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Reflecting on Climate Change Education Priorities in Secondary Schools in England: Moving beyond *Learning about* Climate Change to the Emotions of *Living with* Climate Change

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Abstract: Schools in England remain a valued and important site of climate change education for secondary school pupils (aged 11–18 years). Drawing on focus group data ($n = 85$) from young people based in eight schools in England, we explored the language pupils used about climate change. We found that young people's responses to climate change were predominantly focused on content knowledge about climate change, including the concept of global warming and a range of negative impacts, such as biodiversity and habitat loss and extreme and unpredictable weather. In addition, the young people expressed emotions in relation to climate change that were primarily negative and were focused on fear of the future and fear of frustrated youth action. We highlight that school-based climate change education requires support and resources from policy-makers so that young people do not solely learn about climate change, but rather, they are able to live with the emotions of a future shaped by the impacts of climate change. We highlight the need for teacher professional development which enables them to respond to the emotions young people experience in the context of climate change education.

Keywords: climate change education; secondary schools; emotions; content knowledge



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1. Introduction

In recent years, young people across the globe have continued to advocate for greater access to education that effectively prepares them to live with the complexities and uncertainties of human-induced climate change, including climate and ecological emergencies [1–5]. Now and in the future, young people will continue to experience negative emotions such as fear, sadness and anxiety related to the impacts of climate change [6]. In England, schools remain valued as a key space for climate change education for young people by teachers, teacher educators and parents [7–9]. At the same time, education remains diminished [10] and on the margins [11] of overarching climate change policy-making despite recent statements made by international education and environment ministers that recognised the importance of education in ensuring a ‘climate positive future’ [12] and commitments by the Department of Education in England to ‘put climate change at the heart of education’ [13]. Given these tensions between the ideas and expectations of climate change education in policy and practice in schools in England, this research sought to explore the language that young people use when they think about climate change. Specifically, we wished to identify the words and concepts young people use in relation to climate change, as well as what this use of language could tell us about how young people understand and experience climate change. Finally, we wanted to identify how this understanding can continue to inform school-based climate change education in England and beyond. Ahead of setting out our research design, we first consider the broader context of climate change education in secondary schools (for students aged 11–18 years) in England.

2. Literature Review

Climate Change Education in Schools in England

In the United Kingdom, education is a devolved responsibility, with England, Northern Ireland, Scotland and Wales setting their own education policies, including organising primary and secondary phases of education. Within this context, each jurisdiction places a different emphasis on, and framing of, climate change education [8]. Here, we focus on secondary education (students aged 11–18 years) in England in part because youth movements in the UK have focused attention on the need for more effective climate change education in the secondary phase [1]. Climate change and environmental education has a low profile in education policy-making in England, for example, it is not featured in education inspection frameworks [14] or in recent policy-making related to teacher education, including the Early Career Framework (ECF) [15] and the Initial Teacher Training Core Content Framework (CCF) [16]. In terms of the secondary national curriculum, climate change and the environment are featured in subjects such as design and technology, geography and science, but with an emphasis on subject knowledge-learning *about* the environment rather than *for* the environment [17,18]. This emphasis on learning about the science of climate change contrasts with the views of many UK-based teachers, teacher educators and young people who support climate change education that is action-based and includes issues of global social justice, enabling young people to learn for the environment [7,8,19]. Across the environmental and climate change education literature, researchers have recognised that knowledge gain alone does not represent ‘effective’ or ‘transformative’ climate change education [20]. However, this approach continues to persist in practice [21] and policy [11]. What constitutes ‘effective’ or ‘transformative’ climate change education continues to be explored in the research literature. Rousell and Cutter-Mackenzie-Knowles [20] (p.191) argued that effective climate change education should ‘directly involve young people in responding to the scientific, social, ethical and political complexities of climate change’. Transformative education is a frequently used term for articulating an approach to education that goes beyond the transmission of knowledge that learners can remember [22] and fundamentally changes learners’ attitudes, dispositions and behaviours, frequently drawing on holistic, embodied and aesthetic experiences [23,24]. As Walshe and Sund [25] outlined, transformative education, as understood by Mezirow [26], involves a shift in consciousness that can involve deep learning and changes in behaviour, both of which are needed in the context of climate change education. Research has consistently highlighted the need for climate change education to move beyond a focus on the lack of knowledge people may have and support people in engaging with the emotional and affective aspects of climate change education [27,28]. Focusing on knowledge gain alone in climate change education can be counterproductive, leading to increased climate anxiety and feelings of helplessness and hopelessness in young people [29–31], which can lead to climate apathy [32].

