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Towards justice-oriented climate change and sustainability education: Perspectives from school teachers in England

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Abstract

Education, including school education, is widely understood as fundamental to a just response to global climate and ecological crises. We examined the practices of teachers based in England focused on climate change and sustainability education (CCSE). Analysis of survey responses from over 300 teachers found that CCSE was realised through classroom teaching as part of the official and planned curriculum. CCSE was developed through practices where knowledge was at the centre, and which were action- and community-oriented. Analysing data through the lenses of curricula justice and climate justice, we argue that whilst these practices provide a foundation for justice-oriented CCSE, they do not fully realise the aims of climate justice education which seeks to disrupt, challenge and repair colonial ways of being and thinking. Justice-oriented CCSE demands a fundamental shift in the leadership of school-based education in England at school and policy levels, so that the practices identified through this survey fully encompass ideas of climate justice. Support at policy level is essential if justice-oriented CCSE is to move beyond the scope of committed and enthusiastic individuals and become collaborative practice and a shared responsibility which extends across all educational settings.

KEYWORDS

climate change and sustainability education (CCSE), curriculum, justice, schools

INTRODUCTION

The importance of education, including formal schooling, is widely understood as central to ensuring every child and young person can live justly in a world with urgent global environmental and climate crises (UN, 2023). For nearly 30 years, approaches which develop people's action competence through environmental and sustainability education (ESE), such that individuals are able, willing and qualified to meet the challenges of a given situation, have been widely explored (Jensen & Schnack, 1997; Van Poeck et al., 2024). Such an action-oriented approach includes four dimensions to enable action competence. The first is education which moves beyond knowledge about the existence and consequences of environmental and sustainability issues. Secondly, education should develop understanding of the root causes of the problem. The third dimension is to develop knowledge about alternatives and visions for the future, and lastly, acquiring an understanding of strategies for change (Jensen, 2002; Van Poeck et al., 2024). In the National Curriculum in England, climate change and sustainability are broadly located in secondary science (compulsory 11–16 years) and geography (compulsory 11–14 years) (Dawson et al., 2022). Research with teachers in England has identified action-oriented practices in the context of climate change and sustainability education (CCSE) but that teachers are constrained by a lack of resourcing and support from school leadership (Howard-Jones et al., 2021). The Department for Education's (DfE) *Sustainability and climate change strategy* published in 2022 arguably represents the most significant policy intervention in England focused on climate change and sustainability education for a decade (DfE, 2022). Whilst the strategy acknowledges the importance of schools accessing funding, sharing best practice and developing networks to enhance CCSE (DfE, 2022), these priorities contrast with those of teachers, teacher educators and young people (aged 16–18) (Dunlop et al., 2022). Following the strategy's publication (DfE, 2022), these groups continue to underline the need for curriculum change (which is absent from the strategy) so that CCSE moves beyond geography and science and a persistent framing of a concern with knowledge and 'learning the facts' about climate change as an educational response to climate and environmental crises (Dunlop et al., 2022; Dunlop & Rushton, 2022a). Furthermore, researchers have noted in the strategy an absence of values, the depoliticisation of climate change and sustainability concerns, a focus on economic concerns and a lack of curriculum change (Dunlop et al., 2022).

In England, recent initiatives such as the 'Curriculum for a Changing Climate' project (Teach the Future, n.d.) have sought to exemplify how concepts such as sustainability and climate change can be integrated across the existing primary and secondary school curriculum rather than being siloed in science and geography. However, there are few large-scale studies from England which have considered the nature and extent of teachers' practices related to CCSE (Howard-Jones et al., 2021) and this research responds to that gap. Drawing on findings from a recent online survey of teachers in England, which included responses from over 300 teachers to questions relating to their teaching of CCSE, we investigated the extent and nature of these practices. We bring to this analysis a critical understanding of climate justice, which pays attention to the colonial and racial capitalist roots of the climate crisis where intersectional injustices (such as gender, race, intergenerational and disability injustices) persist (Sultana, 2022), with an analysis of teachers' self-reported CCSE practices. We also draw on critical readings of literatures from climate justice education (e.g. McGregor et al., 2024; McGregor & Christie, 2021), action-oriented sustainability education (e.g. Jensen, 2002; Van Poeck et al., 2024) and curriculum studies (e.g. Riddle et al., 2023). We argue that this approach is essential if we are to better understand the implications of urgent global crises on teachers' practices and professional learning, given the 'age-old challenge of educators translating personal and professional beliefs about teaching for justice

and democracy into actual practice' (Kennedy, 2022, p. 1). We begin by considering ideas of curriculum, justice and climate justice education.

