carlie.trott@uc.edu

Funding information
University of Cincinnati, Office of Research

Abstract

Through in-depth interviews, this study explored US youth climate justice activists' views and experiences of climate change education (CCE) and their recommendations for alternative educational approaches to advance climate justice. Youth activists ($N = 16$; ages 15 to 17) viewed education as critical to spurring societal transformation, however, most described narrowly focused (e.g., depoliticized; science-centric) or inadequate (e.g., sparse, absent) school-based CCE. Youths' recommendations emphasized the need for justice-driven and action-oriented CCE for all ages to equip all learners with the knowledge and skills to actively contribute to urgently needed, justice-minded, systems-level change. Findings have implications for curricular and policy change that enable education for climate justice action.

KEYWORDS

activism, climate change education, climate justice, critical pedagogy, sustainability

Climate justice has emerged as a key framework in academic and policy discourse, yet its application in educational settings remains limited (Trott, Gray, et al., 2023). Though its definitions vary, at its core, the concept of climate justice 'links climate change and social justice by highlighting the unequal burden placed on different groups by climate change, and

emphasizing the need to work toward fair and equitable solutions' (Ogunbode, 2022, p. 1443; Sultana, 2022). Recognizing that climate change exacerbates existing social inequities, the dual aims of climate justice are to centre the experiences and needs of marginalized and disproportionately impacted groups in climate change mitigation and adaptation efforts, while 'dismantl[ing] the individual and structural architectures of marginalization, exploitation, and oppression towards these groups' (Mikulewicz et al., 2023, p. 3; Trott et al., 2022). Critically, adopting a climate justice lens can facilitate the formation of climate change mitigation and adaptation strategies less likely to worsen existing social inequities or drive new manifestations of injustice (Ogunbode, 2022).

In the United States, a wealth of research has shown that students often receive inadequate and sometimes inaccurate climate change education (CCE) that is often confined to the science classroom and rarely considers justice (Kranz et al., 2022; Monroe et al., 2019; Trott, Lam, et al., 2023). However, the depth, content and format of CCE differs across the United States (e.g., Khalidi & Ramsey, 2021) as well as within states (e.g., Stevenson et al., 2023). As Worth (2021) documented in her book *Miseducation: How Climate Change is Taught in America*, what students learn varies widely across the country:

> ...since there is no national curriculum. States provide guidelines of what students should learn each year, but schools can use any method they'd like to get them there. Which is to say, it's impossible to definitively describe what kids are learning about recent climate change, since that happens behind the closed doors ... of classrooms in every community in America.
>
> (p. 12)

Still, CCE scholarship has identified several trends. In particular, in the United States, where climate denial, obfuscation and misinformation continue to hinder coordinated political action, US teachers tend to: spend little time, if any, teaching climate change; approach CCE in ways that align with their political orientation; have students debate 'both sides' of the issue due to a lack of awareness around scientific consensus; and rarely offer action opportunities—particularly beyond those emphasizing individual behaviour change (Borgerding et al., 2023; Khalidi & Ramsey, 2021; Plutzer et al., 2016; Plutzer & Hannah, 2018; Stevenson et al., 2023). Mainstream CCE in the United States is, at best, technically accurate, science-centric and depoliticized and, at worst, misleading or missing altogether—though important justice-oriented examples of CCE are beginning to emerge in states with progressive to conservative political climates (Borgerding et al., 2023; Kupetz & Buttimer, 2023).

While mainstream CCE approaches may advance particular goals in the United Nations' Sustainable Development Agenda (UN, 2023) such as 'responsible consumption and production' and 'climate action' (Sustainable Development Goals [SDGs] 12 and 13), the aims of climate justice deal directly with a much wider array of SDGs, for example but not limited to 'no poverty', 'good health and well-being', 'gender equality', 'reduced inequalities' and 'peace, justice and strong institutions' (SDGs 1, 3, 5, 10 and 16, respectively). Moreover, climate action (SDG 13) is critically intertwined with many SDGs, yet its relationship to education and justice is not widely recognized (Filho et al., 2023). For education to be a potent force for societal transformation to sustainability, there is a need for alternative CCE approaches that frame complex sustainability challenges—and hence their solutions—not only in top-down scientific and technical terms, but also with attention to social, economic, historical, ethical and other contextually grounded considerations (Dunlop et al., 2022; Lam & Trott, 2022; Neas, 2023; Svarstad, 2021; Trott, Weinberg, et al., 2023).

For example, educating for climate justice requires attending to the ideologies and systems fuelling the climate crisis and multi-faceted social injustices, including human and white supremacy, coloniality, racial capitalism, Euro-American epistemic hegemony, and more (McKenzie et al., 2023; Nxumalo & Montes, 2021; Trott, Gray, et al., 2023). As noted by McKenzie et al. (2023),

> Any educational intervention that attempts to address the myriad of issues surrounding climate change must confront these power dynamics, and this is something that dominant approaches to climate change education frequently background or outright ignore.
>
> (p. 3)

Challenges to more holistic, justice-centred approaches to CCE exist at multiple levels (Beasy et al., 2023; Mayes, 2023). A recent systematic review examining justice considerations in CCE within and beyond the United States found that educators face numerous structural and institutional barriers including limited professional autonomy, lack of resources and support, limited training in teacher education programmes and hostile school cultures giving rise to educators' discomfort teaching politically controversial topics (Trott, Gray, et al., 2023; see also Plutzer et al., 2016). However, it must be noted that, with regard to justice-driven and action-oriented CCE, the nature and magnitude of systemic and ideological barriers vary widely across contexts (e.g., Dawson et al., 2022; Howard-Jones et al., 2021).

Yet, despite the relative lack of CJE in the United States and elsewhere, the rapidly expanding literature on youth climate justice activism makes clear that young people around the globe are simultaneously motivated and capable of grappling with and acting on these important topics (Bowman & Germaine, 2022; Brennan et al., 2022; Grosse, 2019; Neas, 2023; O'Brien et al., 2018; White et al., 2022). Because justice-centred CCE is uncommon in formal educational contexts, it is apparent that youth activists are learning more about climate justice through their activism than from school (Mayes, 2023; Verlie & Flynn, 2022). Given their proximity to present-day classroom learning combined with their active engagement with climate justice beyond the classroom, school-age youth activists may have unique insights on how to bridge these disparate spheres.

With key exceptions (e.g., Kowasch, 2023; Neas, 2023; Vamvalis, 2023), few studies with youth climate justice activists have examined their perspectives and experiences of learning about climate change in schools and how they envision alternative educational practices with the capacity to advance climate justice. Towards reimagining climate pedagogies alongside youth activists, the present study used in-depth interviews to understand whether and how they learned about climate change and/or climate justice in schools as well as their recommendations for educational approaches and policies that both reflect and work to address multi-faceted climate injustices. As such, this research was guided by the questions: (1) What are youths' views and experiences of CCE?; and (2) What are youths' recommendations for curricular and policy change to advance climate justice?

METHOD

Participants

The present study is part of a larger US interview project examining the perspectives and experiences of youth climate justice activists ages 15 to 25. Participants in this study were youth ($N = 16$;

ages 15 to 17 years) who were either in or recently graduated from high school at the time interviews took place. Participants' pseudonyms, sociodemographic information (i.e., age, gender, race/ethnicity), educational level and geographic region are provided in Table 1.