Following the announcement of a draft strategy for sustainability and climate change for education and children’s services systems in England at COP26 in Glasgow, Scotland, the Department for Education published a final version in April 2022 [13,33]. Whilst increased attention on the role of education in responding to climate change is to be welcomed, in their analysis of the strategy, Dunlop and Rushton [18] highlighted a range of issues: Firstly, the government’s proposals for climate change and sustainability education have economic concerns in the foreground; secondly, there is continued over-reliance on increasing and developing young people’s science-focused knowledge and skills; and thirdly, educational priorities are framed and driven by the ‘net zero’ policy agenda. Furthermore, Dunlop and Rushton [18] highlighted an absence of attention on the political dimensions of climate change within the strategy, which is inconsistent with the idea that effective climate change education should include social, ethical and political complexities [20]. This is problematic because, whilst some teachers, teacher educators and young people advocate for more opportunities to engage with the social and political dimensions of climate change and sustainability [8,18,19], other teachers in England have reported concerns about teach-

ing climate change and sustainability as they can be viewed as controversial topics [34]. Concomitantly, increasing numbers of young people in England are engaged in climate change and environmental activism, participating in activities related to climate strikes and protests that have received increasing attention across the globe [35,36]. Recent research has found that young people are more likely to strike than their peers when they agree that climate change is a serious issue and that living in harmony with nature is important for their wellbeing [36]. However, Dunlop et al. [37] noted that in England, young people engaged in environmental activism frequently see protest as a less desirable option and would prefer that their engagement in ‘formal’ methods of political participation (such as voting) was effective, with their views valued and acted upon by those in leadership roles. This research has provided a further opportunity to consider how secondary school pupils from a diverse range of geographical and socio-economic contexts in England experience and understand climate change.

3. Research Design

The data collection methods, participants and ethical considerations are described below, followed by an outline of the analysis process.

3.1. Data Collection

The data reported in this study are focused on the responses that pupils in key stages three, four and five (aged 11–18 years) provided during the focus groups. These focus groups were completed as part of a larger study exploring whole-school environmental and sustainability education across eight schools, which was undertaken during May–July 2022 (Table 1). The schools were identified from the authors’ network of schools and selected to provide a range of engagement with environmental and sustainability education. Author one completed one school visit, authors two and three completed one joint school visit and the remaining six school visits and associated focus groups were completed by author two. The eight schools were located across England in rural, urban, suburban and coastal contexts, and they included schools with high levels of socio-economic deprivation, as indicated by high Income Deprivation Affecting Children Indices scores (IDACI) and high levels of pupils eligible for free school meals (Table 1).

Table 1. Participating schools and pupil focus groups.

School Name	School Overview	Key Stage of Focus Group Participants	Number of Participants
School A	Non-selective academy located in the rural east of England; pupil roll of ~2000, aged 11–18 years, of mixed gender; lower than national average free school meal population and IDACI score of 1	3	5
		4	5
School B	Non-selective community school in rural northeast England; pupil roll of ~350, aged 9–13 years, of mixed gender; lower than national average free school meal population and IDACI score of 1	3	4
School C	Non-selective academy located in the rural southwest of England; pupil roll of ~1400, aged 11–18 years, of mixed gender; lower than national average free school meal population and IDACI score of 1	3	8
		5	4

Table 1. Cont.