CONTEXT

Curriculum and justice

We draw on the following understanding of curriculum as, 'the sum total of resources—intellectual and scientific, cognitive and linguistic, textbook and adjunct resources and materials, official and unofficial—that are brought together' in educational contexts (Luke et al., 2013, p. 10). These resources and their selection and organisation into the official and planned curricula are neither neutral nor random. As Michael Apple reminds us, 'the knowledge that got into schools in the past and gets into schools now…is selected and organised around sets of principles that come from somewhere, that represent particular views of normality and deviance, of good and bad' (Apple, 2019, pp. 64–65). Educational projects, including curriculum, have been core to inherently unjust colonial projects (e.g. Fallace, 2015; Hall, 2008). This includes the suppression and elimination of diverse epistemologies, disciplines, theories, concepts and experiences from curricula across the world by Western (neo)colonial projects, in what has been framed as 'curriculum epistemicides' (Paraskeva, 2017). Curricula are therefore actively 'made' across different sites within education systems as a series of social practices which are influenced by different agendas, involving a range of individuals (e.g. teachers, young people) and groups (Priestley et al., 2021). A justice-orientated curriculum would actively include and value the epistemic contributions of historically marginalised groups to ensure that students have access to a diverse range of voices and experiences (Fricker, 2007). This could act against testimonial injustice which has privileged some voices over others and develop students' criticality through questioning whose voices are represented and whose are missing, recognising and valuing diverse ways of knowing.

Like, Michael Apple (2019) and Miranda Fricker (2007), Riddle et al. (2023) understand curriculum as a site of struggle where different ideologies and power dynamics play out and curricula are shaped by social, political and economic forces that often reflect the interests of dominant groups. Riddle et al. (2023) articulated the concept of the 'knowledge + plus' curriculum, where the curriculum which children and young people experience in school combines specialist or disciplinary knowledge (also called, powerful knowledge) with the community funds of knowledge which young people bring with them to their school education. This concept of the 'knowledge + plus curriculum' is grounded on the social justice principles of redistribution, recognition and representation (Fraser, 2004). Redistributive curricula justice can bring about a high-quality curriculum for all, through ideas of a common curriculum which enables all children and young people to experience rich disciplinary learning and teaching (Riddle et al., 2023). Curricula justice through recognition means a rich and meaningful curriculum for all, which values different peoples, cultures, histories and knowledge systems and connects the funds of knowledge which children and young people bring to their learning with powerful knowledge such that they are able engage with real-world issues and develop active citizenship (Riddle et al., 2023). Finally, curricula justice through representation is achieved through a negotiated curriculum for all which includes developing a curriculum (or curriculum making) which listens and responds to student and community voices through collective processes of decision-making (Riddle et al., 2023). We argue that this understanding of curricular justice is an important framing when exploring teachers' practices in the context of CCSE. In what follows we now consider ideas of justice in the context of climate change and education.

Climate change, education and justice

In a systematic review of research with a focus on justice-oriented climate change education, Trott et al. (2023) considered the findings of 55 articles published during 2007–2020. A wide variety of school subjects, disciplines and degree programmes were featured in the review, although the social sciences and humanities dominated. This is notably different from wider trends in climate change education, which demonstrate the dominance of school science and geography (Monroe et al., 2019; Rousell & Cutter-Mackenzie-Knowles, 2020). A focus on 'people' was the most common learning focus, and the 'planet' was the least common, which Trott et al. (2023) argued suggested a growing dominance of human-centric framings of the climate crisis. Furthermore, a focus on 'power' (e.g. promoting equity) featured more strongly than ideas of 'place', which led Trott et al. (2023) to conclude that social justice learning goals were more prevalent than environmental and biospheric goals. Finally, a minority of studies included clear opportunities for action, and where action was present, it was framed at a local or community level in response to future harms associated with climate change (Trott et al., 2023). The marginal place of action is consistent with educational framings identified by Jensen (2002) which do not move beyond learning about the existence and consequences of environmental sustainability issues. This is problematic if education is to enable children and young people to develop action competences that allow them to envisage alternative and just climate and environmental futures that hold leaders and policymakers to account. Whilst ideas of climate justice have been recently considered in research in UK educational contexts, including Scotland (McGregor et al., 2024; McGregor & Christie, 2021), England is minimally represented in the review of Trott et al. (2023) with only two studies exploring justice in Climate Change Education (CCE), and both focused on children and young people rather than teachers and their practices; this current research seeks to address this gap.

In exploring climate justice education in England and Scotland, McGregor et al. (2024) underlined the ways in which some knowledge about climate action and climate justice is disavowed in education when it is deemed to be too radical or too ideological. This results in an absence of such 'profane knowledge' (McGregor et al., 2024); for example, the lack of critique of economic growth in both the more progressive CCSE policy context of Scotland and the more restrictive context of England. This is consistent with previous research with teachers and young people from across the United Kingdom which underlined a need to address economic priorities as part of the 'problem' within Environmental and Sustainability Education (ESE) (Dunlop et al., 2022). Broadly speaking, justice-oriented climate change education aims to both centre the expertise and respond to the needs of groups disproportionately affected by climate-driven inequalities (Sultana, 2022; Trott et al., 2023). Kagawa and Selby (2010, p. 242) called for a paradigm shift in CCE to address the root causes and justice dimensions of the climate crisis arguing: 'there can be no ethical and adequately responsive climate change education without global climate justice education'. Responding to such root causes through climate justice education requires detailed attention to the colonial and racial capitalist legacies and futures which sustain intersectional climate injustices (Sultana, 2022) and ideas of reparative education which 'takes seriously the righting of past and present educational wrongs' (Sriprakash, 2023, p. 782). Critically reflecting on ideas of action competence (Jensen & Schnack, 1997) through the lens of climate justice education arguably requires us to ask different questions. Rather than asking questions framed through action competence such as: What is the problem? Why do we have this problem? Where do we want to go now and in the future? How can we change the problem? (Jensen, 2002; Van Poeck et al., 2024) we might ask: Where and how do injustices exist in the past, present and future? How can we disrupt injustices and create reparative futures?

