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ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/ceer20

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To cite this article: Elizabeth A. C. Rushton & Nicola Walshe (27 Feb 2025): Curriculum making and climate change and sustainability education: a case study of school teachers' practices from England, UK, Environmental Education Research, DOI: 10.1080/13504622.2025.2471990

To link to this article: https://doi.org/10.1080/13504622.2025.2471990

Published online: 27 Feb 2025.

ENVIRONMENTAL EDUCATION RESEARCH
https://doi.org/10.1080/13504622.2025.2471990

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Curriculum making and climate change and sustainability education: a case study of school teachers' practices from England, UK

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ABSTRACT

School-based climate change and sustainability education are widely understood as a vital response to the triple environmental crises of climate change, biodiversity loss and pollution. This current research analyses over 700 responses from a national survey of teachers working in England to explore teachers' curriculum making activities and the sites in which these occur, in the context of climate change and sustainability education (CCSE). Micro and nano sites of curriculum making were the most prominent in the responses provided. A central barrier to curriculum making is understood to be the content-heavy nature of the National Curriculum in England and the low visibility of climate change and sustainability in both the National Curriculum and examination specifications. Enablers and barriers include the level of personal motivation of teaching staff and students to engage with climate change and sustainability education, the extent to which school leaders provide support, the availability of no-cost and high-quality resources, and meso-level support and opportunities for teachers to develop their knowledge and confidence in relation to climate change and sustainability. At a time of curriculum review in England, we highlight the opportunity for policy makers to reconsider the orientation of the National Curriculum such that, consistent with the practices of teachers in relation to climate change and sustainability education, it combines a reduced focus on academic rationalism and social efficiency with an increased emphasis on social reconstructionism.

ARTICLE HISTORY
Received 26 November 2024
Accepted 16 February 2025

KEYWORDS
Curriculum making; climate change and sustainability education (CCSE); schools; teachers; SDG4

Introduction

Climate change and sustainability education (CCSE), including school-based education, is widely understood as a vital response to the triple environmental crises of climate change, biodiversity loss and pollution, enabling all children and young people to live with uncertain futures (Reid 2019). In England, the school curriculum and assessment framework are currently the focus of government reform, providing an opportunity to reconsider the purpose and orientation of

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formal education for children and young people aged up to 18 years (Department for Education (DfE) 2024). The views and practices of teachers working in England related to climate change and sustainability education have been explored through large-scale surveys (Howard-Jones et al. 2021; Greer et al. 2023). This current research builds on previous work (Greer et al. 2023) to explore teachers' practices, here with a focus on different sites of curriculum making in the context of CCSE. Educational researchers have long considered the idea of sites or scales in educational systems and practice including Nespor (2004), who articulated educational scales as, 'the spatial and temporal orders generated as pupils and teachers move and are moved through educational systems; scales are envelopes of spacetime into which certain schoolbased identities (and not others) can be folded' (309). In this research we pay attention to the sites, or scales of curriculum making in the context of CCSE, understanding curriculum making as a series of related social practices (Priestley et al. 2021). This focus on the social practice, or sites of curriculum making as a category of practice is consistent with previous CCSE policy research which has analysed how different scales (e.g. local, regional, national, global) are constituted and operationalised in relation to policy and policy mobility (see for example, McKenzie and Aikens 2021; McKenzie, Bieler, and McNeil 2015). This research based in Canada found examples of policy amplification, where policy priorities at school division or district level can influence the priorities of policy makers at provincial or regional levels (McKenzie and Aikens 2021). To begin, we explore curriculum making as a theoretical framework, before outlining the context of teaching climate change and sustainability in schools in England.

Curriculum and curriculum making as a theoretical framework

Curriculum scholars have identified various curriculum and curriculum making frameworks (Doyle 1992; Deng 2012; Priestley et al. 2021). We understand 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, Woods, and Weir 2013, 10). In the context of school curriculum, Deng (2020) has outlined four curriculum orientations, each of which articulates a different purpose of education. An orientation of academic rationalism understands the main purpose of education to induct students into disciplinary knowledge, including concepts and methods of inquiry. A social efficiency orientation views the purpose of education to provide people with workplace and citizenship skills, including through behaviour change. A humanism orientation sees education as promoting individual freedom through intellectual, physical and affective growth. Finally, a social reconstructionism orientation understands the purpose of education to develop a fair and socially just society. Curriculum resources and their selection and organisation into the official and planned curricula are, therefore, not neutral or random. Instead, curricula are actively 'made' across different sites within education systems as a series of social practices which involve a range of individuals (e.g. teachers, young people) and groups (Priestley et al. 2021).