School Name	School Overview	Key Stage of Focus Group Participants	Number of Participants
School D	Non-selective academy located in suburban northeast England; pupil roll of ~2000, aged 11–18 years, of mixed gender; lower than national average free school meal population and IDACI score of 1	3	8
School E	Non-selective academy located in the coastal east midlands of England; pupil roll of ~1000, aged 11–18, of mixed gender; higher than national average free school meal population and IDACI score of 5	3	16
		4	5
School F	Non-selective academy located in rural southeast England; pupil roll of ~1700, aged 11–18 years, of mixed gender; lower than national average free school meal population and IDACI score of 1	3	4
		4 and 5	3 (1 and 2)
School G	Non-selective academy located in the rural west midlands of England; pupil roll of ~1600, aged 11–18, of mixed gender; lower than national average free school meal population and IDACI score of 3	3	7
		4	2
School H	Non-selective academy located in central London; pupil roll of ~1110, aged 11–18 years, of mixed gender; higher than national average free school meal population and IDACI score of 5	3	8
		4 and 5	6 (3 and 3)
Total: 8 schools		14 focus groups	85 participants

During the on-site visits to each of the eight schools, a total of 14 focus groups took place that involved 85 pupils aged 11–18 years (Table 1). During the focus groups, the pupils were each given a piece of paper with the words ‘climate change’ printed in a central circle and asked to write their individual responses onto the paper in response to the prompt, ‘what comes to mind when you hear the words climate change?’. Although the research team asked the schools to invite pupils with a range of engagement with environmental and sustainability related activities, we frequently found that the pupils who participated were often highly engaged with the environment, for example, being part of a school eco-club or committee.

Institutional ethical approval was provided ahead of all visits, and as part of this, each school headteacher provided permission for the research visit to take place, and parental consent was also obtained by the school ahead of the focus groups. At the outset of the focus group, the researchers explained that they were visiting the school to learn about the school and that they were not there to inspect or judge any teachers, pupils or other aspects of the school community. The pupils were reminded that they did not have to participate in the activity (the focus group), this was not an exam or test and they could share ideas and thinking as suited them best.

3.2. Data Analysis

Data analysis for this paper centred on the written responses that the focus group participants provided to the written prompt ‘what comes to mind when you hear the words climate change?’. A total of 85 written documents, with a total of 1054 individual responses, were obtained. A conventional approach to qualitative content analysis [38] was used as it was appropriate for a large dataset, and all authors were involved in the analysis. In the first

phase of analysis, author two transcribed each individual response into a spreadsheet and identified initial clusters and groupings, and this was shared with the wider authorial team. These initial groupings were reviewed and discussed by the authorial team to identify meaningful patterns across the dataset, drawing on both the wider group knowledge of school-based climate change education and the context of the focus groups. During these discussions, the authors focused on two central areas: the content knowledge of climate change (Table 2), and emotions and climate change (Table 3). In the final phase of analysis, author one reviewed the entire dataset, grouping the data into sub-themes across these two dominant themes.

Table 2. Participants' responses focused on the content knowledge of climate change.

Content Knowledge (928)	Responses
Animals/wildlife (35)	Animals/wildlife (6); cows (2); insects (2); plants (11); polar bears (10); species (2); other (2)
Biodiversity/habitat loss (121)	Animals dying and suffering (16); deforestation (39); extinction (32); loss of biodiversity (5); loss of ecosystems (3); loss of habitats (23); need to plant trees (3)
Carbon (22)	Carbon capture (1); carbon cycle (3); carbon footprint (13); carbon-neutral (2); carbon sink/store (3)
Earth's features/systems (121)	Atmosphere (7); climate (7); desert (2); Earth/the world (11); ecosystems (1); geography (2); habitats (5); natural hazards/disasters (12); oceans (4); ozone layer (13); polar regions (15); rainforests (3); seasons (3); sun (3); other (14); weather (10)
Economics (26)	Economics (13); charity funding (3); other (13)
Energy (60)	Fossil fuels (34); reduce the use of fossil fuels (3); renewable energy (15); radiation (2); other (6)
	Extreme/unpredictable weather (36)
Flooding/sea level rise (56)	Flooding (17); flooding and sea level rise (4); sea level rise (35)
Food (14)	Farming (3); food waste (2); palm oil (3); vegan/vegetarian diet (2); other (4)
Forest fires (17)	Forest fires/burning (13); wildfires (4)
Global warming (181)	Global warming (85); greenhouse effect (14); greenhouse gases (68); human-caused climate change (9); human vs. natural causes of climate change (5)
Leading figures (23)	David Attenborough (5); Donald Trump (2); Greta Thunberg (16)
Climate change in the media (7)	Film (3); news media (4)
	Melting ice caps (40)
Politics (51)	General (11) and specific political bodies/groups: G7 (1); WHO (1); UN (1) Global summits and agreements in general (5); COP26 (5); Kyoto (1); net-zero by 2050 (3); Paris (6) Protests, marches and strikes (17)
Pollution (64)	Air pollution (6); CFCs (2); litter (7); in general (25); plastic pollution (16); rubbish in the oceans (3); water pollution (2); waste (3)
	Reduce, reuse and recycle (15)
Social impacts (7)	Overpopulation (4); migration (3)
	Sustainability (10)
Transport (22)	Air travel (3); bikes (1); buses (3); cars (7); electric cars (4); in general (4)