This current research provides an important opportunity to consider the practices of teachers working in primary and secondary schools in England, given the inconsistent and limited support provided at the policy level. The findings presented below add to those from our initial analysis, which broadly considered the current state of CCSE in England (Greer et al., 2023). In relation to the curriculum, our previous analysis found that the teaching of climate change and sustainability was most prevalent in geography and science at the secondary level, and that the majority of respondents said that it was a priority for climate change and sustainability to feature more strongly in the National Curriculum (Greer et al., 2023). Given this, the research presented here sought to better understand teachers' current practices in relation to CCSE as the point of departure when considering opportunities for justice-oriented CCSE in England. Our overarching research questions were, 'what existing classroom practices do school teachers identify in relation to climate change and sustainability education?' and 'in what ways might these practices be understood as justice-oriented climate change and sustainability education?'.

METHODS

The data collection method, recruitment strategy, participants, ethical considerations and limitations are described before outlining the analysis process.

Data collection

Data were collected through an online, Qualtrics questionnaire which could be completed by participants in about 20–30 min on a range of digital devices. The design, format and piloting process have been previously detailed (Greer et al., 2023). In summary, the questionnaire included 38 items, with a mix of questions requiring open answers and those which invited participants to indicate their responses to a series of statements using a five-point Likert scale ranging from strongly agree to strongly disagree. During the course of the questionnaire, participants were asked questions about their perceptions of climate change and sustainability (Section one), their views and practices related to climate change and sustainability education (Section two) and their experiences and views concerning professional development (Section three). The final section invited participants to share information about themselves, their professional roles and their professional setting. Data reported in this study were drawn from the responses to three questions in Section two of the survey which asked participants:

- Please share an example of how you include climate change and/or sustainability in the subject(s) you teach.
- What has helped you incorporate climate change and/or sustainability into your teaching?
- What barriers or challenges have you encountered in relation to incorporating climate change and/or sustainability in your teaching?

Participant recruitment took place during the period October to December 2022, inviting teachers of all subject areas and school settings to complete the questionnaire. The questionnaire was shared via faculty and research group electronic distribution lists and social media channels of the second author's institution as well as via their professional networks including multi-academy trusts, subject associations and teacher unions. As part of the recruitment strategy, an incentive of two randomly drawn cash prizes for climate change and

sustainability-related teaching resources was offered to those who completed the survey and elected to provide their contact details.

Participants

As reported by Greer et al. (2023), the data set comprised 870 responses, and participants were not required to complete every item, with about 60% of participants electing to complete Section four, which explored teachers' personal characteristics and professional context. Of those who elected to provide responses, the majority reported that they were female (74%) and the vast majority were white (91%). This is consistent with the demographics of the teacher workforce in England in 2022/23, where 76% of teachers were female and less than 10% of teachers identified as an ethnic minority (including Asian/Asian British and Black/Black British) (DfE, 2024). Teaching experience ranged from 1 year to over 20 years, and the majority of respondents completed university-led initial teacher education programmes (87%) (Greer et al., 2023). In this paper, we report on the responses from the three questions identified from Section 2 and listed above. As these were decoupled from Section four apart from the main subject participants reported they taught, we do not have any further specific demographic information about the participant sample we report on here.

Ethical considerations

The research was approved by an Institutional Ethics Committee prior to the commencement of data collection, and voluntary, informed consent was obtained in writing from all participants. Data was managed consistent with the UK GDPR and DPA 2018. Participant data was anonymised before analysis. When recruiting participants, the research team drew on a range of professional networks at individual (for example former students and colleagues) and institutional levels (for example school networks). Therefore, it was important as part of the recruitment process to explicitly state that both the decision to complete the questionnaire (or not) and any responses provided would have no bearing on current or future professional relationships. Finally, we note that whilst the demographics of survey respondents are broadly representative of the teacher workforce in England, women and those from ethnic minority backgrounds continue to be under-represented in leadership roles in schools, which is an issue of justice for education. In the context of our study, the lack of diverse school leadership is a further example of the intersectional nature of risks and marginalisation that children and young people experience in relation to climate change and CCSE.

Limitations of the research design

The data collected represents the views and experiences of those who responded to the questionnaire, rather than being generalisable across the teaching community. Given that participation was wholly voluntary with very limited incentives, it is possible that those who chose to complete the questionnaire were those already incorporating climate change and sustainability as part of their practice. It is also important to note that the recruitment period coincided with the annual United Nations climate change conference (COP27), which increased the prevalence and visibility of climate change in public discourse and may have influenced the number of people who elected to participate and informed their responses. Furthermore, a further phase of interviews with teachers could have further elucidated

details as to the experiences of teachers, which would likely have provided a more detailed understanding than questionnaire responses alone.