Data collection and analysis

Recruitment for this study took place online through email-based outreach to US climate justice groups inviting youth activists to participate in an online sociodemographic questionnaire to indicate their interest in being interviewed. In-depth, semi-structured interviews, lasting approximately 60 to 90 minutes over Zoom, explored youths' views and experiences of climate justice activism, including their CCE experiences and perspectives on the role of education in advancing climate justice. The interview protocol was organized into five sections exploring youths' pathways into activism and experiences in the movement as well as how activism impacts youths' relationships, everyday life, personal outlook, broader activism and visions for the future. To explore youths' initial exposure to climate change and climate justice, they were asked: 'How did you learn about climate change for the first time?' and 'Beyond climate change, how did you first learn of climate justice?', with probes asking 'Was that in a school setting or outside of school?' if this information was not already provided. Full transcripts were analysed for this study, but additional questions of particular interest included: 'In your view, what is the role of education in the movement for climate justice?'

TABLE 1 Participants' pseudonyms and sociodemographic characteristics.

Pseudonym	Age	Gender	Race/ethnicity (open-ended)	School grade	US region	Area
Eva	15	W	Multiracial	9	Northeast	City
Akira	15	W	Jewish and Japanese	10	West	City
Maeve	15	W	White	10	West	City
Sage	15	W	White	10	West	City
Jiang	15	M	Asian/Chinese	11	Midwest	Suburb
Fatima	15	W	South Asian/White	11	Northeast	City
Maya	16	W	Ashkenazi Jewish and White	10	Northeast	City
Divya	16	W	Indian, South Asian	11	West	Suburb
Emma	16	W	White	11	Northeast	Suburb
Ebony	16	W	Black	12	Southeast	Suburb
Mei	17	W	Chinese American or Asian	11	Northeast	Suburb
Isabel	17	W	Mexican/Indigenous	12	West	City
Kate	17	W	White	12	Northeast	Suburb
Avery	17	GNC	White	12	West	City
Jada	17	W	Black	HSG	Northeast	Suburb
Sofía	17	W	Latina and White	HSG	Northeast	Rural

Abbreviations: GNC, gender non-conforming; HSG, high school graduate; M, cis-gendered man; W, cis-gendered woman.

and 'What is the role of schools in supporting climate justice?' Because interviews were semi-structured, additional follow-up questions allowed interviews to dive deeper into youths' particular responses. Following interviews, youth were compensated with $25 gift cards. This study's methods were reviewed by the institutional review board of the data collection university, and youths' participation was voluntary.

Audio-recorded interviews were transcribed verbatim, edited for accuracy and de-identified prior to analysis. Reflexive thematic analysis (Braun & Clarke, 2021) was employed to explore youths' CCE experiences and recommendations. First, I reviewed each transcript to gain familiarity with the full data set. Next, I used an open coding process to identify and label interview text of relevance to this study's research questions. Coding at this stage consisted of 'in vivo' coding (i.e., using participants' own words) and latent coding (i.e., labelling concepts). After each coded transcript, I recorded brief (i.e., 1–2 page) memos summarizing notable features of each interview (e.g., stories, experiences, challenges) to return to throughout the course of analysis. In addition to coding on paper transcripts, I also collated initial codes into a growing list of emerging concepts. Over time, this digital record was iteratively organized to formulate initial thematic categories. After coding all transcripts, I organized the full digital record into a series of clusters based on shared meaning across the data set (e.g., 'Necessity of CCE Mandate'; 'CCE as Moral Obligation'). These clusters were then iteratively revised and reorganized to generate themes. Finally, themes were named and defined in preparation for report writing.

Positionality

From first conceptualizing this research to being the sole analyst of interview transcripts for this article, I recognize that my identities, values and experiences have shaped every stage of the research process. I am a White cis-gendered woman and tenured faculty member at a research-intensive university in the US Midwest, which occupies the stolen ancestral lands of the Shawnee and Myaamia (Miami) Nations. I hold many privileged identities in terms of race and social class as well as key markers of difference with respect to youth interviewed for this study—particularly age, educational level and professional status—which shape and constrain how I approach this research. My motivation for this study was to listen to and amplify the voices of youth climate justice activists whose demands for justice-driven climate change mitigation and adaptation policies I share, and whose well-being, lives and futures I care deeply about. I have been engaged in youth- and community-partnered action-focused research focused on the climate crisis for nearly a decade. As such, I share with youth climate justice activists a strong commitment to using my skills and abilities in the service of raising awareness and advancing action for climate justice. In these and many other ways, my perspectives and beliefs have undoubtedly influenced all aspects of this research from its design to theme descriptions.

RESULTS

In explaining their views and experiences of CCE, youth expressed that education is critical in efforts to: (1) strengthen climate change awareness, (2) advance climate justice, and (3) enable action for just climate futures. However, they described a range of deficiencies in present-day CCE that impose barriers to realizing the promise of education to spur societal transformation. Towards addressing these barriers, youth made several key curricular and policy recommendations for

enabling comprehensive, justice-focused and action-oriented CCE. Thematic findings organized into the educational ideals expressed by youth activists followed by key barriers to, and recommendations for advancing education for climate justice action. Accompanying theme descriptions are illustrative quotes with youths' pseudonyms.

Strengthening climate change awareness

Educational ideal: cultivating an informed and engaged public

Youth activists in this study expressed a firm belief in the power of education to strengthen learners' comprehensive climate change awareness. They viewed education as foundational to cultivating an informed and engaged public equipped to understand, care about, and address the climate crisis and its multi-faceted injustices. As many explained, knowledge is the first step towards deeper engagement.

> There's very little you can do without knowing about climate change and climate justice. ...The younger that we start that education, I think the more environmentally conscious we raise our society and our people, which is why educating youth is so important ... Because the more you educate, the more it affects everyone, and the more likely you are to reach a larger crowd of people.
>
> - Sage

Ultimately, youth viewed as education as a critical lever that can spur societal transformation. As Mei explained, 'I think that moving forward in a more just world, more people will have access to education and be able to use that to inform the decisions that they make and the way that they ... support the world that we're going to hopefully be living in'.

Barriers to surmount: CCE Is limited in scope or entirely beyond reach

Unfortunately, youth described a number of barriers to this ideal. Most deemed their experiences with CCE as inadequate, either due to brevity or limited scope of content. Some had no access to CCE, like Avery who said, 'At various points in science classes, the teachers kind of mentioned climate change, but I've never taken a course that specifically included climate change as part of it... It's always just been off-hand comments and stuff'. Many shared experiences similar to Fatima who explained that school was not her main source of climate change information, 'Some of my teachers would show documentaries in school, but ... school has never been the biggest source of that, unfortunately'. Like others in this study, she learned about climate change from 'parents, through conversation with friends, following the news, just different things happening in my neighborhood, different protests, strikes, that kind of thing'. Reflecting published research (Parry et al., 2022; Tyson et al., 2021), learning meaningful, in-depth information about climate change often came from social media and youths' own online research.