Table 3. Participants’ responses focused on positive and negative emotions and climate change.

Emotions (126)	Indicative Responses
Negative Emotions (114)	
Anger and frustration (5)	
• Anger (3)	Anger; hatred; I feel angry
• Frustration (2)	Annoyed that we have let the planet get into this situation
Apathy (4)	It is like homework because . . . I’ll do something about it this time and then that time passes and you’re like, oh well, I will do it at this time instead and it just continues; most don’t care; lack of action by some
Fear (74)	
• Fear of the future (55)	Getting to a point of no return; need to take action; biggest problem affecting our future; emergency; crisis; terrible for our planet; end of the world
• Fear of frustrated youth action (11)	Ignorance of the powerful; ignoring us; older generation failure; carelessness of some people; struggles children of tomorrow will face; young voices fighting to be heard
• Anxiety (5)	Climate anxiety; worry
• Fear and uncertainty (3)	Confusing; fear; what’s that?
Grief & sadness (21)	
• Grief (5)	Dying; death; world dying
• Sadness (16)	Sadness; sorrow; suffering, regret
Guilt (10)	Affects those less fortunate although it is not them causing it; all our fault
Positive emotions (12)	
Care for the planet (5)	Helping the planet; being eco-friendly is caring
Hope (7)	Hope; building hope with nature reserves; change we can make if we try

4. Findings

4.1. Climate Change and Young Peoples’ Content Knowledge

The vast majority (88%) of the pupils’ 1054 responses to the activity were focused on content knowledge related to climate change (Table 2). Of the 928 responses, 19.5% described global warming as a human cause of climate change, including the use of terms such as ‘the greenhouse effect’. The negative impacts of climate change were also strongly represented in the data, including biodiversity and habitat loss (13%); melting icecaps (4.3%); flooding and sea-level rise (6.4%); extreme and unpredictable weather (3.9%); and forest fires (1.8%).

4.2. Climate Change and Young Peoples’ Content Knowledge

In addition to the content knowledge related to climate change, a significant minority of the focus group responses referenced emotions and climate change (12%) (Table 3). The emotions expressed in pupils’ written responses were predominantly negative—more than 90% of all references to emotions were negative. Such negative emotions focused on ideas of fear (59%), grief and sadness (17%) and anger and frustration (<4%). The ideas of fear coalesced around a central idea of fear of the future that included responses such as ‘getting to the point of no return’ and ‘the biggest problem affecting our future’ and concepts such as ‘emergency’, ‘crisis’ and ‘the end of the world’. The fears also included a fear of frustrated youth action, with expressions of young people being ignored by those

who were older, careless, and more powerful than themselves and future young people ‘struggling’ and ‘fighting to be heard’. The negative emotions also included ideas of grief and sadness, with expressions of grief in relation to the world dying and sketches of the world crossed out and animals crying. Anger and frustration were also featured, although these references were in the minority of expressions of emotion (<4% of all references to emotions). Across the expressions of negative emotions, there was an observed connection between sadness and grief for the loss of animals and plants that was consistent with the young people’s content knowledge, which was dominated by an awareness of the impacts of climate change on biodiversity and habitat loss. Positive emotions were represented in less than 10% of all references to emotions, and they were limited to expressions of hope, including ‘change we can make if we try’ and ‘building hope with nature reserves’, with ideas of ‘care’ for the planet. To a lesser extent, the positive emotions were also connected with biodiversity through ideas of hope rooted in nature reserves. We also observed a connection between fear of the future of life on Earth and the detailed content knowledge of the various negative impacts of climate change which the young people had, including extreme and unpredictable weather, melting icecaps, flooding and rising sea-levels.