Whilst some scholars have focused on curriculum making frameworks which identify curriculum products or artefacts (Thijs and van den 2009), other curriculum making frameworks can help us understand how different components, activities and actors work together at different times and in varied places (Priestley et al. 2021). Priestley et al. (2021) have outlined a heuristic of sites of activity of curriculum making which enables us to identify different sites (in this framework, five sites) and activities. The *nano* site focuses on curriculum making in the classroom and other learning contexts undertaken by teachers and students. The *micro* site is concerned with school-level curriculum making including lesson planning, schemes of work and programme design undertaken by teacher, middle and senior leaders in school. The *meso* site encompasses activities including the production of guidance, support and leadership of curriculum making and the creation of resources and is frequently undertaken by national governments and curriculum agencies, publishers of textbooks and other resources and subject-focused

bodies and organisations. At the *macro* site of activity, national governments and curriculum agencies develop and implement curriculum policy frameworks (e.g. The National Curriculum) and bring about legislation to establish infrastructure and curriculum focused agencies.

Finally, the supra site of activity involves curriculum focused transnational discourse including policy generation, borrowing, lending and learning, involving international organisations such as the World Bank, UNESCO and the OECD. This focus on sites of activity has been developed as an analytical tool to support understandings of *how* curriculum making occurs and emerges in different contexts, rather than a normative framework as to how curriculum making *should* occur (Priestley et al. 2021). Therefore, we argue that this provides an appropriate heuristic to investigate school-based curriculum making focused on climate change and sustainability education. In what follows, we outline the broad context of school-based climate change and sustainability education in the study site of England.

School-based CCSE in England

Since 2010, school curriculum orientations in England have been focused on academic rationalism, as evidence by the discourse of an 'extensive knowledge-rich' curriculum underpinning the National Curriculum reforms in 2010 and visible in outputs from the Department of Education (for example, Department for Education (DfE) 2021). It is arguably this narrow focus on 'giving pupils a grounding in the best that has been thought and said' (Department for Education (DfE) 2021) which has led to the significant increase in curriculum content. At the same time, orientations of social efficiency are also evident in education policy, including in the recent Department for Education (DfE) (2022) sustainability and climate change strategy, with a focus on 'green' jobs, skills and careers which prepare children and young people for the workplace. Almost as soon as the Labour government were elected in the summer of 2024, the new Secretary of State for Education, Bridget Philipson, announced a year-long Curriculum and Assessment Review, led by Professor Becky Francis (Department for Education (DfE) 2024). This announcement stated, 'a broader, richer, cutting-edge curriculum that drives high and rising school standards and sets all young people up for life and work will be central to the government's vision for education' (Department for Education (DfE) 2024 n.p). At the current time, 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; Howard-Jones et al. 2021).

The advent of this review has prompted many figures with long-standing expertise in Environmental Education to underline the 'rigorous evidence that parents, teachers and students want to see a curriculum that better informs current and future generations about climate change and sustainability' (Dillion 2024, n.p.). Whilst some express hope for change such that the curriculum engages with the political, social justice and action-oriented dimensions of CCSE (Dawson et al. 2022; Howard-Jones et al. 2021; Dunlop and Rushton 2022), 'wise' caution prevails (Dillion 2024, n.p.). This caution is perhaps inevitable, given the gap between current policy focus on climate change and sustainability in England which – whilst it acknowledges the importance of schools accessing funding, sharing best practice, and developing networks to enhance CCSE – provides no universal funding (Department for Education (DfE) 2022). Furthermore, these unfunded priorities contrast with those of teachers, teacher educators and young people (aged 16–18) (Howard-Jones et al. 2021; Dunlop et al. 2022). These groups frequently underline the need for curriculum change 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 a response to climate and environmental crises (Dunlop et al. 2022; Dunlop and Rushton 2022).

In a survey of teachers, Howard-Jones et al. (2021) evidence the considerable support from teachers for interdisciplinary climate change education which includes social justice, participation and action as integral to the school curriculum, with early introduction in primary school with the same prominence as numeracy and literacy. In the initial analysis of data collected *via* a

national survey of teachers based in England, from which this present study draws data, Greer et al. (2023) underlined that most respondents prioritised change in the National Curriculum such that climate change and sustainability is more visible. This was particularly the case for those teaching in primary schools and for teachers of subjects other than geography and science (Greer et al. 2023).