> I first learned about climate change probably in middle school ... in my science classes, but I didn't necessarily understand what that even meant until I had social

> media. ...That's where people were saying like, "Oh, we only have this much time left." [Then] I started truly understanding ... how serious it was.
>
> - Isabel

A common experience described by youth was learning about the science of climate change in school, then supplementing that information with other non-school sources.

> The first time I can remember learning about [climate change], though I think I knew about it before then, was in third or fourth grade ... explaining the science part of climate change ... how greenhouse gases worked and very little on, "What are the effects of climate change going to be?" That was kind of like my baseline understanding of just, "Oh, the planet's getting warmer and that's a bad thing." Then, I definitely learned a lot more about it just getting older in middle school, I would see it in the news more, people talking about it more.
>
> - Maya

Some youth described more engaging and motivating experiences with CCE. For example, Kate described her earlier CCE as 'surface level', but later on attributed her activism in part to a course that enabled her deeper engagement. As she put it, 'I took an Environmental Science class right before I started getting involved in climate activism ... and that definitely fed into my motivation since I learned more about the environment at a more in-depth level'.

Youths' recommendations: compulsory CCE to develop basic knowledge and understanding from a young age

To strengthen young people's climate change awareness, youth activists had clear recommendations for CCE curriculum and policy change. Many said that CCE should reach earlier age groups and strive to introduce age-appropriate information in ways that help young people make sense of their world. In the United States, CCE is often not introduced until middle school, which corresponds roughly with the early teenage years (Plutzer et al., 2016; Worth, 2021). As Sofia explained, 'I think that kids should learn about it from a young age because kids can start developing their own personal views from a young age, and so they need to know the facts and the kind of world that they're growing up in'. Eva and Jada expressed similar views:

> I think probably the earlier the better. I know people are always worried about scaring kids or something with talking about the climate crisis, but I think just being exposed to it at a young age is really important. And then, just like anything else, I think talking to them about it more in-depth as kids grow up.
>
> - Eva

> If anything, [pre-school to middle school students] are going to be the ones that are truly affected. ... So, I think that trying to bring in more people and younger people [is important] because it's kind of seen they're too young understand or something, but it also goes into bringing it into schools and making things more accessible and training for people of all ages and groups.
>
> - Jada

Like Jada, many spoke of CCE as a moral obligation. Because young people will be facing climate change impacts throughout their lives, they deserve deeper engagement. A common critique of the CCE experienced by youth in this study was its limited capacity to inform learners of the gravity of the problem. Beyond reaching all age groups, they recommended a more comprehensive approach to CCE content.

> I think it's super, super important that we have better climate curriculum and that students are educated about climate change in their schools ... We learned about climate change for a week or two, maybe [at] the most and I remember we learned a piece of information that wasn't even true. And it was really vague and mostly about human adaptation. I think it's really important that—given that people my age are living with this and are going to have to see it happen—we're given all the facts and that we know how drastic it is.
>
> - Akira

Several called for a compulsory CCE, requiring all students to develop basic knowledge and understanding about the environment and climate change. In expressing the need for basic knowledge through CCE, youth often stressed the importance of learning 'the facts', a desire perhaps rooted in their awareness of the continuing spread of misinformation, which they noted was still rampant. In the US context, where post-truth politics, 'alternative facts' and climate denialism are more widespread than in many regions, youths' emphasis on CCE-driven awareness of 'the facts' (e.g., the existence of human-caused climate change) is likely tied to their sense of frustration that basic denialism continues to thwart concerted climate action. To move beyond climate change as a 'politically divisive subject', Avery said:

> Schools are supposed to teach people about health-type things—that's the requirement—just because it's good for you to know. It's good for everyone. Similar to that, there should be required [education] that's like, "Here's a few things about how the environment works." I think if there were more required courses ... it'd be so much easier because ... we're still debating, "Is this climate change a problem?" ... And we should be debating "What is the best way to address it, so everyone can just get the same basic [level] of understanding that, "Yes, climate change is real and that it is bad. And here are tangible things that scientists agree on that are good." If we could get everyone at that stage, that would be so good.
>
> - Avery

Advancing climate justice

Educational ideal: promoting care and climate justice

For youth in this study, awareness alone was not seen as the end goal of education. Rather, strengthening learners' climate change awareness was seen as a pathway to their care and concern. As Mei put it, 'you need to inform young people in order for them to care about the problem'. Basic information was seen to not only enable learners to better understand present-day societal conditions, but also to envision preferable futures and care about the issues.

> I think that education is one of the most foundational parts of the climate justice movement. I think that just being provided with the facts and with information allows us to make more informed opinions and decide what we support and what we want as an individual for the world and for the climate. I think that education can be one of the most influential tools in just making people more aware of and convincing people to care about climate change.
>
> - Ebony

Towards advancing climate justice, education was considered critical for learners' deeper understanding of the ways climate change disproportionately impacts marginalized groups, both within countries (e.g., low-income and racialized groups) and around the world (e.g., people of the global South). Importantly, education can help illuminate how the climate crisis is intertwined with social injustice, offering additional avenues for learners' affective engagement.

> Education is so important in climate justice. ... Especially we need education that focuses on the disproportionate effects of climate change. Because some people are like, "Oh, climate change is a problem, but it's not impacting me, so what's the point?" We need to educate people on what its actual effects are, where in the world it's having effects. The actual facts. We need to stop sugar-coating it for people because that way no action is actually gonna get taken.
>
> - Sofia

Barriers to surmount: CCE is depoliticized and climate justice is neglected

However, according to youth activists, CCE is presently falling far short of this ideal. As they explained, school-based CCE is often focused on scientific explanations and ecosystem impacts over the human and political dimensions of the climate crisis. Sofia recalled learning about climate change in third grade, 'Like, "Oh, polar bears are dying in the Arctic because of climate change," ... [but] I didn't know the whole depth of climate change and what its effects were on people, and disproportionate effects [on marginalized groups] and everything'. Similarly, Divya recalled an early CCE experience that left out critical information. 'In elementary school [science], we once talked about climate change, and that was good. But also, in a lot of ways, when they taught about it, it was trying to be as non-political as possible and trying to just keep it very neutral'. For Isabel, the CCE she experienced was missing climate justice, but her activist group was working to fill this critical gap.

> We actually have climate justice-oriented curriculum and we also do class presentations, which I help with sometimes... The presentation that was done in my science class, [was] like the only time I was exposed to climate justice at school. And I also know that that was only one class that was exposed to it.
>
> - Isabel

Some youth attributed their inadequate CCE and lack of attention to climate justice to the political climate of their locality or school. As Jada surmised, 'In my school, it was a very White, conservative-minded school, so most people did not believe in climate change and they just believed it was a

hoax. ... I think that schools, or specifically my school, they were kinda close-minded [about climate justice] because they already had their own personal beliefs and biases'. In explaining present-day CCE, youth activists emphasized the adultism embedded in educational approaches that seek to shield young people from distressing information due to the assumption that young people either cannot (or should not have to) handle it. According to Ebony, when CCE is lacking, young people are prevented from developing informed views and voicing their concerns, which should be a goal of education.