Data analysis

Open-text responses to the three questions were collated and imported into an Excel spreadsheet. The number of responses per question ranged between 334 and 380 responses. Responses were provided by teachers of a variety of subjects, with Geography, Science and English being the most represented. Other subjects also included: Art, Business Studies, Citizenship, Classics, Design & Technology, Drama, Economics, History, Information and Computer Technology (ICT), Mathematics, Modern Foreign Languages (MFL), Music, Physical Education (PE), Personal, Social and Health Education (PSHE), Psychology and Religious Studies. These open-text responses were reviewed by all three authors in the first instance to determine the next steps for data analysis.

Given the breadth of the responses, data were analysed using a conventional approach to qualitative content analysis, appropriate when working as a team across a large, shared dataset (Hsieh & Shannon, 2005). This involved an iterative process of individual reflections and group discussions concerning the coding of the data set over a period of 3 months, including during the writing process. Findings were broadly analysed through a hybrid process of inductive and deductive coding (Fereday & Muir-Cochrane, 2006). This process brought together deductive analysis informed by ideas from published literature focused on curriculum theory (e.g. Riddle et al., 2023), school-based climate change and sustainability education in England (e.g. Greer et al., 2023; Howard-Jones et al., 2021) and climate justice education (McGregor et al., 2024; Trott et al., 2023). We also approached data analysis inductively, where the coding process involved considering the individual responses provided across the three questions as data points. As part of this approach, we understood our roles as researchers as organising and interpreting the data points such that we can develop patterns of information, or themes.

As a further part of the deductive, analytical process, we drew on our professional lives and experiences as secondary school teachers and university-based teacher educators and education researchers, and how these shaped our engagement with the data. The inclusion of author three during the data analysis phase, who did not participate in phases of questionnaire development and data collection and whose expertise is derived from a different context (Scotland) than that of the study (England), provided a different perspective to data analysis.

FINDINGS

The findings presented below extend those from initial analyses previously reported, which provided a broad overview of the state of CCSE in England (Greer et al., 2023). Here, we focus on teachers' classroom practices in relation to climate change and sustainability education.

CCSE realised through existing classroom practices in response to official and planned curricular

The vast majority of teachers who responded to at least one of the three questions shared how they taught climate change and sustainability education (CCSE), providing examples

from their existing classroom practices as a teacher. These responses could be broadly grouped into two categories. The first group included those who considered that climate change and sustainability concepts and topics were an existing part of the official curriculum which they taught. This included teachers making specific references to climate change and sustainability in aspects of the National Curriculum, for example key stage 3 (secondary school students aged 11–14 years) Business, Geography, Religious Education and Science. Climate change and sustainability was also explicitly identified in exam specification documents including the General Certificate in Secondary Education (GCSE) specifications of Food, Design & Technology and Religious Education and both the GCSE and Advanced-level (A-level) specifications of subjects including Business, Geography, Modern Foreign Languages and Science.[1] In addition to teachers identifying where climate change and sustainability was referenced in the official curriculum, and therefore taught in the classroom, teachers also identified specific topics where they taught sustainability and climate change. For example, in Art and Design & Technology, topics included the sustainable use of materials, population growth, energy sources and production and manufacturing, whilst in History, the topic of the industrial revolution was identified, and in Business, climate change and sustainability were taught through the topic of externalities. In both Geography and Science, teachers described climate change and sustainability as not only visible in the official curriculum, but as an integral part of their subjects. For example, in geography, climate change and sustainability were frequently described as, 'essential part of the curriculum across all key stages', 'a thread which underpins our teaching' and 'naturally woven' into many topics such as ecosystems, migration, global cities and tourism. Similarly, in Science, teachers reported that 'climate change is a natural part of the curriculum' and 'it pretty much runs through my lessons like a golden thread' with specific topics such as energy, the carbon cycle and global warming referenced. Across these responses, teachers shared approaches to teaching CCSE which were reflective of the National Curriculum and/or exam specifications and were, therefore, broadly focused on the existence and impacts of climate change and sustainability issues.

A second group of teachers identified how they framed or adapted the official curriculum into a planned curriculum that foregrounded ideas and concepts of sustainability and climate change. For example, in English, a frequent response was that teachers taught integrated climate change and sustainability themes and ideas through their choice of literature and non-fiction texts. One English teacher shared:

> In the science fiction module, I have been co-teaching to Year 7s we have been discussing Winterson's 'The Stone Gods' with the class, which has brought in discussions around climate change and sustainability. Also, in the literacy… scheme of work, we recently discussed a news article around how flooding has been worsened by global warming.

Another teacher reported how they brought climate change and sustainability to the fore across the secondary phase:

> I teach English in years 7–13. I most often use persuasive articles to teach the skills of persuasive writing but use them on climate or nature-related topics. For example, I find the writing of George Monbiot very accessible and powerful—Guardian articles. I recently used a website about tree-planting from the Woodland Trust. I have used Greta Thunberg and Vanessa Nakate speaking to the UN (I think) and also the Avaaz petition from youth leaders about COP26.