This current research provides an important opportunity to consider teachers' curriculum making in relation to climate change and sustainability education, in the context of teaching in primary and secondary schools in England, and at a time when the National Curriculum is under review. Here, we report on findings from an online questionnaire which investigated teachers' ideas, experiences and practices related to climate change and sustainability in England. This data was collected ahead of both the implementation of the Department for Education (DfE) (2022) non-statutory strategy for sustainability and climate change in education (Department for Education (DfE) 2022) and the launch of the Curriculum and Assessment Review (Department for Education (DfE) 2024). The findings presented below extend those from our initial analysis (Greer et al. 2023) and focus on curriculum making. Our over-arching research question was: *from the perspectives of teachers, what is the nature and scope of curriculum making in relation to climate change and sustainability education? Where does it happen, what practices are evident and who is involved?*

Materials and methods

Here we describe data collection method, participants, ethical considerations and limitations before outlining the analysis process.

Data collection

Data were collected through an online questionnaire and the design, format and piloting process have been previously outlined (Greer et al. 2023). As an overview, 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. Respondents were asked questions about their perceptions of climate change and sustainability (Section 1), their views and practices related to climate change and sustainability education (Section 2) and their experiences and views concerning professional development (Section 3). The final section invited respondents to share information about themselves, their professional roles and their professional setting (Section 4). Data reported in this study were drawn from the responses to two questions in Section 2 of the survey which asked: What has helped you to 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?

Recruitment took place during October to December 2022, inviting teachers of all subject areas and school settings to complete the questionnaire. The questionnaire was shared *via* the faculty and research group electronic distribution lists and social media channels of the second author's institution, as well as through professional networks including multi-academy trusts, subject associations and teacher unions. 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.

As reported by Greer et al. (2023), the data set comprised 870 responses, and respondents were not required to complete every item. About 60% elected to complete Section 4 which explored teachers' personal characteristics and professional context; 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) (School Workforce Census 2023). Teaching experience ranged from one year to over twenty years, and most 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 4 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.

Research design limitations

The data collected represents the views and experiences of those who responded to the questionnaire, rather than being generalisable across the teaching professional community. Given that participation was wholly voluntary with very limited incentives, it is possible that 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 in Glasgow (COP26), 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.

Ethical considerations

The research was approved by an Institutional Ethics Committee (REC1627) 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. Data was anonymised before analysis. During phases of research design, data collection and analysis our approach was consistent with the BERA (2024) guidelines for ethical research. For example, in the design and piloting of the survey, we were cognisant of our responsibilities as researchers to minimise any potential harm arising from participation in research, including the potential for the construction of the survey questions to prompt or elicit psychological distress associated with climate anxiety (BERA, 2024, paragraph 34). Furthermore, as part of the recruitment strategy, 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 (BERA, 2024, paragraph 19). We also note that whilst the demographics of the survey respondents are consistent with the teacher workforce in England, women and those from ethnic minority backgrounds continue to be under-represented in school leadership. In the context of this study, the lack of diverse school leadership is an example of the intersectional marginalisation which children and young people experience in relation to education, including climate change and sustainability education.

Data analysis

Data analysis focused on the open-text responses provided by teachers to two questions from Section 2 (What has helped you to 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?). These responses were explored through iterative

content analysis undertaken by both authors which took place over a series of stages (Hsieh and Shannon 2005). Stage one involved the creation of the dataset to be analysed by collating and importing all responses to the two questions into an Excel spreadsheet, with the combined data set of responses to the first item totalling just under 5400 words and the responses to the second item totalling just under 7000 words. As part of this stage of initial analysis we explored the number of responses to each question organised by teachers' self-identified main subject taught.

As set out in Table 1, this showed that geography, science and English the most represented alongside a range of other subjects.

The second stage of data analysis involved an initial review and categorisation of the data independently by both authors to identify commonalities. This initial review produced individual coding of the data which the authors shared, discussed and refined iteratively through regular meetings and ongoing individual analysis and refinement. This process of analysis involved a hybrid process of inductive and deductive coding (Fereday and Muir-Cochrane 2006). This

Table 1. Number of responses to each questionnaire item organised by teachers' self-identified main subject taught.