> I'm thinking of the school system. I think that particularly politics and just controversial things like climate change are thought to be ... inappropriate topics ... for young people and children because we might make informed opinions, or we're uninformed because we're children or some assumption like that. However, ... at a young age, I think that it's very important to be exposed to advocating for ... and voicing our opinions.
>
> - Ebony

Other youth described being drawn to climate justice topics and seeking information beyond school settings. Climate justice—the intersections between climate change and social justice issues—was a key motivator for youths' active involvement. When asked what led her to join the movement, Isabel explained:

> I would say that one of the main issues was environmental racism, just because it was so personal to me ... I'm learning the history of that. I mean, that's something that we never talked about in my classes, like in my history classes. It's all the things that I have had to learn on my own.
>
> - Isabel

Youths' recommendations: Intersectional climate justice curriculum for teenagers

To address these barriers, youth advocated for a comprehensive climate justice curriculum. A common rationale was that young people are already living with the realities of climate change and will continue to face its impacts throughout their lives, so CCE should be an invitation for young people to engage with this multi-faceted issue. Moreover, as Akira explained, young people can handle it.

> I think it's horrible that we have to handle the facts of climate change, and that we have to live with them, but I think that at some point, young people are gonna have to face them whether they're taught them in school or not. And personally, I believe that we should be taught about them from a really young age ... I think that people my age are really powerful, and we deal with a lot more than schools necessarily think that we do ... And our movement has shown how powerful we can be when we've seen this information, and I think that it's not enough for schools to give a super watered-down version of climate change, and that especially, when students are teenagers or in middle and high school, that they should know all of the facts.
>
> - Akira

Middle school, which in the United States typically serves young people ages 12 to 15, was commonly raised as a key age group for justice-centred CCE. Eva told of co-designing a climate justice curriculum for middle schoolers at her school alongside science and health teachers and the head of the school. As she put it, 'try[ing] to bring attention to climate justice ... is really important, especially at the middle school age'. Like other youth activists in this study, she supported starting CCE 'as young as possible', but as she explained:

> [Middle school] is a great time for people to get involved with organizations and to really start thinking deeply about, especially the intersectionality of the climate movement, when they're in middle school. I think that's a really important time, so that's why we're developing this curriculum for them, but I think education in general is very important.
>
> - Eva

By intersectionality, Eva was referring to the ways in which climate change exacerbates existing racial, gender, class, and other social inequities, making the climate crisis deeply interconnected with many facets of social justice. Rather than avoiding the topic, according to Divya, understanding and critiquing the systemic nature of the climate crisis and its many injustices should be incorporated into classroom learning.

> In a lot of instances, because climate justice is so tied to social justice and all of these different issues, that almost inherently connect with ... the systemic issues we face, I think that's why [schools] tend not to bring it up. Because they often don't wanna acknowledge the issues wrong with the system. That being said, ... our English department has had a race unit for the last couple of years where we deep-dive into systemic racism, and I think that's super important. Although it isn't climate justice, it definitely has similar ties. And I think climate justice could be incorporated in almost a similar way of just acknowledging that there are systemic issues.
>
> - Divya

Embedding climate justice in the curriculum was not seen as a goal solely for the science classroom where, in the United States, CCE is most likely to take place (Bhattacharya et al., 2021; Monroe et al., 2019). Rather, youth viewed climate justice as relevant to a variety of subject areas from health to history. For Jiang, a more comprehensive curriculum would discuss the economic and sociological dimensions of climate change to shed light on the systemic forces that have worked to thwart transformative action addressing the climate crisis.

> I will say that [climate change] is not politicized or discussed economically and sociologically in the sense that it should be ... I think there's a difference between being aware of climate change and being aware of why climate change is being solved so slowly.
>
> - Jiang

To implement climate justice education, youth emphasized the need for policy change, recognizing that it is misguided to blame teachers for deficiencies in CCE because they are typically not provided the necessary support (e.g., time, resources or training) to carry out this task (Plutzer et al., 2016; Worth, 2021). Beyond advocating for a federal mandate requiring CCE, some youth called for educational standards to discourage state-level political agendas from diluting a justice-driven climate curriculum.

> I wouldn't say it's put on the teachers because I'm not sure if the teachers are the ones who make the curriculum, but more like the Department of Education or ... whoever makes the curriculum and provides resources to teachers so they can teach it and educate the teachers on climate justice and have trainings ... I do think that it is on the schools to teach this because climate justice and the climate crisis is the future, and I don't think that they should just put all the people into the world not knowing really much that's happening to the Earth or their environment, and leave them clueless. So, I do think that it is definitely on the schools and the government to make this happen.
>
> - Jada

> I think that there needs to be action on the part of the federal government in mandating climate education nationwide. ... I think that everyone needs to learn it and ... I've heard a lot of stories and seen a lot of articles about places like Texas where they don't teach Critical Race Theory or how different their textbooks are from mine ... I can imagine that the differences between climate education in [the Northeastern U.S.] and in Texas are completely different as well. ...The federal government needs to do more to close that gap and make sure [to cover] ... systems of oppression and climate justice and climate change and the reality across the board so that everyone knows the truth.
>
> - Sofia

In the United States, where CCE varies considerably across and within states, the political climate of a region often shapes the content and framing of CCE (Khalidi & Ramsey, 2021; Stevenson et al., 2023). Interestingly, in contrast to Sofia's concerns, a recent study found climate change content in US textbooks to be more or less consistent across states, concluding that textbook reform could be a possible entry point to improving CCE across contexts (D'Apice & Bromley, 2023).

Enabling action for just climate futures

Educational ideal: positioning learners as active participants in democratic processes

Perhaps most importantly, youth activists in this study saw CCE as a pathway towards young people's informed and active engagement in advancing climate justice. As they described, learners' awareness and affective engagement are essential ingredients in the desire to become more involved (McGimpsey et al., 2023). Still, many explained that knowing and caring about the climate crisis and its multi-faceted injustices is one thing, while knowing that you can do something about it is another. Thus, beyond teaching 'what is happening?' and 'why care?', CCE should aim to bridge awareness with action.

> I think education is definitely really important. It's a way to get people involved. ... I think having everyone understand how large this issue is and why they need to get involved and then how they can make a difference, I think really is critical.
>
> - Eva

> I think education is super important because, I mean, it's hard to kind of learn about policies and other ways to get involved. ... I think definitely, as early as possible, having a very set climate education curriculum in schools — as early as elementary school — is definitely important. Especially since it shows the how important the crisis is and how real it is, and how people should do something about it.
>
> - Emma

In the broadest sense, youth viewed CCE as a means to transform society, with benefits for the 'very young' as well as adults. For children and youth, widespread CCE would assist young people in bridging knowledge about climate change with activism for a better future. For adults, it would help curb the spread of misinformation, an impediment to political action.

> I think that so much would change if the country and ... school districts had mandated climate curriculum in their schools. I think that when kids learn about things when they're very young, that stays with them for a long time, and that eventually they are able to transform that knowledge into activism. And I think that even ... if it's with adults ... because the science is still hotly disputed now ... I think that helping to get the knowledge of the climate crisis into people, so they can make decisions that are based on the science and not politics is very important.
>
> - Fatima

Barriers to surmount: CCE Is detached from action

Unfortunately, present-day CCE typically does not equip youth to meaningfully participate in social change processes (Dawson et al., 2022; Monroe et al., 2019). As Maeve described, individualistic, lifestyle-oriented actions are most commonly advocated, not collective action for systemic change. As she explained, her misleading CCE experience left her feeling betrayed by the adults in her life. Not only did the messages she received deceive her about the kinds of actions required, they also invited optimism that others' actions would save the day.