This capacity to integrate climate change and sustainability across the teaching of different year groups in English was visible in a further response:

> When teaching English, I usually bring climate change and sustainability in two ways: first, through the teaching of pastoral literature to Year 8 students; and, second, GCSE English language lessons which involve students reading and writing non-fiction texts (e.g. newspaper articles) on environmental topics. Additionally, I try to discuss the environmental contexts of the literature I teach wherever possible, reminding students, for instance, that the natural world that historical writers wrote about was considerably more biodiverse and bio-abundant than our own.

Similarly, in Mathematics, some teachers shared how they drew on environmental ideas and contexts when teaching mathematical concepts. For example, teachers shared how they used real-world climate data when teaching data topics using carbon dioxide emissions to discuss trends and graphs and, teaching about carbon sinks and how to compare the carbon sink of a rainforest compared to the school site and how to calculate a carbon footprint. In psychology, some teachers highlighted how they taught about climate change when teaching the topic of behaviour and social change processes, for example, 'when I teach human behaviour believing it as someone else's problem/responsibility. Also. How world leaders need to work together as a common goal'. In music, one teacher highlighted that they would include the topic of 'music and the natural world' in their key stage 3 curriculum in the coming academic year, saying, 'this will encourage pupils to engage with their environment and create compositions based on nature/sustainability/climate'.

Some teachers highlighted cross-curricular working in the context of climate change and sustainability education, including teaching across English and Geography in both primary and secondary phases such as:

> As an English teacher, I was given the opportunity to work cross curricular with the Geography department last year on a COP26 topic. Students were given the opportunity to create a poem based on climate change and the destruction of natural habitats.

Finally, it is important to note that a very small minority of responses ($n=4$) explicitly reported that climate change and sustainability were not part of the curriculum in their subject. This included maths, where one teacher said, 'not discussed in maths' and another, 'I only teach maths and climate change and sustainability don't come into the curriculum'. Two teachers whose main subject was psychology or music respectively, also reported that climate change and sustainability were not included.

CCSE realised through practices that extend beyond the existing curriculum: Action and community-oriented CCSE

Across the data, there were some examples of practices related to climate change and sustainability education which were school-wide and included extra-curricular activities and frameworks which were action-and community-oriented. Ideas of action, particularly action competence which includes knowledge, understanding and skills focused on strategies for change, were visible; for example, in student-led school audits of resources (e.g. paper, food, energy) with recommendations for school policies for leaders to consider and shared through whole-school day-long events, student magazines and presentations.

Action-oriented approaches, which developed action competence, focused on knowledge about alternatives and visions for the future, were present in the ways some teachers understood the purpose of CSSE. For example, one teacher explored action both now and in the future:

> By reading articles on climate change and its impact on nature and discussion in class. I encourage students to share their thoughts and ideas, write persuasive and passionate speeches about the subject and discuss how they can help change the future.

This theme of self-expression also connected with ideas of communication as a key element of teachers' approaches to action that supported children and young people to explore and develop knowledge about alternatives and visions for the future. This included providing opportunities for children and young people to have their views and opinions heard by the wider community, including decision-makers. For example, teachers described how lessons included supporting children to write letters to their local Members of Parliament concerning environmental issues such as air quality, to create emails or social media posts to leads of business concerning greenwashing practices or to write letters to the headteacher sharing their views on actions that could support sustainability in the school context. Other activities included writing letters to a past Prime Minister to persuade them to accept climate change and to take action, and also running a mock climate conference, where students represented the interests of different countries concerning resources and decision-making in relation to climate change.

As well as communication, ideas of community were also strongly featured across the theme of action, which developed knowledge, understanding and skills focused on strategies for change. For example, teachers highlighted the ways they included members of the wider community to participate in school climate projects, such as university lecturers, local businesses and environmental groups. Teachers also shared how they worked with a range of other external organisations to implement climate change and sustainability education in their settings. For example, the resources provided by the World Wildlife Fund and the United Nations, including the Sustainable Development Goals (UN, n.d.), were used by teachers in school assemblies, form time and to support extra-curricular clubs and activities which included opportunities for learning and taking action as part of wider local, national and international communities. As one teacher described:

> We have launched an eco-committee and students get involved with eco-audits and light/electronic monitors who turn off electronics after school. Charities provide schools with trees and the eco committee will be planting ours in November. We also arrange online eco talks and had 'insect week' last week, where students received a talk from a Professor at a local university.

Some teachers shared how they used outdoor learning contexts for activities such as annual wildlife surveys of the school site and local litter and tree planting initiatives, which include a focus on improving the school site for the benefit of the wider school community:

> With regards to the site, we are planting trees and are planning on developing two outdoor areas in school. One as a flower garden and to promote biodiversity and one for a herb garden.