Questionnaire item	Respondent's main subject	Number of responses
What has helped you to incorporate climate change and/or sustainability into your teaching?	Art & Design	19
	Business	7
	Citizenship	3
	Classics	1
	Design and Technology	13
	Drama	1
	Economics	3
	English	29
	Geography	102
	History	11
	ICT	3
	Mathematics	13
	Modern Foreign Languages	11
	Music	7
	Physical Education	1
	Personal, Social Health and Economic Education	1
	Psychology	3
	Religious Education	9
	Science	67
	Other (e.g. Cover Teacher, Teaching Assistant, Extra-Curricular, Unsure)	30
	Total	**334**
What barriers or challenges have you encountered in relation to incorporating climate change and/or sustainability in your teaching?	Art & Design	18
	Business	8
	Citizenship	4
	Classics	1
	Design and Technology	11
	Drama	1
	Economics	3
	English	37
	Geography	101
	History	14
	ICT	2
	Mathematics	28
	Modern Foreign Languages	19
	Music	9
	Physical Education	1
	Psychology	2
	Religious Education	8
	Science	74
	Other (e.g. Cover Teacher, Teaching Assistant, Extra-Curricular, Unsure)	39
	Total	380

process brought together deductive analysis informed by ideas from published literature focused on curriculum theory (e.g. Priestley et al. 2021), school-based climate change and sustainability education in England (e.g. Greer et al. 2023; Howard-Jones et al. 2021; Rushton, Dunlop, and Atkinson 2025a, Rushton et al. 2025b). We also approached data analysis inductively, where the coding process involved considering the individual responses provided across the responses to both questions. As part of this approach to coding, we understood our roles as researchers as organising and interpreting the data points such that we can develop patters 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.

Stage three of data analysis took place as part of the writing process, including engaging with feedback provided through peer review, which further refined the consistency of classification and the foci of themes across the dataset. Stage three also provided additional opportunities to triangulate the themes collectively identified by the authors through greater critical engagement with existing climate change and sustainability education literature.

Findings

We present findings which move beyond those initial analyses previously reported (Greer et al. 2023) and focus in depth on teachers' curriculum making in the context of school-based climate change and sustainability education.

Sites of curriculum making in the context of CCSE

Curriculum making across nano and micro sites were the most prominent in the responses, with approximately two thirds of respondents providing examples associated with curriculum making in classrooms and at school-level. These sites of activity were found across most subjects (of the 19 subjects listed, four were not specifically represented: Classics, Drama, Physical Education and PSHE). Respondents shared a range of resources which they identified and accessed themselves to support their own professional learning and practice in relation to curriculum making in the context of climate change and sustainability. These resources included documentary programmes (e.g. David Attenborough documentaries), news articles and programmes (e.g. BBC News, Guardian), podcasts, textbooks and non-fiction resources (e.g. Meteorological Office, Inter-governmental Panel on Climate Change (IPPC) reports) and fiction resources (e.g. the novel *Exodus* by Julie Bertagna). These resources were used to support teachers' planning and teaching of both individual lessons (nano sites) as well as developing series of resources and rewriting entire schemes of work (sow) or learning plans (nano and micro sites). Examples where teachers had identified relevant resources and incorporated these into individual lessons to ensure that their knowledge was accurate and current and accessible to young people included:

> I try to include resources that are really current, so will often use newspaper articles and videos to highlight points. I'm really interested in how we use waste, create materials from unusual sources and repair items. I will often go to exhibitions or find information from sustainable companies on social media, present this to the students and encourage discussion. (Design and Technology teacher)

> Videos. I teach in a deprived area in South Yorkshire. Many children have never even visited Sheffield. Videos help students to visualise and access the content. (Geography teacher)

Other respondents shared how they developed a series of resources and re-wrote schemes of work to foreground climate change and sustainability themes, including in ways which are oriented towards action and justice:

> Being able to re-write sow [scheme of work or series of lessons] with a planned emphasis on sustainability and action rather than having to squeeze it in. (Design and Technology teacher)

> Having the freedom to incorporate a unit on climate justice…being able to create my own schemes of work on the topic. (Religious Education teacher)

Respondents also shared the importance of opportunities to work collaboratively with knowledgeable and inspiring colleagues both within school and through networks beyond school when developing resources and schemes of work as part of nano and micro sites of curriculum making:

> Regular reminders of imaginative ideas from colleagues, in department meetings, and in whole-school briefings and training sessions. (Music teacher)

> Talking to colleagues through networks outside of school. (MFL teacher)

These data underline that the majority of curriculum making in relation to climate change and sustainability education happens in nano and micro-sites of activity (found in approximately two thirds of responses across 15 of the 19 subjects represented). This occurred through the work of individual teachers and groups of teachers within schools and across networks of schools. Resources, including a range of media available online (e.g. podcasts, documentaries, news articles) and offline (e.g. books), provide teachers with the opportunity to develop their knowledge of climate change and sustainability and ensure that this is accurate and current. This micro site of curriculum making includes changes to individual lessons, rewriting schemes of work and the creation of bespoke resources and is achieved through both teachers' individual endeavour and collaborative effort.