> When I was younger, ... [climate change] was presented in a way that was like, "Oh, it's about polar bears and ice caps, and we can fix it if we pick up trash and turn the lights out when we're not home," and it was really minimized. And adults basically told me that I didn't really need to worry, and by the time that I grew up, our leaders would have fixed it already, and that's clearly not happening. In a way, I definitely feel betrayed and lied to.
>
> - Maeve

More often, youth in this study recounted educational experiences that left them feeling ill-equipped to take action of any kind. For some, not having access to CCE meant not learning about the problem in the first place. For others, CCE introduced the problem of climate change but not its solutions. Regarding the latter, many described feeling anxious and motivated to act, but directionless due to a lack of knowledge about whether and how they could make a difference (Jones & Davison, 2021; Neas, 2023). Almost invariably, the youth in this study described climate justice activism as a source

of hope and connection that coexisted alongside their anxiety and outrage. Still, most found it on their own, disconnected from school-based CCE.

> At my school, you could take an elective class about climate change but other than that, you wouldn't really hear about it in any science classes, health classes, history classes, where it should really be showing up. So, I think if schools could really take the initiative and educate their students about the climate crisis and how they can make a difference, I think that could just make the world of difference because you would have a lot more youth getting involved at an early age and then maybe staying involved with activism the rest of their lives.
>
> - Eva

> I remember in ninth grade ... we had a climate change unit at the very end of the year, and I was like, "Wow, there's so many issues going on with the earth, but what am I supposed to do about it? What can I do?" I knew there were solutions, but I was like, "Why are you teaching us this is if we can't do anything about it? That doesn't really make sense." ... And then once I found the climate movement ... I felt more hopeful because, one, I saw all these people who were doing all this amazing work ... and then also I found my role in what I could do to advocate for climate justice.
>
> - Sofia

Recommendations: CCE aimed to mobilize youths' civic engagement and activism

According to the youth in this study, CCE should always be a bridge to action. As they explained, climate change knowledge is not enough and should only be viewed as a first step (Kollmuss & Agyeman, 2002). They were aware that the climate crisis is unfolding every second, that today's actions matter, and that the time for urgent action is now.

> Education is always extremely important. But I also think ... there's definitely a problem when people stop with education. That's not really enough. You have to be able to turn that awareness into actual concrete action and mobilization. ... Education is always the baseline.
>
> - Maya

For Avery, such change starts with 'the education system'. As they described, 'First, everyone needs to recognize [climate change] is a big problem, and we can do things to solve it ... [But] without that energy and without that knowledge, we're still stuck in square one ... not getting anywhere'.

Some youth in this study were themselves drawn to educating young people on the climate crisis and related action opportunities. For them, CCE was seen as a pathway to meaningful action by young people who are often unaware of the difference they can make. Sage viewed action-oriented CCE with younger groups as an avenue towards greater impact, while Sofia—like several other youth in this study—became action-oriented climate justice educators in their own schools.

> I want to start educating younger people, even younger than me, to start thinking about these things because I am very lucky that I started to organize with my ... activism groups as a freshman in high school ... But I'm just thinking about how much more of an impact I can make ... if I had started thinking about those things when I was a lot younger. ... How I would feel about these things now?
>
> - Sage

> [It's important to] educate people on what they can do. So, recently I spoke to some of the ninth-grade classes at my school because the teacher was like, "Do you want to tell them about your activism and how they can get involved?" So, not just telling them what the problem is, but telling them what the solutions are, and that the solutions are possible, and that they can do stuff to help and to advocate for those solutions.
>
> - Sofia

To equip learners with the skills to act for climate justice, youth called for CCE content to encompass and engage with democratic processes more broadly. Echoing recent CCE scholarship (Birdsall et al., 2023), youth noted that doing so would enable young people to develop competencies for active citizenship. When asked about the role of schools in supporting climate justice, Mei said, 'Learning about political structures is helpful. I think that schools should promote civic engagement ... teach kids about voting and ... how to be an active citizen'. Mei conveyed that, with school support, critical learning can also take place beyond the classroom:

> Give your students a free pass when there's a big protest that day... My school on the day of the climate rally ... [provided] excused absence[s], but I know that some schools make it really hard for their kids to participate ... If I had been at a school that was like, "Oh, you're gonna get detention if you go to this protest," then I wouldn't have gone. And I would never have ... become involved in climate organizing. So, giving your students an opportunity to explore ways of engaging in civic action.
>
> - Mei

Inside the classroom, youth envisioned a climate justice curriculum that would reach all students and position them as agents of change in advancing climate justice (Borgerding et al., 2023; Kupetz & Buttimer, 2023). Doing so, youth emphasized, would meet an existing, unmet and perhaps widespread need among youth who desire to be involved but lack the necessary tools to engage locally. For Maeve, a comprehensive, climate justice education would begin to repair a broken system characterized by adultism and hampered by obfuscation that often leaves young people uninformed and disengaged. What is needed is education for climate justice action.

> I feel like if every kid was taught about climate justice all through school ... I think that that would have a huge impact. I feel like there are so many people who want to get involved but don't know how they can. Or they just don't really know what's going on at all because that's not an accident that we're basically being shielded from the urgency of the crisis and no one wants to admit that, and politicians don't wanna admit that, and adults are trying to "protect" kids by not telling them that, and that is preventing action from happening. I'm really interested in the idea of climate justice

education and using that as a tool to get more youth involved. And yeah, I feel like that's where it starts, in schools."

- Maeve

DISCUSSION

Through in-depth interviews with US youth climate justice activists, this study explored youths' views and experiences of CCE and their recommendations for curricular and policy change to advance climate justice. Findings indicate that while youth considered education as critical, few felt that schools were providing adequate CCE. Some described school cultures actively hostile to CCE due to politicization, while most described key limitations (e.g., time; content) that prevented their deeper engagement. Youths' recommendations for alternative climate pedagogies emphasized the need for compulsory CCE reaching all age groups—including the youngest students—to enable all learners to understand and take action for just climate futures.

Reshaping the curriculum for climate justice

Youth interviewed for this study viewed justice-driven CCE as a way to cultivate an informed and engaged public equipped with the knowledge and skills necessary to actively contribute to societal transformation. Reflecting on their own CCE experiences that fall short of these ideals, youths' critiques reflect the findings of existing studies documenting important drawbacks of CCE, including its depoliticized framing and lack of action opportunities (Dunlop & Rushton, 2022; Howard-Jones et al., 2021; Jones & Davison, 2021; McGimpsey et al., 2023; McGregor & Christie, 2021). When invited to envision better approaches to CCE, the young activists in this study set low and high bars. To them, the bare minimum was compulsory CCE in support of learners' basic knowledge of the environment and climate change—a desire likely rooted in their awareness that US-based CCE is often absent, inaccurate or inadequate (Plutzer et al., 2016; Worth, 2021). Although there is growing consensus among CCE scholars that knowledge alone is not enough to drive attitudinal or behaviour change (Kellstedt et al., 2008; Kollmuss & Agyeman, 2002; Plutzer & Hannah, 2018), youth activists in this study nevertheless hoped that a greater, CCE-driven societal awareness of 'the facts' could combat the spread of misinformation and climate denial that today contributes to low-quality CCE and impedes climate action in the United States.