4.3. Reflections on Research Data Limitations

The data reported in this article is centred on a simple opening activity from the focus groups with secondary school pupils in the eight schools. It should also be noted that a majority of the participants were aged 11–14 years (60 from a total of 85), and as such, the findings predominantly reflect the views of young people in this age range. The focus group activity represented an accessible way for the researchers to initiate focus group discussions and build connections with the young people, who they had not previously met, that was consistent with the opportunities and affordances of classroom-based data collection. However, there was the potential that such an exercise, which asked the young people to respond individually (without discussion at that point in the focus groups) and in writing, could engender a sense that the researchers expected responses which shared what the young people knew about climate change—‘the facts’ of climate change. It is also important to note that whilst the participants were encouraged to respond in a way that best suited them, including text and/or drawings, the researchers were not aware of any participants’ additional learning needs, and so these needs were not explicitly considered in the design of the initial activity. Therefore, the data derived from this exercise should be understood as providing an initial response that the young people gave to the prompt ‘what comes to mind when you hear the words climate change?’ rather than a reflective response developed from conversations between the researchers and the students’ peers. Whilst the former provided a snapshot of each individual’s thinking, the latter approach would have provided a richer and more nuanced insight into the ideas and thinking of the young people and how they change and can be shaped over time and in different contexts. As previously discussed, although the researchers encouraged the schools to invite pupils with a range of experiences and engagement in relation to the environment to participate, the sense researchers developed through the fieldwork was that the participants were those young people who were active in environmental-related and sustainability related issues. Therefore, the data reported should be understood as representing young people with more than average engagement and interest in climate change.

5. Discussion

The responses the young people provided in this activity highlighted their emphasis on content knowledge about climate change, with a focus on the impacts of climate change, as well as some knowledge about climate mitigation strategies (alternative energy, carbon capture, planting trees and international agreements). In these ways, the young people’s responses were consistent with the policy emphasis on learning the science of climate change and sustainability, which persists in England [10,11,18]. In addition to the content knowledge about climate change, the young people expressed negative emotions,

particularly, ideas of fear of the future and fear of frustrated youth action in the face of an uncertain and dangerous future. We argue that these negative emotions appeared to be entirely consistent with an approach to climate change education that provides young people with knowledge about the spatially and temporally complex impacts of climate change but without the implementation of emotionally responsive pedagogies. Expressions of fear could be seen as logical responses to the sense that the climate change education that young people experience is not preparing them sufficiently for the challenges of present and future climate and ecological crises. As Dunlop and Rushton [39] previously argued, emotionally responsive pedagogies that identify responsibilities develop coping potential and improve future expectations are needed in the context of climate change education. Climate change education that draws on such pedagogies encompasses both the causes and consequences of environmental damage whilst also developing teachers' and students' capabilities in acting for the environment, which ultimately transforms their emotional appraisals. This is consistent with ideas of 'hope' in the context of climate change and sustainability education [29–31,40], including the concept of 'constructive hope' which Finnegan [41] (p.17) described as 'a stance towards the future in which we believe a positive future is possible, but not a given, and each of us are called to shape that future'. Within the data, there is a liminal, tentative sense of 'constructive hope,' for example, when a young person wrote 'change we can make if we try'. Finnegan [41] underlined the need to connect constructive hope with opportunities for young people to develop action competence in the context of climate change education.