As well as activity across nano and micro sites of curriculum making, respondents provided insights as to activity across meso and macro sites. Activity as part of meso sites was much less visible in the data provided by respondents to the survey, featuring in about 10% of responses and in only nine of the 19 subjects identified: Art & Design, Business, Design & Technology, Drama, English, Geography, Mathematics, RE, and Science. However, actors and organisations at meso sites of activity provided guidance and support of curriculum making, including the production of resources. These include third sector organisations, such as Greenpeace, The Woodland Trust and UNICEF. Meso site actors also included higher education programmes (undergraduate and post-graduate degrees as well as teacher education programmes), as well as subject associations and other networks, including the National Association of Teachers of Religious Education, the Geographical Association, the Royal Society of Chemistry and the Eco-Schools network:

> Great resources by BBC Teach and subject associations like the Royal Geographical Society and the Geography Association who produce resources like lessons and podcasts, articles and forums for dialogue around climate education. (Geography teacher)

> Free resources such as those collated by Transform our World, Ministry of Eco Education. (Science teacher)

> My college course- we did a whole module on developmental education (including climate change) and it was really valuable. (English teacher)

Responses which featured macro sites of curriculum making represented about 20% of the responses and the national curriculum and exam specifications were the focus of these. This focus extended beyond the subjects of science and geography, which are traditionally associated with these topics, and where climate change and sustainability form part of the national curriculum. Respondents also highlighted macro-sites in subjects including Art & Design, Business, Design & Technology, Economics, English, Geography, History, ICT, Mathematics, MFL, Religious Education and Science. A key point made across many of the responses was that the inclusion of climate change, sustainability and broadly environmental topics within exam specifications made it possible for teachers to ensure these issues were taught within their subject:

> The GCSE English Curriculum does have the flexibility for teachers to choose extracts from the news to compare with attitudes from the past. We can use climate change and sustainability as a topic for analysis and discussion or debate in the classroom. We can read extracts on the impact on animals and the environment around us like flooding and recent news. (English teacher)

> The curriculum and specific topics within it that students can be both educated about and in some cases can directly relate to due to increased news coverage and awareness. (Business teacher)

> A commitment from the exam boards to ensure it stays in the specifications (despite being removed from the curriculum in 2014). (Design &Technology teacher)

> At A Level we joke that a 20-mark essay isn't an essay without some synoptic link to climate change, even if it isn't in the question. Sustainability and climate change is a thread that underpins our teaching, for example looking at SDG and assessing the success so far in relation to SDG based goals (direct/indirect). (Geography teacher)

As is visible in the examples of macro sites of curriculum making shared in these responses above, the role of examination specifications is visible. So too is the incorporation of system-level frameworks (e.g. the Sustainable Development Goals) produced by supra level actors, such as the United Nations. However, this was only minimally visible (four examples in total were provided by respondents) and frameworks such as the SDGs were operationalisation within macro sites of activity such as examination specifications.

Across the example analyses from the over 300 responses, curriculum making in relation to climate change and sustainability is broadly focused in nano and micro sites of activity, with some examples in meso and macro sites. In the following section we further analyse enablers of nano and micro sites of curriculum making before considering the barriers which also exist.

Enablers of nano and micro sites of curriculum making in the context of CCSE

Across the responses analysed, five enablers of curriculum making in nano and micro sites of activity were identified (Table 2).

Through the first theme, an enabler of nano and micro sites of curriculum making are the personal interests, prior experience of, and beliefs in the importance of climate change and sustainability education which teachers hold. Respondents shared that their personal interest was frequently long-standing and was nurtured by professional and personal relationships. Connected to teachers' beliefs as to the importance of climate change and sustainability education was the enthusiasm to learn about these issues expressed by the students they taught. Some respondents identified that children and young people were more concerned about environmental issues that they had been in the past and raised these concerns in classroom settings, including through asking questions. The motivation and concern which some respondents shared were held by both teachers and students was also supported by the increasing prominence of climate change and sustainability topics in the media. This includes the news media and other digital and printed materials, as well as speeches and writings by figures who were well-known to respondents, including the naturalist and film maker David Attenborough and the climate activist Greta Thunberg. The availability of accessible and high-quality resources was frequently identified by respondents as enabling and enhancing their curriculum making in the context of climate change and sustainability education. Finally, school leadership was visible across the responses to the survey, both in the ways that school leadership could inhibit and limit climate change and sustainability education as well as enhance and enable. Key aspects of school leadership were raising awareness of the importance of climate change and sustainability issues across the school and support from school leaders to access time to collaboratively engage in curriculum making with colleagues.

Table 2. Enablers of nano and micro sites of curriculum making related to climate change and sustainability.