Youths' highest aspirations for CCE aligned with the emerging literature on climate justice education (CJE), which posits that justice-driven CCE—beyond merely informing learners about the scientific and technological dimensions of the climate crisis—can offer a coherent, counter-hegemonic narrative that weaves together seemingly disparate yet deeply interconnected social, economic and environmental challenges, while deepening learners' understanding and galvanizing support for justice-centred climate action (Bang, 2020; Gladwin et al., 2022; McKenzie et al., 2023; Nxumalo & Montes, 2021; Nxumalo et al., 2022; Stapleton, 2019; Tagg & Jafry, 2018; Trott, Gray, et al., 2023). In these ways, youths' visions of action-oriented CJE are consistent with the UN's Sustainable Development Agenda, which calls for 'building an inclusive, sustainable and resilient future for people and planet' (UN, 2023).

Despite key structural barriers to CJE identified in this study, there is growing evidence of its implementation in the formal classroom, community settings and activist spaces (Trott, Gray,

et al., 2023). However, at present, CJE implementation is the outcome of trailblazing efforts by impassioned educators working voluntarily to develop and implement critical pedagogies against prevailing norms. As noted by McKenzie et al. (2023):

> Education and education policy have the potential to contribute as levers of change ... to help address misinformation, redress wrongs, support relational onto-epistemologies, and build social momentum for climate justice action. ... [However,] climate change remains marginalized in education structures including schools of education, teacher professional development, state policies, and more. When included, it still too often focuses on the science of climate change, rather than addressing structural, psychosocial, or justice aspects that are core to just climate futures.
>
> (p. 3)

One exception is the 2016 adoption of a resolution mandating district-wide CJE in K-12 Portland Oregon Public Schools (PPS) – the first of its kind in the United States (PPS, 2016). A recent article detailing the movement for, and implementation of CJE in PPS offers a useful framework to inform others within and beyond the United States hoping to implement CJE in their schools, noting that the six principles of climate justice (CJ) pedagogy are that it must be: '(1) justice-oriented; (2) problem-posing; (3) interdisciplinary; (4) community-driven; (5) hopeful and imaginative; and (6) rooted in relational solidarity and activist in nature' (Kupetz & Buttimer, 2023, p. 8). In concordance with the justice-centred and action-oriented desires expressed by youth activists in this study, the authors note that:

> Within CJ pedagogy, the climate crisis is viewed as a social, political, and ethical issue in addition to a scientific one; *equity and justice are at the center* of the curriculum and learning. ... [O]ne of the most important distinctions between climate science education and CJ education is that CJ pedagogy is designed to transcend the classroom and *spur students to take transformative action* both within and beyond the school walls.
>
> (pp. 8-11 [emphasis added])

Indeed, in this study, youths' visions of CJE foregrounded the role of alternative climate pedagogies in cultivating just, sustainable futures for their own and future generations by bridging knowledge with action. Moreover, youths' CJE visions align Panos and Sherry's (2023) notion of what it means to be 'globally literate [which] means being literate about climate justice as part of our place-based experiences with global responsibilities' (p. 124). In the world's richest countries—such as the United States where this study took place—with the greatest historical responsibility and most relative insulation from climate breakdown, CJE would emphasize these realities and work to dismantle them, both through emphasis on climate change mitigation through their own emissions reductions and advocating for policies and programs that centre the specific experiences and needs of disproportionately-impacted groups within countries and around the world. Internationally, especially in global South contexts where historical responsibility for climate breakdown is lowest and exposure is highest, CJE would similarly emphasize these aspects, while working to build local adaptive capacity to minimize harms from imminent and ongoing climate breakdown and advocating for justice-centred policies and programs that advance structural change.

Despite shared future visions rooted in sustainability and justice, it is worth noting a fundamental distinction between the framework of climate justice and the UN's Sustainable Development Agenda. Alternative futures characterized by climate justice align with many goals articulated by the UN (2023) insofar as they respond to 'a universal call to action to end poverty, protect the planet and improve the lives and prospects of everyone, everywhere'. However, the theories of change embedded within these discourses are fundamentally at odds in that climate justice calls for 'dismantling systems of domination, extraction, and exploitation, either by transforming existing institutions or building alternative institutions to advance [climate justice]' (Trott, Lam, et al., 2023), whereas the Sustainable Development Agenda has been criticized for its uncritical or tacit embrace of existing systems and worldviews, most notably neoliberal ideology and its unfettered growth imperative (Selby & Kagawa, 2010). Conceptualizing 'processes of CJE as *hegemonic encounters*' (p. 494), McGregor et al. (2018) have noted that, 'the insurgent discourse of climate justice [offers] an alternative to the dominant discourse of sustainable development, which has arguably constructed climate change as a global "post-political" problem, with the effect of erasing its ideological features'. Understanding the political and systemic roots of the climate crisis, youth activists in the present study called for an intersectional approach to CJE that aims to recognize and actively resist the disproportionate impacts of the climate crisis on marginalized groups. Indeed, as Kupetz and Buttimer (2023) emphasize:

> [CJ pedagogy] *does not pretend to be neutral*, nor does it posit that climate change is "human-caused" without interrogating the dissonance between who is most responsible and who is most impacted ...[and] calls for learning, or knowledge creation, to be tied to action to change the material conditions in which students live.
>
> (pp. 8-11 [emphasis added])

Despite the contradictory ideological roots of CJE and the SDGs, by aiming to dismantle systems of oppression and exploitation that fuel the climate crisis and perpetuate asymmetrical harms, CJE unequivocally reflects SDG 16, which calls for 'promoting peaceful and inclusive societies, providing access to justice for all and building effective, accountable and inclusive institutions at all levels' (UN, 2023). However, it must be recognized that the practice and radical implications of CJE—in reimagining human-created systems to serve human well-being and flourishing ecosystems globally—first require educational environments not bound by the same ideological impediments that have, to date, stymied concerted action addressing the climate crisis (McGregor et al., 2018).

Limitations and future directions

Results of this study should be interpreted in light of its limitations. First, youths' perspectives are grounded in a US context where CCE varies regionally due to state-level educational policies. Youth interviewed for this study lived in just seven states, including five coastal states with liberal to progressive policies. With some exceptions, this study largely overlooks the perspectives of youth from more conservative regions as well as youth not active in the climate justice movement. Future studies should seek to understand the CCE views of more geographically diverse youth climate justice activists. Additionally, given this study's findings which highlight an unmet need to bridge CCE with action opportunities for youth, future research should explore the CCE perspectives of youth not involved in activism.