These activities with a theme of improving eco-practices and school sites were frequently part of 'Eco-days', 'climate weeks' or 'Eco-clubs' which were sometimes a regular feature of

the school calendar. Teachers frequently drew on formal frameworks, such as that provided by the Eco-Schools organisation (Eco-Schools, n.d.) and the Sustainable Development Goals (UN, n.d.) to structure and enhance climate change and sustainability in their setting. Some teachers made an explicit connection between climate change and sustainability education and ideas of enhancing children and young people's wellbeing, including working with external expertise to develop approaches:

> We have worked with a climate activist and theatre director to create a blueprint on how to teach children about the climate crisis…including creative responses and wellbeing….we have modelled these ideas and provided workshops in school.

The dimension of children and young people's wellbeing was also evident in another teacher's response who described how through their teaching, they aimed to, 'support young people to engage with the emotions of the climate crisis…and move through these to find ways to take part in the future that they have inherited'. Both these ideas of the future, and the emotions of living with the climate crisis, was also visible in responses from teachers focused on providing children and young people with opportunities to 'express themselves through their concerns'. These examples and ideas speak to teachers' practices which consider the empowerment and flourishing of the students they teach, which are consistent with developing action competence focused on understanding strategies for change.

Finally, ideas of justice were explicitly mentioned by four teachers, including ideas of social justice in the teaching of Geography and climate justice in the context of teaching religious studies. For example, one teacher shared, 'I have also created a unit…on climate justice that explores climate crisis causes, impacts and responses, including political, religious and ethical responses' and another reported:

> We look at religious responses to the natural world and climate justice issues. We look at creation stories and how these inspire people to care for the planet. We encourage students to consider their own responses to climate issues and be creative in demonstrating these.

In summary, whilst explicit considerations of justice were limited across the responses shared by teachers, all four dimensions of action competence (Jensen, 2002; Van Poeck et al., 2024) were visible in teachers' CCSE practices.

Having considered these dimensions of action, community, communication and justice, we now reflect on the challenges and opportunities for justice-oriented CCSE, guided by the question, in what ways might the practices shared by teachers be understood as justice-oriented climate change and sustainability education?

DISCUSSION

Knowledge at the centre: Challenges and opportunities for justice-oriented CCSE

Across our findings, teachers with different subject-specialisms underlined the importance of a range of disciplinary-subject knowledge, as it is articulated through the official and planned curriculum in England, when teaching climate change and sustainability concepts and topics. Indeed, responses to this survey from over 300 teachers highlight the rich and varied ways they approach CCSE, sharing specific examples from a range of school subjects in their mediation

of the National Curriculum. Here, we draw on Priestley et al.'s (2024) typology of knowledge to consider teachers' practices in the broad context of the school curriculum. In using this typology, our aim is that these findings further our understanding of CCSE practices and potentials across the school curriculum rather than providing an exclusive and, therefore, likely marginalised framework for school-based CCSE. This typology of knowledge includes the disciplinary or *propositional knowledge* of CCSE which teachers identified in their teaching of the official curriculum such as the concepts of biodiversity and global warming (Science), migration and space (Geography), industrial revolution (History), externalities (Business) and social change processes (Psychology). As well as propositional knowledge, teachers described *procedural knowledge*, such as developing the skills or capabilities to apply knowledge in the context of CCSE. Examples included persuasive writing in English and data analysis in Mathematics. Ideas of *epistemic knowledge*, or an understanding of the structures and processes of disciplines which enable enquiry in different fields and domains, was visible in the responses of teachers who highlighted that the concepts of climate change and sustainability were integral to their subject, such a as geography and science. As well as these different types of knowledge, Deng (2015) underlines that the development of school subjects is more complex than the selection and organisation of disciplinary knowledge. Rather, school subjects are part of education which is a formational process which draws on disciplines as resources for people to develop intellectual and moral capacities and personal and social attributes. With this in mind, when we look across the responses from teachers working in schools in England, we noted that when sharing examples of teaching the impacts of climate change, the examples (or procedural knowledge) teachers specified were frequently and predominantly regions and/or countries which were geographically distant from England. These included South Asia, India, Pakistan, Bangladesh, China, the Maldives, 'floods, droughts and famines in the global south' and 'glaciers in the Arctic and Antarctic'. In contrast, few examples were provided which focused on the UK, including one example of the 'recent UK heatwave'. There may be perfectly logical reasons for this focus, for example, the teaching and learning resources which teachers have ready access to (e.g. textbooks, subject magazines, video clips) and the examination specifications may signpost teachers to focus on certain case studies or examples. However, if the procedural knowledge that the curriculum reproduces about climate change impacts is potentially limited, this is not only supporting a fundamental misconception but is an issue of epistemic justice. How can we achieve climate justice if the curriculum we have reinforces ideas that the impacts of climate change are removed from children and young people in classrooms in England? This underlines the importance of an approach to CCSE where ideas of knowledge are pluralistic and enable children and young people to achieve full and active participation in the world. If children and young people learn about climate change and sustainability from multiple disciplines (e.g. scientific, ethical, economic, political) they can develop a more holistic understanding of the complexity of the issues (Rousell & Cutter-Mackenzie-Knowles, 2020). This is an essential foundation for developing an understanding of responses to climate change and sustainability which prioritise justice and equity. We argue that this foundation of pluralistic and holistic understandings of CCSE is necessary but not sufficient for justice-oriented CCSE. In addition, school curricula should have a concern for reparations or reparative education which Sriprakash (2023, p. 782) has described as the requirement to, 'understand the past, present and future in both the formation of injustice and its repair…until injustices are actively addressed, they can endure in social institutions—like education—which also shape lives-to-come'. This research has found that the idea that climate change impacts are removed from the lives of children and young people in classrooms in England persists. We argue that it is vital to urgently challenge this if climate and colonial injustices are to be repaired now and in the future.