Theme (number of references in responses)	Indicative quotes
1. Teachers' personal interest, prior experience of, and beliefs in the importance of climate change and sustainability education. (53)	Taking part in the Cape Farewell Youth Voyage in 2007 and my continued interest and passion about it ever since. (Art and Design teacher)
	My own assessment of the urgency to raise awareness in the young people…who will take over stewardship of the natural world. (English teacher)
	Personal knowledge and research, as well as personal interaction with climate change activism. (Geography teacher)
2. Students' motivation to learn about climate change and sustainability issues. (13)	The current state of the climate emergency has brought these issues to the fore and students now take the issues more seriously than they used to. (Design and Technology teacher)
	The enthusiasm of the students to learn about it and make a difference for good through their actions. (Geography teacher)
3. The urgency and visibility of climate change and sustainability, including in the media. (28)	The immediacy of the issue and the impact it is having now on people living around the world. (Geography teacher)
	The increasing prominence of climate change as a political issue. (History teacher)
4. The accessibility of freely available and high-quality resources focused on climate change and sustainability issues. (60)	Resources: videos, news articles, documentaries. (Geography teacher)
	Availability of resources in textbooks and online platforms. (Modern Foreign Languages teacher)
5. School-level leadership providing support for climate change and sustainability across the school. (17)	The head is very supportive and has appointed me as STEM and Sustainability Lead. This is helping to raise the profile at school but, as it is a temporary post, I am concerned about lasting impact across other departments. (Maths teacher)
	I think the presence in my school of teachers who include a focus on promoting awareness of climate change is important, and also the fact that our headteacher has spoken up on this topic and there is discussion about school trips using flights, etc. (Modern Foreign Languages teacher)
	Conversations with interested colleagues, support from senior colleagues to focus school efforts in this area. (Science teacher)

Barriers to curriculum making in the context of CCSE

Five themes were identified in relation to the barriers which respondents reported in relation to CCSE (Table 3).

The most significant barrier featured in the responses was the perception that climate change and sustainability topics did not have sufficient prominence or visibility in the National Curriculum and/or examination specifications and that the substantial amount of content made it challenging for teachers to incorporate climate change and sustainability into their teaching. Related barriers identified in this theme included a lack of support from government and accountability pressures experienced by school inspection regimes undertaken by Ofsted (The Office for Standards in Education, Children's Services and Skills). The lack of priority given to climate change and sustainability in schools was also identified as a barrier, with respondents highlighting a lack of concern from school staff, insufficient support from parent and a disinterest from young people and their parents. In the third barrier, respondents highlighted a lack of time and/or resource to undertake curriculum making in relation to climate change and sustainability education. For example, respondents noted a lack of freely available resources that did not have connections to fossil fuel companies and a lack of time to create their own up to date resources. Respondents also highlighted a lack of teacher professional knowledge and/or confidence to undertake curriculum making in relation to teaching climate change and sustainability, including how to respond to students' climate anxiety and how to be up to date with the research. Finally, it is important to note that a minority of respondents shared that they did not experience any barriers in teaching climate change and sustainability in their practice. This was primarily the case in geography (16 responses), science (6 responses) but also in Modern Foreign Languages (2), Art and Design and Business (1 response each).

Table 3. Barriers identified in relation to climate change and sustainability focused curriculum making.