CONCLUSION

In the United States and around the world, young people are leading the climate justice conversation, demanding action for climate change mitigation and adaptation policies that centre the needs of marginalized groups (Bowman & Germaine, 2022; Trott, Lam, et al., 2023). As this and previous studies have shown, youth are also filling critical educational gaps for themselves by learning about, raising the visibility of and working towards climate justice through their activism (Brennan et al., 2022; Mayes, 2023; Trott, Gray, et al., 2023; Verlie & Flynn, 2022; White et al., 2022). While youths' leadership in these efforts is undeniably commendable, advancing climate justice awareness and action—much like addressing the climate crisis itself—should not be their burden to bear alone. Cultivating just climate futures requires bold action on the part of today's adult power holders through justice-driven climate and educational policies that prioritize the present-day and future well-being of young people, inside the classroom and out. Youths' recommendations in this study offer concrete, practical steps towards meeting this urgent need.

ACKNOWLEDGEMENTS

The author would like to thank the youth climate justice activists who took part in this study and the Collaborative Sustainability Lab research assistants who contributed to data collection: Emmanuel-Sathya Gray, Stephanie Lam, Jessica Roncker, and R. Hayden Courtney. Funding for this study was provided by the University of Cincinnati's Office of Research and the Society for Community Research and Action (APA Division 27). [Correction added on 9th Mar 2024, after first online publication: Acknowledgment section has been included in this version.]

DATA AVAILABILITY STATEMENT

Research data are not shared.

ORCID

Carlie D. Trott https://orcid.org/0000-0002-4400-4287

REFERENCES

Bang, M. (2020). Learning on the move toward just, sustainable, and culturally thriving futures. *Cognition and Instruction*, *38*(3), 434–444.

Beasy, K., Jones, C., Kelly, R., Lucas, C., Mocatta, G., Pecl, G., & Yildiz, D. (2023). The burden of bad news: Educators' experiences of navigating climate change education. *Environmental Education Research*, *29*, 1678–1691. https://doi.org/10.1080/13504622.2023.2238136

Bhattacharya, D., Carroll Steward, K., & Forbes, C. T. (2021). Empirical research on K-16 climate education: A systematic review of the literature. *Journal of Geoscience Education*, *69*(3), 223–247.

Birdsall, S., Eames, C., Gaze, S., Stoddard, G., Harré, N., Whitehouse, H., & Blythe, C. (2023). *Nurturing secondary students' hope and agency: Educating to live in a climate-impacted world*. Teaching and Learning Research Initiative.

Borgerding, L. A., Heisler, J. L., Beaver, B. C., & Prince, A. O. (2023). Secondary science teachers' views and approaches for teaching for climate justice and action. *Journal of Science Teacher Education*. https://doi.org/10.1080/1046560X.2023.2265715

Bowman, B., & Germaine, C. (2022). Sustaining the old world, or imagining a new one? The transformative literacies of the climate strikes. *Australian Journal of Environmental Education*, *8*(1), 70–84.

Braun, V., & Clarke, V. (2021). *Thematic analysis: A practical guide*. SAGE Publications Ltd.

Brennan, M., Mayes, E., & Zipin, L. (2022). The contemporary challenge of activism as curriculum work. *Journal of Educational Administration and History*, *54*(3), 319–333.

D'Apice, H. K., & Bromley, P. (2023). Climate change discourse in US history textbooks from California and Texas. *Environmental Education Research*, *29*, 1637–1658. https://doi.org/10.1080/13504622.2023.2206595

Dawson, V., Eilam, E., Tolppanen, S., Assaraf, O. B. Z., Gokpinar, T., Goldman, D., Putri, G. A. P. E., Subiantoro, A. W., White, P., & Widdop Quinton, H. (2022). A cross-country comparison of climate change in middle school science and geography curricula. *International Journal of Science Education*, *44*(9), 1379–1398.

Dunlop, L., & Rushton, E. A. (2022). Putting climate change at the heart of education: Is England's strategy a placebo for policy? *British Educational Research Journal*, *48*(6), 1083–1101.

Dunlop, L., Rushton, E. A., Atkinson, L., Ayre, J., Bullivant, A., Essex, J., Price, L., Smith, A., Summer, M., Stubbs, J. E., Diepen, M. T. V., & Wood, L. (2022). Teacher and youth priorities for education for environmental sustainability: A co-created manifesto. *British Educational Research Journal*, *48*(5), 952–973.

Filho, W. L., Wall, T., Salvia, A. L., Dinis, M. A. P., & Mifsud, M. (2023). The central role of climate action in achieving the United Nations' Sustainable Development Goals. *Scientific Reports*, *13*(1), 20582.

Gladwin, D., Karsgaard, C., & Shultz, L. (2022). Collaborative learning on energy justice: International youth perspectives on energy literacy and climate justice. *The Journal of Environmental Education*, *53*(5), 251–260.

Grosse, C. (2019). Climate justice movement building: Values and cultures of creation in Santa Barbara, California. *Social Sciences*, *8*(3), 79.

Howard-Jones, P., Sands, D., Dillon, J., & Fenton-Jones, F. (2021). The views of teachers in England on an action-oriented climate change curriculum. *Environmental Education Research*, *27*(11), 1660–1680.

Jones, C. A., & Davison, A. (2021). Disempowering emotions: The role of educational experiences in social responses to climate change. *Geoforum*, *118*, 190–200.

Kellstedt, P. M., Zahran, S., & Vedlitz, A. (2008). Personal efficacy, the information environment, and attitudes toward global warming and climate change in the United States. *Risk Analysis: An Official Publication of the Society for Risk Analysis*, *28*(1), 113–126.

Khalidi, R., & Ramsey, J. (2021). A comparison of California and Texas secondary science teachers' perceptions of climate change. *Environmental Education Research*, *27*(5), 669–686.

Kollmuss, A., & Agyeman, J. (2002). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research*, *8*(3), 239–260.

Kowasch, M. (2023). Climate activism, environmental justice and ecopedagogy–a collaboration project between FFF activists and trainee teachers in Austria. *Journal of Political Ecology*, *31*, 2. https://doi.org/10.2458/jpe.4856

Kranz, J., Schwichow, M., Breitenmoser, P., & Niebert, K. (2022). The (Un) political perspective on climate change in education—A systematic review. *Sustainability*, *14*(7), 4194.

Kupetz, Z. I., & Buttimer, C. J. (2023). The struggle for climate justice education in the Portland public schools. https://edarxiv.org/dw5h9/download?format=pdf

Lam, S., & Trott, C. D. (2022). Children's climate change meaning-making through photovoice: Empowering children to learn, care, and act through participatory process. *Educação, Sociedade & Culturas*, *62*, 1–25. https://doi.org/10.24840/esc.vi62.478

Mayes, E. (2023). Young people learning climate justice: Education beyond schooling through youth-led climate justice activism. In J. Wyn, et al. (Eds.), *Handbook of children and youth studies* (pp. 1–14). Springer Nature Singapore Pte Ltd.

McGimpsey, I., Rousell, D., & Howard, F. (2023). A double bind: Youth activism, climate change, and education. *Educational Review*, *75*(1), 1–8.

McGregor, C., & Christie, B. (2021). Towards climate justice education: Views from activists and educators in Scotland. *Environmental Education Research*, *27*(5), 652–668.

McGregor, C., Scandrett, E., Christie, B., & Crowther, J. (2018). Climate justice education: From social movement learning to schooling. In T. Jafry (Ed.), *Routledge handbook of climate justice* (pp. 494–508). Routledge.