Turning to the context of secondary school education in England, over the last decade or more has seen an emphasis on 'knowledge-rich' approaches to the curriculum (Gibb, 2021). This focus on knowledge in CCSE as 'learning the facts about climate change' is further

visible in the recent DfE strategy (DfE, 2022), which also narrows the scope of CCSE to predominantly school science (Dunlop & Rushton, 2022a). Broadly speaking, ideas of knowledge and its place in the school curriculum, are frequently the source of polarised discussion and debate which often positions knowledge and skills in opposition, where curricular are either 'knowledge-rich' (e.g. England) or 'competency-based' (e.g. Scotland). We note both the criticisms of competency-based curriculum approaches where this has resulted in an emphasis on skills such that knowledge is 'downgraded' and the notion that skills can be developed in the absence of knowledge (e.g. Biesta, 2014; Priestley & Sinnema, 2014). We also recognise the critique of 'knowledge-rich' approaches which can conflate ideas of knowledge with discrete and atomised information or facts, rather than the structured development of knowledge that leads to understanding and new ways of seeing the world which fulfils educational potential (Deng, 2022). In the context of climate change education (CCE) specifically, scholars have called for the recognition of climate change as a disciplinary-subject, arguing that this is essential given the seeming failure of cross-curricular approaches to CCE and to ensure the integrity of climate change as a body of knowledge that should not be subsumed as part of sustainability (Eilam, 2022). Concomitantly, scholars have articulated a different view of CCE, underlining the need for a multidisciplinary approach which, 'empowers children and young people to meaningfully engage with entanglements of climate fact, value, power and concern across multiple scales and temporalities' (Rousell & Cutter-Mackenzie-Knowles, 2020, p. 203). Our findings show that teachers valued both subject-specific and cross-curricular approaches to CCSE which they realised through the official and planned curricula.

We also return to the concept of a 'knowledge + plus curriculum' (Riddle et al., 2023), which asks challenging questions about the place of community-knowledge building as part of school curricula. These distinctions and ideas are important starting points if we are to adequately reflect on the nature of knowledge and the purpose of school-based CCSE which is justice-oriented. For example, who has access to which funds of knowledge? Whose funds of knowledge are visible and considered powerful? What is knowledge powerful for? These questions provide an important stimulus when reflecting on types of knowledge which are placed at the centre of CCSE. Our analysis of teachers' practices has identified approaches which are consistent with developing a range of dimensions of action competence. However, the extent to which teachers engaged with children and young people's community funds of knowledge, and the ways in which their ideas and experiences form part of CCSE curriculum making, is at best unclear. This underlines the need for further research and thinking focused on articulating the procedural, propositional and epistemological knowledge which underpins CCSE in school settings and extent to which opportunities exist to meaningfully involve children and young people in curriculum making.

Action for empowerment: Challenges and opportunities for justice-oriented CCSE

Consistent with the four dimensions of action competence (Jensen, 2002; Van Poeck et al., 2024), teachers shared practices which provided students with opportunities to develop the knowledge, understanding and skills to act collaboratively in the context of CCSE. These actions included those focused around communicating their views and experiences of climate change and sustainability, engaging in discussion and debate concerning decision-making related to climate and environmental issues and concerns, and being part of environmentally focused practical projects and initiatives that explore alternatives and strategies for change. These types of practices focused on action were often linked with explicit and implicit ideas of student empowerment, including equipping young people with

the knowledge and capabilities to act *for* the climate and the environment now and in the future (Gandolfi, 2023) and to live with the consequences of climate-altered futures (Dunlop & Rushton, 2022b; Finnegan, 2023). These ideas of empowerment, where students can question and challenge the *status quo*, also speak to the inherently political nature of education, where central to the teacher's role is explicit engagement with socio-political ideas and issues: 'the teacher must also be teaching in favour of something and against something. This "something" is just the political project, the political profile of society, the political "dream"' (Shor & Freire, 1987, p. 46). Teachers' responses included examples of how they as teachers were empowered to act for the environment and the climate through their teaching, especially through their mediation of the official curriculum into the planned curriculum and teaching. However, consistent with previous research in Scotland and England (e.g. Dunlop et al., 2022; McGregor et al., 2024) the practices teachers shared underlined an absence of examples which are perhaps more consistent with ideas of climate justice. Teachers did not provide examples of CCSE which connected colonial legacies with past, present and future climate injustice or articulated an understanding of the intersectional nature of climate injustice. Absent too were practices which substantially questioned economic and political models of growth and development which McGregor et al. (2024) argue is a vital and frequently missing or marginalised part of climate justice education and climate change policy more broadly. Whilst teachers' practices shared through this survey attended to notions of action, empowerment and student wellbeing in the context of climate anxiety and the climate crisis, explicit connection was not made between climate anxiety and the limits of current education and education policy. This analysis should not be framed as critical of the teachers who shared their practices, or to diminish the ways in which teachers continue to persist with ideas of action-oriented and elements of justice-oriented CCSE in a policy context where such framings are marginalised and/or entirely absent. Nevertheless, our analysis shows that whilst the foundations for justice-oriented CCSE are evident, ongoing collaborative work between groups, including teachers, children and young people, academics, climate activists and policy makers, is required to realise the potential of current school-based practice in England. If this work is not valued and resourced by policy makers, it is likely that narrowly conceived and unjust climate change knowledge will persist; for example, the perception that the impacts of climate change are geographically distant to children and young people in the West and, therefore, might not require urgent responses.