Theme (number of references in responses)	Indicative quotes
1. Low emphasis and/or visibility of CCSE in National Curriculum and exam specifications. (151)	National Curriculum is too narrow and doesn't provide sufficient flexibility to provide meaningful climate education opportunities. Too much bureaucracy = too little time to be ambitious in developing effective climate education activities. Ofsted concerns restrict flexibility in teaching. (Business teacher) Very little guidance from government and a lack of time to dedicate to it due to curriculum pressures. (English, teacher) Pressure of time on the curriculum. Assessment requirements and Ofsted. (Geography teacher) The curriculum is very content heavy and the new DfE strategy is not making any room for manoeuvre. (Science teacher)
2. CCSE is not a leading school/education priority as reflected by:	
a. Staff in are not interested in/lack of understanding of CCSE and view CCSE as not relevant to their subject. (15)	Lack of care or concern about its importance or relevance from other members of staff (Art & Design teacher) Some staff are short sighted in their view, or take the easy way out and say things for example like "climate change doesn't really work in PE" (Citizenship teacher) Unsupportive colleagues. Limited support/awareness in school as a whole. (Geography teahcer)
b. School leaders do not value and/or prioritise CCSE, including do not making CCSE practices visible in the school community. (20)	All the other 'priorities' of school. Literally people cannot see beyond the year ahead, let alone the future young people face. I have found my voice and use it wisely to influence the Senior Leadership Team but truthfully, so many people are disconnected from the state of the earth that it is very lonely work and people don't really care. (Art & Design teacher) The Senior Leadership Team (SLT). The pupils want change (e.g. to stop plastic bottles being sold) but the SLT haven't supported their suggestions in the past. We have a new Headteacher so I'm optimistic things might change! (Science teacher)
c. Students and their parents do not value and/or priorities CCSE. (29)	I don't think the bulk students are as interested as statistics suggest, though obviously lots are. (Design & Technology teacher) Students think that climate change is a debate, or conspiracy theory, or it doesn't matter. (English teacher) Pupils saying it doesn't exist or issues from parents. (Geography teacher)
3. Insufficient time and/or resource for curriculum making activity related to CCSE within and across subjects. (62)	I run extra-curricular activities and initiatives at school but am given no extra time on my timetable or increase in salary to do so. (Art & Design teacher) Time – researching and resourcing is difficult because of workload pressures. Accountability – a focus on exam results across the educational system means there's less emphasis than there ought to be on discussing and debating climate change issues. (Geography teacher) Not much available without paying for it, or it comes from BP/Shell which are just trying to cover up all the negative impact they have had on the climate! (Science teacher)
4. Lack of teacher professional knowledge and/or confidence to undertake curriculum making in relation to CCSE. (41)	Limiting climate anxiety in students. Trying not to be too passionate/ showing a degree of impartiality over choices. (Citizenship teacher) Concern for how to deliver some of the more 'alarming' facts to students so they don't feel overwhelmed / helpless. (English teacher) Distilling scientific papers into resources which younger secondary students can access, in order to keep pace with the constantly changing science in this area. (Geography teacher)
5. No barriers experienced in relation to CCSE. (26)	As a geography teacher I have not experienced any barriers within the classroom. (Geography teacher) Zero barriers as it is so relevant. (Science teacher)

Discussion

In recent times, scholars working across national and international contexts have explored CCSE policy at macro (national or system) and supra (international) levels and consider the relationships and mobilities between these different sites (McKenzie, Bieler, and McNeil 2015; McKenzie and

Aikens 2021; McKenzie 2021). In this case study of teachers' practices from England, examples of macro sites of curriculum making included the role of examination specifications as barriers and opportunities for CCSE and the incorporation of system-level frameworks (e.g. the Sustainable Development Goals), largely in response to the construction of examination specifications. This operationalisation of global frameworks within macro sites of examination systems was visible in very few responses (four in total) and was the only example of supra sites of activity visible in teachers' responses. This is perhaps unsurprising, as the survey questions analysed as part of this research invited respondents to reflect on their individual practices in relation to CCSE in terms of the support they have received and the barriers and challenges they have encountered. The framing of these questions may have encouraged respondents to reflect on these issues in the context of nano and micro sites and the ways in which the meso and macro governed these, rather than looking across to influences operating at supra sites. An alternative conclusion could be that the teachers working in England who responded to this survey did not share experiences which made the influence of CCSE activity from supra sites prominent, and further research situated in England which builds on previous research in other national and global contexts (for example, Bieler et al. 2017; McKenzie and Aikens 2021) might helpfully explore why this is the case.

The responses provided through this survey underlined that micro and nano sites of curriculum making (e.g. lesson planning, resource selection) were the most frequently identified across a range of subjects in relation to school-based climate change and sustainability education in England. Teachers' curriculum making practices were enabled by different factors, including the accessibility of freely available and high-quality resources focused on climate change and sustainability issues (Table 2). This is aligned with the previous findings of Howard-Jones et al. (2021) where teachers' confidence in teaching climate change education correlated with reported resource availability. The frequent use of online resources and mass media sources (e.g. newspapers, television, magazines) to support teaching climate change is also consistent with research undertaken by Puttick and Talks (2022). They underlined that the quality of climate change education is, 'intrinsically linked to the quality of information about climate change that teachers use in their curriculum making' (Puttick and Talks 2022, 379). The research reviewed by Puttick and Talks (2022) predominantly focused on teachers of geography, science and earth science and in countries other than England, including Cyprus, Denmark, Finland, Greece, Singapore, Turkey and the USA. The current study expands our understanding of the use and appetite for no-cost, high-quality and easily accessible resources when teaching climate change and sustainability across responses from teachers across a diverse range of school subjects (including art & design, design & technology, English, geography, history, mathematics, religious education and science), in both primary and secondary school contexts in England.