McKenzie, M., Henderson, J., & Nxumalo, F. (2023). Climate change and educational research: Mapping resistances and futurities. *Research in Education*, *117*, 3–10. https://doi.org/10.1177/00345237231203073

Mikulewicz, M., Caretta, M. A., Sultana, F., & Crawford, J. W. N. (2023). Intersectionality & climate justice: A call for synergy in climate change scholarship. *Environmental Politics*, 1–12.

Monroe, M. C., Plate, R., Oxarart, A., Bowers, A., & Chaves, W. A. (2019). Identifying effective climate change education strategies: A systematic review of the research. *Environmental Education Research*, *25*(6), 791–812. https://doi.org/10.1080/13504622.2017.1360842

Neas, S. (2023). Narratives and impacts of formal climate education experienced by young climate activists. *Environmental Education Research*, *29*, 1832–1848. https://doi.org/10.1080/13504622.2023.2193684

Nxumalo, F., & Montes, P. (2021). Pedagogical commitments for climate justice education. *Connected Science Learning*, *3*(5), 12318704.

Nxumalo, F., Nayak, P., & Tuck, E. (2022). Education and ecological precarity: Pedagogical, curricular, and conceptual provocations. *Curriculum Inquiry*, *52*(2), 97–107.

O'Brien, K., Selboe, E., & Hayward, B. M. (2018). Exploring youth activism on climate change. *Ecology and Society*, *23*(3), 42. https://doi.org/10.5751/ES-10287-230342

Ogunbode, C. A. (2022). Climate justice is social justice in the Global South. *Nature Human Behaviour*, *6*(11), 1443. https://doi.org/10.1038/s41562-022-01456-x

Panos, A., & Sherry, M. B. (2023). Storying climate change: Discursive possibilities for teaching climate justice literacies. In S. N. Kerkhoff & H. A. Spires (Eds.), *Critical perspectives on global literacies: Bridging research and practice* (pp. 124–139). Routledge. https://doi.org/10.4324/9781003320142

Parry, S., McCarthy, S. R., & Clark, J. (2022). Young people's engagement with climate change issues through digital media–a content analysis. *Child and Adolescent Mental Health*, *27*(1), 30–38.

Plutzer, E., & Hannah, A. L. (2018). Teaching climate change in middle schools and high schools: Investigating STEM education's deficit model. *Climatic Change*, *149*(3–4), 305–317.

Plutzer, E., Hannah, A. L., Rosenau, J., McCaffrey, M. S., Berbeco, M., & Reid, A. H. (2016). *Mixed messages: How climate change is taught in America's public schools*. National Center for Science Education. http://ncse.com/les/MixedMessages.pdf

Portland Public Schools. (2016). *RESOLUTION No. 5272: Resolution to develop an implementation plan for climate literacy*. Portland Public Schools. https://www.pps.net/cms/lib8/OR01913224/Centricity/Domain/219/FINAL%20Climate%20Change%20Reso%205.11.16%20MR%20revised.pdf

Selby, D., & Kagawa, F. (2010). Runaway climate change as challenge to the 'closing circle' of education for sustainable development. *Journal of Education for Sustainable Development*, *4*(1), 37–50.

Stapleton, S. R. (2019). A case for climate justice education: American youth connecting to intragenerational climate injustice in Bangladesh. *Environmental Education Research*, *25*(5), 732–750.

Stevenson, K., Busch, K. C., Peterson, M. N., Lawson, D. F., & Chavez, R. A. (2023). How mixed messages may be better than silence in climate change education. https://doi.org/10.21203/rs.3.rs-3084246/v1

Sultana, F. (2022). Critical climate justice. *The Geographical Journal*, *188*(1), 118–124.

Svarstad, H. (2021). Critical climate education: Studying climate justice in time and space. *International Studies in Sociology of Education*, *30*(1–2), 214–232.

Tagg, N., & Jafry, T. (2018). Engaging young children with climate change and climate justice. *Research for All*, *2*(1), 34–42.

Trott, C. D., Gray, E., Lam, S., Courtney, R. H., Roncker, J., & Even, T. L. (2023). People's action for climate justice: A systematic review. *Local Environment*, *28*(9), 1131–1152. https://doi.org/10.1080/13549839.2023.2187363

Trott, C. D., Lam, S., Roncker, J., Gray, E., Courtney, R. H., & Even, T. L. (2023). Justice in climate change education: A systematic review. *Environmental Education Research*, *29*(11), 1535–1572. https://doi.org/10.1080/13504622.2023.2181265

Trott, C. D., Reimer-Watts, K., & Riemer, M. (2022). In pursuit of a practical utopia: Transitioning towards climate justice. In C. Kagan, R. Lawthom, M. Richards, J. Alfaro, A. Zambrano, & J. Akhurst (Eds.), *The Routledge international handbook of community psychology: Facing global crises with hope*. Taylor & Francis. https://doi.org/10.4324/9780429325663-19

Trott, C. D., Weinberg, A. E., Frame, S. M., Jean-Pierre, P., & Even, T. L. (2023). Civic science education for youth-driven water security: A behavioral development approach to strengthening climate resilience. *International Journal of Behavioral Development*. https://doi.org/10.1177/01650254231188661

Tyson, A., Kennedy, B., & Funk, C. (2021). *Gen Z, Millennials stand out for climate change activism, social media engagement with issue*. Pew Research Center. https://www.pewresearch.org/science/wp-content/uploads/sites/16/2021/05/PS_2021.05.26_climate-and-generations_REPORT.pdf

United Nations. (2023). The sustainable development agenda. Retrieved August 10, 2023 from: https://www.un.org/sustainabledevelopment/development-agenda/

Vamvalis, M. (2023). "We're fighting for our lives": Centering affective, collective and systemic approaches to climate justice education as a youth mental health imperative. *Research in Education*, *117*, 88–112. https://doi.org/10.1177/00345237231160090

Verlie, B., & Flynn, A. (2022). School strike for climate: A reckoning for education. *Australian Journal of Environmental Education*, *38*(1), 1–12.

White, P. J., Ferguson, J. P., O'Connor Smith, N., & O'Shea Carre, H. (2022). School strikers enacting politics for climate justice: Daring to think differently about education. *Australian Journal of Environmental Education*, *38*(1), 26–39.

Worth, K. (2021). *Miseducation: How climate change is taught in America*. Columbia Global Reports.

AUTHOR BIOGRAPHY

Carlie D. Trott, Ph.D. is an Associate Professor in the Department of Psychology at the University of Cincinnati where she heads the Collaborative Sustainability Lab and advises students in the Community and Organizational Research for Action (CORA) PhD program. Dr. Trott's climate justice research agenda aims to bring visibility to, and work against the inequitable impacts of climate change, socially and geographically. As a social psychologist by training and community psychologist in practice, Trott's work aims to center the voices and actions of those most affected by environmental injustice and the climate crisis and often involves community-engaged, participatory, and action-oriented research methods.

How to cite this article: Trott, C. D. (2024). Envisioning action-oriented and justice-driven climate change education: Insights from youth climate justice activists. *Children & Society*, *38*, 1802–1823. https://doi.org/10.1111/chso.12846