Leadership at school and policy levels is integral to creating and sustaining communities and curricula that effectively address CCSE and justice. Through vision, strategic planning, resource allocation, professional learning and advocacy, leaders can ensure that education systems prepare pupils not only to understand these critical issues, but also to act as informed, ethical and engaged citizens (Rushton, Walshe, et al., 2024). This type of leadership can foster a learning community where sustainability and justice are not just taught but are lived values, preparing pupils to engage with the challenges of the 21st century in meaningful and just ways. Previous research which has considered leadership of school-based CCSE in England underlines that such an approach to leadership is possible, even given the constraining policy context (Rushton, Walshe, et al., 2024). Such an expansive view of education demands a fundamental shift in the leadership of school-based education in England, so that these potentially transformational practices move beyond the committed and enthusiastic individual to a place of collaborative, shared responsibility which extends across all educational settings. Such a shift in leadership will necessarily include a renewed focus on teacher professional learning which enables teachers to consider their practices through intersectional lenses. We argue for school leadership and policy makers to support professional contexts where all teachers see justice-oriented CCSE as a fundamental part of their professional lives and responsibilities, and where these responsibilities are reflected in the professional standards and curriculum policies which shape their work.

CONCLUSION

Through a critical reading of teachers' practices in relation to CCSE in the context of climate justice education and curricular justice literatures, we have articulated approaches to CCSE which places knowledge at the centre and is framed by ideas of action for empowerment. We argue that this provides a strong foundation for, but does not yet fully realise, the ideals of climate justice education. We recognise that the self-reported practices shared through the survey very likely represent the contributions of committed and enthusiastic individuals, guided by both personal and professional motivations to realise CCSE throughout their professional lives. The practices shared by teachers may not reflect the experiences of the children and young people they teach and, therefore, provide only a partial account of the enacted curriculum. In our ongoing work we seek to explore children and young people's experiences of CCSE in England (Walshe et al., 2024). We also acknowledge that these practices have been elicited by teachers working in England, where CCSE is currently viewed rather narrowly by policymakers (Dunlop & Rushton, 2022a). If transformational CCSE is genuinely to be available to all children and young people, this will require a significant shift in the prominence and purpose of CCSE as part of school-based education in England, including ensuring that school leaders are equipped to create and sustain positive whole-school cultures related to CCSE, which is underpinned by career-long teacher professional learning (Rushton, Dunlop, & Atkinson, 2024; Rushton, Walshe, et al., 2024). Whilst previous research has underlined that teachers can find ways to integrate CCSE into their practices in the absence of formal policy frameworks, incremental changes are an inadequate response to the triple environmental crises of pollution, biodiversity loss and climate change (Dunlop & Rushton, 2022a). We contend that an important starting point is to ensure that ideas of justice—ncluding curricular justice (Riddle et al., 2023) and climate justice education (McGregor et al., 2024; McGregor & Christie, 2021)—are integral throughout teachers' careers, including initial teacher education and subsequent professional learning and leadership programmes. As an evolving and vital area of research, we underline important opportunities for future research which considers climate justice education as a fundamental part of curricular justice, including comparative research across Australia and the United Kingdom. We note that ideas of activism and justice in the context of education can be challenging for teachers (McGregor & Christie, 2021), especially in constraining policy contexts. This underlines the need for well-resourced professional learning opportunities for teachers which include collaborations between teachers, school leaders, education researchers, policy makers and young people. Such professional learning opportunities could be framed through teacher-led, critical collaborative professional enquiries (Drew et al., 2016) where teachers collaboratively identify and develop culturally responsive teaching practices which could draw on young people's community funds of knowledge (Riddle et al., 2023). Such an approach, which draws on ideas about curriculum and teacher professional learning from both the United Kingdom and Australia and beyond, will provide rich opportunities to further articulate a justice-oriented curriculum for CCSE. Drawing together ideas of curricular justice and justice-oriented CCSE, we can better understand how schools can provide high-quality CCSE for all, which values and connects varied funds of knowledge, including that which children and young people bring to their education. Such a curriculum will be responsive to student and community voices and will enable children and young people to act justly for the environment throughout their lives.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

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PATIENT CONSENT STATEMENT

All research participants consented to take part.

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Endnote

[1] GCSE examinations are completed by students aged 15–16 years and A-levels are completed by students aged 17–18 years.

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