Another key enabler visible in the responses to this current study included teachers' personal interest and beliefs in the importance of climate change, and prior experiences (including higher education and engaging in climate change activism) which support them to enact those beliefs in their curriculum making practices. The importance of teachers' ideas and values has been previously shown to shape teachers' curriculum making practices in the broad context of CCSE, including geography and science teachers working in England (Rushton et al. 2025b) and the USA (Bonner, Diehl, and Trachtman 2020), and the practices of teacher educators; for example, see insights from research in Jamacia which focuses on care in the context of Education for Sustainable Development (Hordatt Gentles 2023). The current study underlines that teachers' beliefs and values are key enablers for CCSE for primary and secondary school teachers of a range subjects and career stages. Relatedly, across analysis of both the enablers and barriers to curriculum making focused on CCSE, school leadership was recognised by respondents as an important theme (Tables 2 and 3). This included the extent to which school leaders understood climate change and sustainability issues to be a whole-school priority, including incorporating climate change and sustainability across the curriculum and responding through wider school practices. The importance of school leadership is consistent with previous research in England which has

underlined the central role of school leaders in enabling teacher agency (Rushton et al. 2025b) and whole-school approaches (Rushton, Dunlop, and Atkinson 2025a) in the context of climate change education. Relatedly, Howard-Jones et al. (2021) found a small correlation between teachers feeling comfortable teaching climate change education and levels of 'school encouragement', and in the American context, Ennes et al. (2021) also found that perceptions of low support for climate change education was a barrier for teachers' engagement with in-service professional development.

Responses to this survey from England underline that school-based climate change and sustainability education curriculum making is currently focused on micro sites of activity enacted by individual teachers who are prompted by their own beliefs and values, motivated by the passion of their students and supported by school leadership. At the same time, the National Curriculum and exam specifications are experienced by most respondents as a central barrier to curriculum making related to climate change and sustainability education due to being 'narrow', 'inflexible' and 'content-heavy'. These responses are aligned with both previous research (including Dunlop et al. 2022; Dunlop and Rushton 2022), as well as the emerging findings from workshops held as part of the review of Curriculum and Assessment led by Professor Francis (Department for Education (DfE) 2024). Through these workshops, teachers have underlined that assessment 'dictates' curriculum making in the context of a curriculum which is 'overprescribed and overstuffed' (Booth 2024). Whilst the review has suggested that the scope of change will be 'evolution' rather than 'revolution' (Department for Education (DfE) 2024, 4), what change might be required at macro sites of curriculum making activity to enhance what climate change and sustainability education which currently exists and remove constraints and barriers? Drawing on the findings from this research, we highlight a timely opportunity for policy makers to reconsider the curriculum 'orientation' which underpins the National Curriculum in England (Deng 2020). Whilst orientations of academic rationalism and social efficiency are evident, orientations of social reconstructionism, which have faith in education as a force for equitable and justice-oriented change are marginalised. This is in stark contrast to beliefs and ideals of teachers and young people in England (Howard-Jones et al. 2021; Dunlop and Rushton 2022), including in the responses of teachers analysed as part of this current study who recognised the 'serious' and 'urgent' need to respond to environmental and climate priorities through education.

At a time of policy review and reform, this current research underlines the disconnect between the current orientation of the school-curriculum in England and the curriculum making practices of teachers in relation to climate change and sustainability education. The highly marginal place of meso-level support reported in the responses to the survey (approximately 10% of responses) is also noteworthy and underlines the need for expanded and equitable access to meso-level support which enables teachers and school leaders to integrate CCSE across the curriculum. This meso-level support should include access to teacher networks to support collaborative sense making, expertise and guidance from agencies and researchers, and funding. We argue for researchers to continue to explore the relative absence of meso-level actors in the context of CCSE, with an aim to better understand the causes of this marginalisation and, therefore, the opportunities to address this in English school system and potentially beyond. Finally, we argue for a recalibration of a curriculum orientation at the macro level such that curriculum retains the disciplinary and subject knowledge, concepts and methods of inquiry necessary for climate change and sustainability education (Eilam 2022), whilst also enabling children and young people to develop the capacities, dispositions and values vital for living with uncertain and climate altered futures (Lotz-Sisitka 2010; Stevenson, Nicholls, and Whitehouse 2017).

Acknowledgements

We acknowledge the contribution of colleagues based at the UCL Centre for Climate Change and Sustainability Education in the creation and implementation of the survey, including Kate Greer, Alison Kitson, Richard Sheldrake, Eleanore Hargreaves and Justin Dillon. We also thank every teacher who shared their insights *via* the survey.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This project was supported by Funding from UCL Institute of Education's Strategic Investment Board.

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