Environmental education literature provides rich resources for considering pedagogies that develop action competencies, e.g., [42–45], and the wider science education literature underlines the importance of providing young people with authentic or 'real-life' experiences in science and research [46,47]. As the Department for Education in England implements the new strategy for sustainability and climate change [33], with a framing of school grounds across England as a National Education Nature Park, there is an opportunity to approach such an initiative as a way for young people to develop action competencies in the domains of biodiversity, habitat observation and conservation. If such an approach to building young people's action competencies was taken through the National Education Nature Park, there is extensive literature in the field of conservation-focused citizen science that demonstrates the ways in which participation can engender pro-environmental behaviours, including such behaviours in the school context [48,49]. The data from this current study suggests that there is a significant opportunity to support young people's action competencies through the National Education Nature Park. For example, if young people and teachers are supported in developing nature observation and monitoring projects that inform future conservation priorities and action in their local area, this could provide a meaningful pathway to develop action competencies.

This case study of the language young people use to describe climate change underlines priorities for climate change education that move beyond learning about climate change to include emotionally responsive pedagogies that enable young people to live with climate change now and in the future. This is consistent with wider research that has highlighted the emotional support that teachers need to provide in the context of environmental and climate change education [39,50–52]. Whilst there is a wealth of evidence as to what constitutes effective climate change education, there remains a climate change education policy gap in England. There are clear opportunities for further policy-led support and resources in relation to teacher education, including initial teacher education (ITE) and continuous professional development (CPD) [18]. The government's current strategy [33] points to existing teacher education policy frameworks such as the CCF [16] and the ECF [15] as providing the impetus for teacher professional development in relation to climate change and sustainability education, but this arguably remains implicit [18]. Consistent with previous research, we argue that effective teacher professional development focused on climate change and sustainability education should enable teachers to support learning that encompasses a range of pedagogical approaches, including those

which are participatory, interdisciplinary, creative and affect-driven [18,20,39]. For example, Verlie [53] (p.104) highlighted the value of stories in climate change education that provide a way for people to explore the complexities of climate change as follows: ‘We need stories that enable us to identify as part of climate change, and that enable us to stay with the ethical and interpersonal challenges of living with it’. Therefore, we underline the need for teacher professional development to provide opportunities for teachers to leverage their subject-specific knowledge and expertise whilst also viewing climate change and sustainability education as benefiting from interdisciplinary approaches that respond to spatial, temporal, ethical and political complexities. Teachers require support so that climate change education can encompass emotions that move beyond acknowledging fear, anger, sadness and guilt and instead imbue this education with constructive hope for the future.

6. Conclusions

Through this case study of young people’s initial responses to climate change, we have identified a focus on climate change content knowledge such as global warming and associated negative impacts which include biodiversity and habitat loss, melting ice caps, rising sea levels and extreme and unpredictable weather events. The young people expressed emotions in relation to climate change, which were predominantly negative emotions such as fear of the future and fear of frustrated youth action. Some positive emotions were expressed by the young people, including hope for the future and care for the planet through action. Consistent with a long-standing body of environmental education research, we underline the need for climate change education to move beyond learning about the science of climate change and instead include pedagogies that encompass the emotions of living with climate change, such as enabling constructive hope for the future through action. We argue that a key action area for policy-makers is to continue to provide the imperative and financial resources for schools to implement teacher professional development that enables all young people to access effective and transformative climate change education. Such professional development should empower teachers to draw on their age-phase and subject expertise whilst also supporting them to engage with climate change as a challenge that has political, economic, social and ethical complexities, as well as scientific realities. In England, the recent Department for Education strategy (DfE, 2022) underlined the importance of schools and the work of teachers and school leaders in the context of climate change and sustainability. The ongoing challenge is to provide the support, resources and frameworks meaningfully and consistently for schools to realise this aspect of their work, amongst the many other priorities they have. The young people in this study underlined both the understanding they had of the impacts of failing to urgently respond to the climate emergency and the fear this has created in them for their futures. What is perhaps remarkable is that they also articulated that an alternative vision is possible, and some continued to have hope that this could be achieved if they, and those who hold positions of authority, act. Therefore, we underline the continued need to urgently ensure that all young people have access to effective and transformative climate change education as a fundamental part of their formal education.

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and the British Educational Research Association’s ethical guidelines. The study received institutional ethical approval from the Research Ethics Committee, Institute of Education, University College London prior to the commencement of the research (25 May 2022).

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